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Request for Reconsideration after Final Action

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MARK SECTION (no change)	
ARGUMENT(S)	

In an office action dated July 1, 2013, the examining attorney issued a final refusal to register Applicant's mark iCT for medical imaging apparatus on Section 2(e)(1) grounds and made a final requirement that Applicant provide certain information concerning the goods identified in the subject application.

With respect to the final requirement for certain information concerning the goods identified in the subject application, medical imaging apparatus, submitted herewith are five pieces of promotional literature for the identified goods. *(See Attachment A, Declaration of Mark E. Olszewski, PhD, ¶. 3, Exhibits 1 through 5.)* Applicant submits that these five pieces of promotional literature provide all of the information requested by the examining attorney with the possible exception of information concerning the channels of trade for Applicant's goods. However, information concerning Applicant's channels of trade for the goods identified in the subject application is provided in the body of the Olszewski Declaration. *(Id., ¶ 5.)* Accordingly, Applicant believes that it has fully complied with the examining attorney's final requirement that Applicant provide certain information concerning the goods in question.

With respect to the final refusal under Section 2(e)(1), Applicant respectfully submits that the mark iCT is suggestive rather than merely descriptive of medical imaging apparatus, that in the alternative the mark has become distinctive of Applicant's goods in commerce, and that the mark is thus registrable on the Principal Register either as an inherently distinctive mark or as a pursuant to Section 2(f) as a mark that has acquired distinctiveness. Some of the facts in support of Applicant's position are set forth the Olszewski Declaration. Other facts or matters to be considered in support of Applicant's position are set forth below and/or attached hereto as further exhibits.

The Term iCT Is Not "Merely Descriptive" Of Applicant's Goods

As the examining attorney correctly notes, an abbreviation, initialism or acronym term is merely descriptive of goods or services within the meaning of Section 2(e)(1) when it is "generally understood" as "substantially synonymous" with the descriptive words it represents. Thus, a Section 2(e)(1) refusal cannot be made simply because the applied-for mark iCT can be construed as an abbreviation, initialism or acronym for specific wording ("intra-operative computed tomography" or

"intra-operative CT") that is merely descriptive of the identified goods or services. It is also necessary that a relevant consumer when viewing Applicant's mark must recognize the term iCT as the equivalent of the phrase "intra-operative computed tomography" before a Section 2(e)(1) refusal can be properly made. TMEP Section 1209.03(h). If the term in question is not directly and immediately understood by relevant purchasers as "substantially synonymous" with the merely descriptive wording it represents, a Section 2(e)(1) refusal is not warranted. *E.g., Barnoness Small Estates, Inc. v. Am. Wine Trade, Inc.*, 104 USPQ2d 1224, 1230-31 (TTAB 2012) (dismissing petition to cancel based on, among other things, a claim that the acronym in question was merely descriptive).

Despite the evidence relied on by the examining attorney, and in light of the evidence submitted herewith and discussed below, Applicant respectfully submits that its mark iCT is not "generally understood" by the relevant purchasers as "substantially synonymous" with the phrases "intra-operative computed tomography" or "intra-operative CT." Instead, the even the evidence relied on by the examining attorney demonstrates that the mark iCT is no more than suggestive of with respect to medical imaging apparatus and thus is inherently distinctive. As a result, the Section 2(e)(1) refusal should be withdrawn.

Applicant notes that review of a number of publicly available resources (including at least one resource, Wikipedia, on which the examining attorney himself has relied) regarding the meaning of abbreviations, initialisms and acronyms does not support a finding that the term iCT is substantially synonymous with the phrase "intra-operative computer tomography." For example, Wiktionary does not identify the initials iCT or ICT as referring to "intra-operative computed tomography" or "intra-operative CT" *(see Attachment B).* Similarly, the terms iCT or ICT are not identified as referring to intra-operative computed tomography" or "intra-operative CT" in either Wikipedia *(see Attachment C),* AcronymFinder.com *(see Attachment D)* or AcronymAttic.com. *(see Attachment E).* This is the case even though these resources do reflect a consensus concerning the meaning of a number of other abbreviations, initialisms or acronyms for other, closely related medical devices. *(See Attachment F relating to "CT" for "computed tomography" and Attachment G relating to "MRI" for "magnetic resonance imaging".)*

Applicant notes further that the promotional materials for the goods identified in the subject application do not draw any association, direct or indirect, between its mark iCT and the phrase "intra-operative computed tomography" or "intra-operative CT." *(See Attachment A, Olszewski Dec., Exhibits 1 through 5.)* In fact, the phrases "intra-operative computed tomography" or "intra-operative CT" do not appear in these promotional materials. *(Id.)* Nor does either appear in any of Applicant's advertisements for the goods identified in the subject application. *(Id., Composite Exhibit 6.)* Instead, Applicant's promotional materials and advertisements use the term iCT solely as a mark to identify and distinguish particular goods of Applicant for other goods of Applicant and the goods of others. *(Id.)* Thus, Applicant is not doing anything that would lead potential purchasers or anyone else in the medical imaging marketplace to draw an association between the term iCT and the phrase "intra-operative computed tomography" or the phrase "intra-operative CT."

Applicant acknowledges that the examining attorney was able locate a relatively small number references in the medical literature that use the term iCT or ICT to mean "intra-operative computed tomography" or "intra-operative CT." However, Applicant respectfully submits that the small number of references cited by the examining attorney do not support his finding that there is "widespread" use of the term iCT or ICT in that fashion. Applicant also respectfully submits that the cited medical literature references are not sufficient to establish that the term iCT is directly and immediately recognized by potential purchasers as "substantially synonymous" with the phrase "intra-operative

computed tomography" or "intra-operative CT" for at least two reasons.

First, Applicant notes that each piece of medical literature relied on by the examining attorney includes a specific definition of the term "iCT" as meaning "intra-operative computed tomography" or "intra-operative CT." Spelling out a specific definition of the term iCT would not be necessary if the term were in fact generally or readily understood by relevant portions of the public as being equivalent or substantially synonymous to the phrase "intra-operative computed tomography" or "intra-operative CT." The references cited by the examining attorney corroborate this on their face inasmuch as none of the cited references also spell out specific definitions for terms such as CT or MRI, which also appear in the references relied on by the examining attorney. Thus, in light of the recent holding in *Barnoness Small Estates, Inc.*, the medical literature evidence relied on by the examining attorney fails to establish that the term ICT is "instantly" or "directly" understood by relevant purchasers to refer to "intra-operative computed tomography" or "intra-operative CT." In *Barnoness Small Estates, Inc.*, the Board held that references that "spell out" the connection between an acronym and a merely descriptive phrase are actually evidence of suggestiveness, not mere descriptiveness. 104 USPQ2d at 1230-31 (dismissing petition to cancel registration of acronym based on mere descriptiveness grounds). Applicant accordingly relies on them as such in support of a finding that its mark is suggestive rather than merely descriptive.

Second, while the term CT is admittedly recognized by the medical imaging marketplace as meaning "computed tomography," the examining attorney has not submitted any evidence that the use of a lower case "i" is a recognized abbreviation in the medical imaging marketplace for the term "intra-operative." Again, the recent holding in *Barnoness Small Estates, Inc.*, controls the outcome here. In *Barnoness Small Estates, Inc.*, the Board held there must be evidence that each component element of an acronym is a recognized abbreviation for a merely descriptive term. 104 USPQ2d at 1230-31.

Accordingly, the evidence in the record is such that while some potential purchasers may be able to derive a connection between the term iCT and "intra-operative computed tomography" or "intra-operative CT," doing so requires some thought and is not an immediate and direct association. Applicant respectfully submits that its mark iCT is not merely descriptive and instead is suggestive, and as such, is registrable on the Principal Register as an inherently distinctive mark.

The Term iCT Has Acquired Distinctiveness

In the alternative, Applicant respectfully suggests that even if the term iCT is construed as merely descriptive, it has by virtue of Applicant's use as a source identifier acquired secondary meaning and is thus registrable on the Principal Register under Section 2(f). A variety of indicia can support a finding of acquired distinctiveness under Section 2(f) and a number of them apply to Applicant's mark iCT.

For example, TMEP Section 1212.05 provides that at least five years of substantially exclusive and continuous use can be *prima facie* evidence of acquired distinctiveness. Accordingly, Applicant claims acquired distinctiveness under Section 1212.05 inasmuch as it has been using the term iCT as a mark for medical imaging apparatus continuously since 2007, or approximately six years prior to Applicant's making of a claim of acquired distinctiveness. *(See Attachment A, Olszewski Dec.,.¶ 2, 7 and 14.)* Applicant's use of that term as a mark has also been substantially exclusive within the meaning of TMEP Section 1212.05(b). Applicant admittedly has been made aware by the examining attorney of a potentially inconsequential or infringing use (see the references cited by the examining attorney to use of the term iCT by Brainlab) and that situation is being evaluated with respect to what if any action Applicant should take. *(Id. ¶ 13.)* Applicant believes that its use of the term iCT is prior to Brainlab's and respectfully submits that Brainlab's junior use should not undermine Applicant's Section 2(f)

claim for the reasons set forth in TMEP Section 1212.05(b).

Applicant also relies on actual evidence of acquired distinctiveness, particularly its success in educating the public to recognize that the mark iCT is a source identifier for Applicant's medical imaging apparatus. TMEP Section 1212.06(b) provides that 'the ultimate test in determining whether a designation has acquired distinctiveness is applicant's success . . . in educating the public to associate the proposed mark with a single source." In measuring Applicant's success in educating the public to construe the term iCT as a source indicator, it is important to note that Applicant has from the start consistently used its mark iCT in a particular format that includes a representation of the initial letter "i" in a lower case format. *(Id., ¶ 12.)* The use of the small "i" is part of a larger branding strategy for Applicant's iCT brand products, and extends to other trade designations used to denote features of or accessories for iCT medical imaging apparatus, such as "iDose," "iPatient" and "iMRC." *(Id., ¶ 12 and Exhibits 1 through 5.)* It is also important to note that Applicant promotes all of its iCT brand products as being part of the " Philips iCT Family" of products. *(Id., ¶ 3 and Exhibits 3 and 4.)*

In light of that, Applicant submits herewith evidence of how the term iCT is actually recognized and used by end-users and others in the medical imaging apparatus market, not as a descriptor, but as a source identifier for Applicant's goods in the exact format used by Applicant. This evidence includes: (a) a press release announcing that two of Applicant's iCT brand products had won a prestigious industry award *(id. ¶ 6 and Exhibit 7)*; (b) product evaluation reports from industry rating organizations that identify Applicant's products and distinguish them from others by using iCT as a mark *(id. ¶ 8 - 10 and Exhibits 8, 9, 11, 12 and 13)*; comments from end-users of iCT brand products in which the products are specifically identified by reference to Applicant's mark *(id. ¶ 8, 9 and Exhibits 8, 9, 11, and 12).* There are no direct or even indirect connections or associations drawn in any of this evidence between the term iCT and the phrase "intra-operative computer tomography" or "intra-operative CT." Instead, the term iCT is consistently used as a source indicator for Applicant's products. Applicant respectfully submits that this is the most reliable and most persuasive evidence that the term iCT is not generally or readily understood merely as an initialism or acronym for "intra-operative computer tomography" or "intra-operative CT" and instead has acquired the secondary meaning that allows it to function and be registered as a mark for Applicant's medical imaging apparatus.

At least part of Applicant's success in educating the public to associate the term iCT as a source indicator can be attributed to the success of the iCT brand products in the marketplace, another traditional indicator of secondary meaning. In the first year after introduction, approximately 30 units were sold and since then sales have gone up significantly, with total sales to date in excess of 550 units. *(Id. ¶ 7.)* While in absolute terms that may not seem like a large number, the products in question are expensive, with an average price between $750,000 and $2,500,000. Thus, Applicant's product sales to date account for more than $800,000,00 in sales. *(Id. ¶ 7.)* Moreover, the volume of units sold is meaningfully large in light of the fact that Applicant promotes and sells its products to a relatively small market comprised of medium to large hospitals and academic medical centers. *(Id. ¶ 5.)* As for advertising expenditures, the sophistication, complexity and cost of the products are such that they are not of the type that are heavily advertised in mass media -- instead the products are marketed and sold in the traditional channels in which comparably complex and expensive medical devices are sold. *(Id.)*

Some of Applicant's success in the marketplace can be attributed to the fact that the first two iCT brand products won the prestigious Frost & Sullivan 2009 North American Product Innovation of the Year Award. As noted above, the announcement of that award featured use of the term iCT has a mark to distinguish Applicant's goods from the goods of others. Unsolicited media attention that calls out a product by its mark is also a traditional indicator of secondary meaning.

Finally, the fact that a potential infringer (Brainlab) has mimicked the exact format of Applicant's mark (iCT), is also supportive of Applicant's claim of acquired distinctiveness as copying is frequently relied on by the courts in making determinations that the copied mark has secondary meaning.

Conclusion

Applicant respectfully submits that the Section 2(e)(1) refusal be withdrawn inasmuch as the evidence in the record supports a finding that the mark iCT is suggestive rather than merely descriptive. Alternatively, the refusal should be withdrawn because the mark iCT has acquired secondary meaning.

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DESCRIPTION OF EVIDENCE FILE	Attachment A is a Declaration in support of Request for Reconsideration, with 15 exhibits; Attachments B through G are copies of materials from online sources that are offered in support of the Request for Reconsideration.
SIGNATURE SECTION	
RESPONSE SIGNATURE	/Raymond Rundelli/
SIGNATORY'S NAME	Raymond Rundelli
SIGNATORY'S POSITION	authorized U.S. attorney, Ohio bar member
SIGNATORY'S PHONE NUMBER	216.622.8854
DATE SIGNED	12/31/2013
AUTHORIZED SIGNATORY	YES
CONCURRENT APPEAL NOTICE FILED	YES
FILING INFORMATION SECTION	
SUBMIT DATE	Tue Dec 31 10:48:41 EST 2013
TEAS STAMP	USPTO/RFR-207.54.134.4-20131231104841288582-79108849-500443fac31af981c962dac30b58fcc7ecc1bfdc3f47df29fbecf1b0c4b550c945-N/A-N/A-20131231103053024047

PTO Form 1930 (Rev 9/2007)
OMB No. 0651-0050 (Exp. 05/31/2014)

Request for Reconsideration after Final Action

To the Commissioner for Trademarks:

Application serial no. **79108849** has been amended as follows:

ARGUMENT(S)
In response to the substantive refusal(s), please note the following:

In an office action dated July 1, 2013, the examining attorney issued a final refusal to register Applicant's mark iCT for medical imaging apparatus on Section 2(e)(1) grounds and made a final requirement that Applicant provide certain information concerning the goods identified in the subject application.

With respect to the final requirement for certain information concerning the goods identified in the subject application, medical imaging apparatus, submitted herewith are five pieces of promotional literature for the identified goods. *(See Attachment A, Declaration of Mark E. Olszewski, PhD, ¶. 3, Exhibits 1 through 5.)* Applicant submits that these five pieces of promotional literature provide all of the information requested by the examining attorney with the possible exception of information concerning the channels of trade for Applicant's goods. However, information concerning Applicant's channels of trade for the goods identified in the subject application is provided in the body of the Olszewski Declaration. *(Id., ¶ 5.)* Accordingly, Applicant believes that it has fully complied with the examining attorney's final requirement that Applicant provide certain information concerning the goods in question.

With respect to the final refusal under Section 2(e)(1), Applicant respectfully submits that the mark iCT is suggestive rather than merely descriptive of medical imaging apparatus, that in the alternative the mark has become distinctive of Applicant's goods in commerce, and that the mark is thus registrable on the Principal Register either as an inherently distinctive mark or as a pursuant to Section 2(f) as a mark that has acquired distinctiveness. Some of the facts in support of Applicant's position are set forth the Olszewski Declaration. Other facts or matters to be considered in support of Applicant's position are set forth below and/or attached hereto as further exhibits.

The Term iCT Is Not "Merely Descriptive" Of Applicant's Goods

As the examining attorney correctly notes, an abbreviation, initialism or acronym term is merely descriptive of goods or services within the meaning of Section 2(e)(1) when it is "generally understood" as "substantially synonymous" with the descriptive words it represents. Thus, a Section 2(e)(1) refusal cannot be made simply because the applied-for mark iCT can be construed as an abbreviation, initialism or acronym for specific wording ("intra-operative computed tomography" or "intra-operative CT") that is merely descriptive of the identified goods or services. It is also necessary that a relevant consumer when viewing Applicant's mark must recognize the term iCT as the equivalent of the phrase "intra-operative computed tomography" before a Section 2(e)(1) refusal can be properly made. TMEP Section 1209.03(h). If the term in question is not directly and immediately understood by relevant purchasers as "substantially synonymous" with the merely descriptive wording it represents, a Section 2(e)(1) refusal is not warranted. *E.g., Barnoness Small Estates, Inc. v. Am. Wine Trade, Inc.*, 104 USPQ2d 1224, 1230-31 (TTAB 2012) (dismissing petition to cancel based on, among other things, a claim that the acronym in question was merely descriptive).

Despite the evidence relied on by the examining attorney, and in light of the evidence submitted herewith and discussed below, Applicant respectfully submits that its mark iCT is not "generally understood" by the relevant purchasers as "substantially synonymous" with the phrases "intra-operative computed tomography" or "intra-operative CT." Instead, the even the evidence relied on by the examining attorney demonstrates that the mark iCT is no more than suggestive of with respect to medical imaging apparatus and thus is inherently distinctive. As a result, the Section 2(e)(1) refusal should be withdrawn.

Applicant notes that review of a number of publicly available resources (including at least one resource,

Wikipedia, on which the examining attorney himself has relied) regarding the meaning of abbreviations, initialisms and acronyms does not support a finding that the term iCT is substantially synonymous with the phrase "intra-operative computer tomography." For example, Wiktionary does not identify the initials iCT or ICT as referring to "intra-operative computed tomography" or "intra-operative CT" *(see Attachment B).* Similarly, the terms iCT or ICT are not identified as referring to intra-operative computed tomography" or "intra-operative CT" in either Wikipedia *(see Attachment C),* AcronymFinder.com *(see Attachment D)* or AcronymAttic.com. *(see Attachment E).* This is the case even though these resources do reflect a consensus concerning the meaning of a number of other abbreviations, initialisms or acronyms for other, closely related medical devices. *(See Attachment F relating to "CT" for "computed tomography" and Attachment G relating to "MRI" for "magnetic resonance imaging".)*

Applicant notes further that the promotional materials for the goods identified in the subject application do not draw any association, direct or indirect, between its mark iCT and the phrase "intra-operative computed tomography" or "intra-operative CT." *(See Attachment A, Olszewski Dec., Exhibits 1 through 5.)* In fact, the phrases "intra-operative computed tomography" or "intra-operative CT" do not appear in these promotional materials. *(Id.)* Nor does either appear in any of Applicant's advertisements for the goods identified in the subject application. *(Id., Composite Exhibit 6.)* Instead, Applicant's promotional materials and advertisements use the term iCT solely as a mark to identify and distinguish particular goods of Applicant for other goods of Applicant and the goods of others. *(Id.)* Thus, Applicant is not doing anything that would lead potential purchasers or anyone else in the medical imaging marketplace to draw an association between the term iCT and the phrase "intra-operative computed tomography" or the phrase "intra-operative CT."

Applicant acknowledges that the examining attorney was able locate a relatively small number references in the medical literature that use the term iCT or ICT to mean "intra-operative computed tomography" or "intra-operative CT." However, Applicant respectfully submits that the small number of references cited by the examining attorney do not support his finding that there is "widespread" use of the term iCT or ICT in that fashion. Applicant also respectfully submits that the cited medical literature references are not sufficient to establish that the term iCT is directly and immediately recognized by potential purchasers as "substantially synonymous" with the phrase "intra-operative computed tomography" or "intra-operative CT" for at least two reasons.

First, Applicant notes that each piece of medical literature relied on by the examining attorney includes a specific definition of the term "iCT" as meaning "intra-operative computed tomography" or "intra-operative CT." Spelling out a specific definition of the term iCT would not be necessary if the term were in fact generally or readily understood by relevant portions of the public as being equivalent or substantially synonymous to the phrase "intra-operative computed tomography" or "intra-operative CT." The references cited by the examining attorney corroborate this on their face inasmuch as none of the cited references also spell out specific definitions for terms such as CT or MRI, which also appear in the references relied on by the examining attorney. Thus, in light of the recent holding in *Barnoness Small Estates, Inc.*, the medical literature evidence relied on by the examining attorney fails to establish that the term ICT is "instantly" or "directly" understood by relevant purchasers to refer to "intra-operative computed tomography" or "intra-operative CT." In *Barnoness Small Estates, Inc.*, the Board held that references that "spell out" the connection between an acronym and a merely descriptive phrase are actually evidence of suggestiveness, not mere descriptiveness. 104 USPQ2d at 1230-31 (dismissing petition to cancel registration of acronym based on mere descriptiveness grounds). Applicant accordingly relies on them as such in support of a finding that its mark is suggestive rather than merely descriptive.

Second, while the term CT is admittedly recognized by the medical imaging marketplace as meaning

"computed tomography," the examining attorney has not submitted any evidence that the use of a lower case "i" is a recognized abbreviation in the medical imaging marketplace for the term "intra-operative." Again, the recent holding in *Barnoness Small Estates, Inc.*, controls the outcome here. In *Barnoness Small Estates, Inc.*, the Board held there must be evidence that each component element of an acronym is a recognized abbreviation for a merely descriptive term. 104 USPQ2d at 1230-31.

Accordingly, the evidence in the record is such that while some potential purchasers may be able to derive a connection between the term iCT and "intra-operative computed tomography" or "intra-operative CT," doing so requires some thought and is not an immediate and direct association. Applicant respectfully submits that its mark iCT is not merely descriptive and instead is suggestive, and as such, is registrable on the Principal Register as an inherently distinctive mark.

The Term iCT Has Acquired Distinctiveness

In the alternative, Applicant respectfully suggests that even if the term iCT is construed as merely descriptive, it has by virtue of Applicant's use as a source identifier acquired secondary meaning and is thus registrable on the Principal Register under Section 2(f). A variety of indicia can support a finding of acquired distinctiveness under Section 2(f) and a number of them apply to Applicant's mark iCT.

For example, TMEP Section 1212.05 provides that at least five years of substantially exclusive and continuous use can be *prima facie* evidence of acquired distinctiveness. Accordingly, Applicant claims acquired distinctiveness under Section 1212.05 inasmuch as it has been using the term iCT as a mark for medical imaging apparatus continuously since 2007, or approximately six years prior to Applicant's making of a claim of acquired distinctiveness. *(See Attachment A, Olszewski Dec.,.¶ 2, 7 and 14.)* Applicant's use of that term as a mark has also been substantially exclusive within the meaning of TMEP Section 1212.05(b). Applicant admittedly has been made aware by the examining attorney of a potentially inconsequential or infringing use (see the references cited by the examining attorney to use of the term iCT by Brainlab) and that situation is being evaluated with respect to what if any action Applicant should take. *(Id. ¶ 13.)* Applicant believes that its use of the term iCT is prior to Brainlab's and respectfully submits that Brainlab's junior use should not undermine Applicant's Section 2(f) claim for the reasons set forth in TMEP Section 1212.05(b).

Applicant also relies on actual evidence of acquired distinctiveness, particularly its success in educating the public to recognize that the mark iCT is a source identifier for Applicant's medical imaging apparatus. TMEP Section 1212.06(b) provides that 'the ultimate test in determining whether a designation has acquired distinctiveness is applicant's success . . . in educating the public to associate the proposed mark with a single source." In measuring Applicant's success in educating the public to construe the term iCT as a source indicator, it is important to note that Applicant has from the start consistently used its mark iCT in a particular format that includes a representation of the initial letter "i" in a lower case format. *(Id., ¶ 12.)* The use of the small "i" is part of a larger branding strategy for Applicant's iCT brand products, and extends to other trade designations used to denote features of or accessories for iCT medical imaging apparatus, such as "iDose," "iPatient" and "iMRC." *(Id., ¶ 12 and Exhibits 1 through 5.)* It is also important to note that Applicant promotes all of its iCT brand products as being part of the " Philips iCT Family" of products. *(Id., ¶ 3 and Exhibits 3 and 4.)*

In light of that, Applicant submits herewith evidence of how the term iCT is actually recognized and used by end-users and others in the medical imaging apparatus market, not as a descriptor, but as a source identifier for Applicant's goods in the exact format used by Applicant. This evidence includes: (a) a press release announcing that two of Applicant's iCT brand products had won a prestigious industry award *(id. ¶ 6 and Exhibit 7*); (b) product evaluation reports from industry rating organizations that

identify Applicant's products and distinguish them from others by using iCT as a mark *(id. ¶ 8 - 10 and Exhibits 8, 9, 11, 12 and 13)*; comments from end-users of iCT brand products in which the products are specifically identified by reference to Applicant's mark *(id. ¶ 8, 9 and Exhibits 8, 9, 11, and 12)*. There are no direct or even indirect connections or associations drawn in any of this evidence between the term iCT and the phrase "intra-operative computer tomography" or "intra-operative CT." Instead, the term iCT is consistently used as a source indicator for Applicant's products. Applicant respectfully submits that this is the most reliable and most persuasive evidence that the term iCT is not generally or readily understood merely as an initialism or acronym for "intra-operative computer tomography" or "intra-operative CT" and instead has acquired the secondary meaning that allows it to function and be registered as a mark for Applicant's medical imaging apparatus.

At least part of Applicant's success in educating the public to associate the term iCT as a source indicator can be attributed to the success of the iCT brand products in the marketplace, another traditional indicator of secondary meaning. In the first year after introduction, approximately 30 units were sold and since then sales have gone up significantly, with total sales to date in excess of 550 units. *(Id. ¶ 7.)* While in absolute terms that may not seem like a large number, the products in question are expensive, with an average price between $750,000 and $2,500,000. Thus, Applicant's product sales to date account for more than $800,000,00 in sales. *(Id. ¶ 7.)* Moreover, the volume of units sold is meaningfully large in light of the fact that Applicant promotes and sells its products to a relatively small market comprised of medium to large hospitals and academic medical centers. *(Id. ¶ 5.)* As for advertising expenditures, the sophistication, complexity and cost of the products are such that they are not of the type that are heavily advertised in mass media -- instead the products are marketed and sold in the traditional channels in which comparably complex and expensive medical devices are sold. *(Id.)*

Some of Applicant's success in the marketplace can be attributed to the fact that the first two iCT brand products won the prestigious Frost & Sullivan 2009 North American Product Innovation of the Year Award. As noted above, the announcement of that award featured use of the term iCT has a mark to distinguish Applicant's goods from the goods of others. Unsolicited media attention that calls out a product by its mark is also a traditional indicator of secondary meaning.

Finally, the fact that a potential infringer (Brainlab) has mimicked the exact format of Applicant's mark (iCT), is also supportive of Applicant's claim of acquired distinctiveness as copying is frequently relied on by the courts in making determinations that the copied mark has secondary meaning.

Conclusion

Applicant respectfully submits that the Section 2(e)(1) refusal be withdrawn inasmuch as the evidence in the record supports a finding that the mark iCT is suggestive rather than merely descriptive. Alternatively, the refusal should be withdrawn because the mark iCT has acquired secondary meaning.

EVIDENCE
Evidence in the nature of Attachment A is a Declaration in support of Request for Reconsideration, with 15 exhibits; Attachments B through G are copies of materials from online sources that are offered in support of the Request for Reconsideration. has been attached.
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Converted PDF file(s) (2 pages)
Evidence-1
Evidence-2

SIGNATURE(S)
Request for Reconsideration Signature
Signature: /Raymond Rundelli/ Date: 12/31/2013
Signatory's Name: Raymond Rundelli
Signatory's Position: authorized U.S. attorney, Ohio bar member

Signatory's Phone Number: 216.622.8854

The signatory has confirmed that he/she is an attorney who is a member in good standing of the bar of the highest court of a U.S. state, which includes the District of Columbia, Puerto Rico, and other federal territories and possessions; and he/she is currently the applicant's attorney or an associate thereof; and to the best of his/her knowledge, if prior to his/her appointment another U.S. attorney or a Canadian attorney/agent not currently associated with his/her company/firm previously represented the applicant in this matter: (1) the applicant has filed or is concurrently filing a signed revocation of or substitute power of attorney with the USPTO; (2) the USPTO has granted the request of the prior representative to withdraw; (3) the applicant has filed a power of attorney appointing him/her in this matter; or (4) the applicant's appointed U.S. attorney or Canadian attorney/agent has filed a power of attorney appointing him/her as an associate attorney in this matter.

The applicant is filing a Notice of Appeal in conjunction with this Request for Reconsideration.

Serial Number: 79108849
Internet Transmission Date: Tue Dec 31 10:48:41 EST 2013
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	Koninklijke Philips N.V.
Trademark	:	iCT
Serial No.	:	79108849
Filing Date	:	December 21, 2011
Attorney Docket No.	:	30961/04099

DECLARATION OF ACQUIRED DISTINCTIVENESS UNDER 15 U.S.C. § 1052 (f)

1. I, Mark E. Olszewski, PhD, declare that I am Sr. Product Manager, Computed Tomography for Philips Healthcare, a business unit of Philips Medical Systems, (Cleveland), Inc., which in turn is a subsidiary of Koninklijke Philips N.V. ("Applicant"), and that I am authorized to make this declaration on behalf of Applicant. This declaration is based on my personal knowledge of the facts asserted herein or the business records of Applicant to which I have access by virtue of my position as Sr. Product Manager, Computed Tomography for Phillips Healthcare.

2. The term iCT was first used as a mark by or on behalf of Applicant in connection with medical imaging apparatus in late 2007, and the term has been in use in commerce as a mark for such goods by or on behalf of Applicant continuously since that time.

3. The first product on or in connection with the mark iCT was used in commerce by or on behalf of Applicant was the Brilliance iCT imaging apparatus, which was introduced in 2007. A piece of promotional material for the Brilliance iCT imaging apparatus is attached hereto as Exhibit 1. In 2008, the Brilliance iCT SP imaging apparatus was introduced. A piece of promotional material for the Brilliance iCT SP imaging apparatus is attached hereto as Exhibit 2. In 2011, a variation of the Brilliance iCT product known as the iCT TVI imaging apparatus was introduced and in 2012 another variation known as the iCT Elite imaging apparatus was introduced. Together, these four products or product variations are marketed as part of the "Phillips iCT Family" of medical imaging apparatus. (See the promotional materials attached hereto as Exhibit 3 and Exhibit 4.) A current promotional piece that sets forth the specifications for iCT imaging apparatus products is attached hereto as Exhibit 5. None of these materials use the term iCT to describe

Applicant's products or any feature or application of such products. Moreover, none of these promotional materials use or make reference to the phrase "intra-operative computed tomography" or draw any connection or association between Applicant's iCT mark and the phrase "intra-operative computed tomography." Instead, all of these promotional materials use the term iCT solely as a mark to distinguish Applicant's imaging apparatus from the products of others.

4. Attached hereto as Composite Exhibit 6, which is a collection of advertisements placed by Applicant for its iCT brand medical imaging apparatus. None of these advertisements use the term iCT to describe Applicant's products or any feature or application of such products. Moreover, none of these advertisements use or make reference to the phrase "intra-operative computed tomography" or draw any connection or association between Applicant's iCT mark and the phrase "intra-operative computed tomography." Instead, all of these advertisements use the term iCT solely as a mark to distinguish Applicant's imaging apparatus from the products of others.

5. Applicant's iCT brand medical imaging apparatus are premium computed tomography products that are marketed and sold to a variety of customers, most often comprised of medium to large hospitals and academic medical centers. Premium computed tomography (CT) scanners are used to produce diagnostic images of the head, body, and cardiovascular systems of the human body. The premium CT market represented approximately US$950M in 2013, and is has a compound annual growth rate of approximately 7%. The sales price of a CT scanner in the premium CT market segment is approximately US$750,000 – US$2.5M, depending on the configuration of options and accessories. Applicant markets its iCT medical imaging apparatus products through appearances at trade shows, by advertising in trade publications, through Applicant's websites dedicated to medical imaging apparatus, through industry rating organizations, and through direct sales efforts with potential purchasers. The sales process for an iCT consists of quotation of an iCT scanner and associated options and accessories by an individual Philips account manager that may result in an order being placed on one of Philips CT factories. Fulfillment of the order is by shipment from Philips to the customer.

6. In March 2009, the Brilliance iCT imaging apparatus and the Brilliance iCT SP apparatus were awarded the Frost & Sullivan 2009 North American Product Innovation of the Year Award. A copy of the press release announcing this award is attached hereto as Exhibit 7. The press release does not use or make reference to the phrase "intra-operative computed tomography" in connection with Applicant's product or any application thereof. The reference to iCT in the press

17-DEC-2013

release is solely as a mark to identify Applicant's products and distinguish them from the products of others. The Frost & Sullivan Product Innovation of the Year is awarded to a company that has demonstrated excellence in new products and technologies within its industry. Frost & Sullivan is a well-respected consulting company that advises medical imaging customers regarding the market and available products.

7. Applicant's iCT brand medical imaging apparatus that have met with substantial success in the marketplace. Approximately thirty units were sold in the first year following introduction and more than 550 units have been sold to date, accounting for more than US$800M in sales.

8. Applicant's iCT brand products are regularly rated for performance by an organization that rates the performance of healthcare technology, KLAS Enterprises, LLC ("KLAS"). Attached hereto as Exhibit 8 is a copy of a January 2012 performance report from KLAS that covers Applicant's Brilliance iCT imaging apparatus and apparatus offered by Applicant's principal competitors in the premium computed tomography market -- GE, Siemens and Toshiba. Attached as Exhibit 9 is a copy of a December 2010 product comparison report from KLAS that also covers Applicant's Brilliance iCT imaging apparatus and apparatus offered by GE, Siemens and Toshiba. KLAS uses the term iCT in these reports solely as a mark to distinguish Applicant's goods from those of GE, Siemens and Toshiba. The KLAS reports also include comments from end-users of Applicant's iCT brand products and these comments also use the term iCT solely as mark to distinguish Applicant's goods from those others. The KLAS reports make no reference to the phrase "intra-operative computed tomography" and draw no association between that phrase and the term "iCT." Attached as Exhibit 10 hereto is information concerning KLAS.

9. Applicant's iCT brand products are regularly the subject of user satisfaction reports compiled by an organization that provides information to healthcare providers about medical technology, MD Buyline. Attached hereto as Exhibit 11 is a copy of a June 2011 quarterly user satisfaction report from MD Buyline that covers Applicant's imaging apparatus, including but not limited to the iCT brand products. Attached hereto as Exhibit 12 is a copy of a March 2012 quarterly user satisfaction report from MD Buyline that covers Applicant's imaging apparatus, including but not limited to the iCT brand products. In both reports, MD Buyline uses the term iCT solely as a mark to distinguish certain of Applicant's goods from others. The MD Buyline reports make no reference to the phrase "intra-operative computed tomography" and draw no association

between that phrase and the term "iCT." Attached as Exhibit 13 hereto is information concerning MD Buyline.

10. Another organization that evaluates medical devices is ECRI Institute ("ECRI"). Attached as Exhibit 14 is a copy of an evaluation of premium computed tomography systems by ECRI published in 2009 that covers Applicant's Brilliance iCT imaging apparatus as well as competing products from GE, Siemens and Toshiba. ECRI uses the term iCT in these reports solely as a mark to distinguish Applicant's goods from those of its competitors. The ECRI evaluation of premium computed tomography systems makes no reference to the phrase "intra-operative computed tomography" and draw no association between that phrase and the term "iCT." Attached as Exhibit 14 hereto is information concerning ECRI.

11. Although the pending request to register the mark iCT is for the standard characters iCT, the mark iCT has been consistently used by or on behalf of Applicant in a particular format, specifically with a lower case "i" followed by "CT" in upper case: "iCT." (See Exhibits 1 through 5.) When third parties use the mark to identify Applicant's products, Applicant's "iCT" formatting is followed. (See Exhibits 7 - 9, 11, 12 and 14.)

12. Applicant's particular use of a lower case "i" in the mark iCT is part of a branding effort that extends to other products in Applicant's medical imaging product line. For example, Applicant identifies a feature of its medical imaging apparatus products as "iDose^4." The "iDose^4" feature is an advanced iterative reconstruction technique that allows for faster reconstructive imaging. (See Exhibit 4, p.5.) Applicant also uses the term "iPatient" to identify a software platform that can be used with its iCT brand medical imaging apparatus. (See Exhibit 5, p.4.) Applicant also identifies the X-ray tube of its iCT brand imaging products as an "iMRC" tube. (See Exhibit 1, p. 4.)

13. By virtue of information provided by the USPTO during prosecution of Applicant's request to register the mark iCT, Applicant learned of an unauthorized and possibly infringing use or misuse of the term iCT by Brainlab that mimics the "iCT" format of the mark used by Applicant. Brainlab's use of the term iCT is believed to be junior to Applicant's first use in 2007 and is being evaluated by Applicant as an infringing use or misuse of Applicant's mark without Applicant's consent.

14. Based on its continuous and substantially exclusive use of that term for at least five years prior to making of this Declaration, the success of Applicant's products in the marketplace,

and the other evidence set forth above, Applicant believes that the mark iCT has acquired distinctiveness and is entitled to registration on the Principal Register.

I declare further that all statements made herein of my own knowledge are true and that all statements made herein on information and belief are believed to be true and that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this document and the application to which it relates or any registration resulting therefrom.

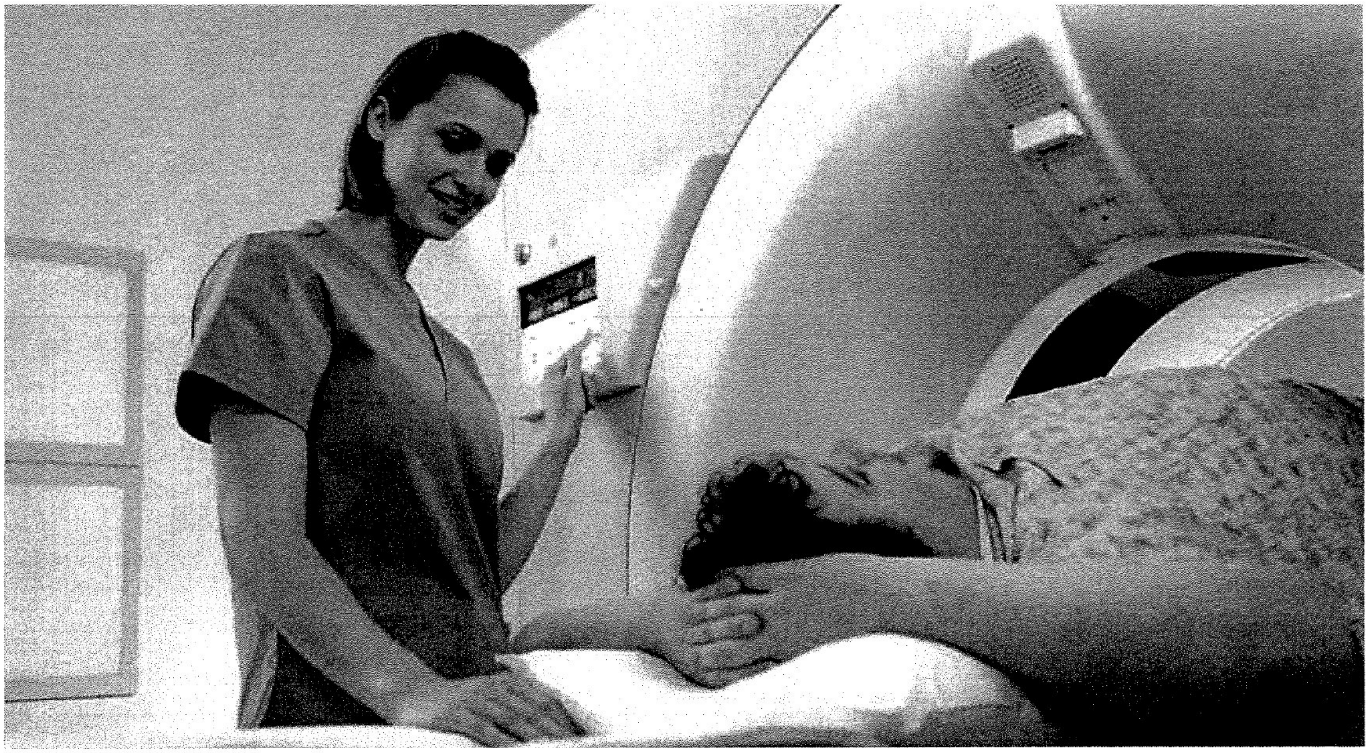
Koninklijke Philips N.V.

Dated: December 19, 2013

By: Mark E. Olszewski

Name: Mark E. Olszewski, PhD

Title: Sr. Product Manager, Computed Tomography for Phillips Healthcare



Pushing the clinical boundaries

Philips Brilliance iCT

Olszewski Declaration
Exhibit 1

PHILIPS

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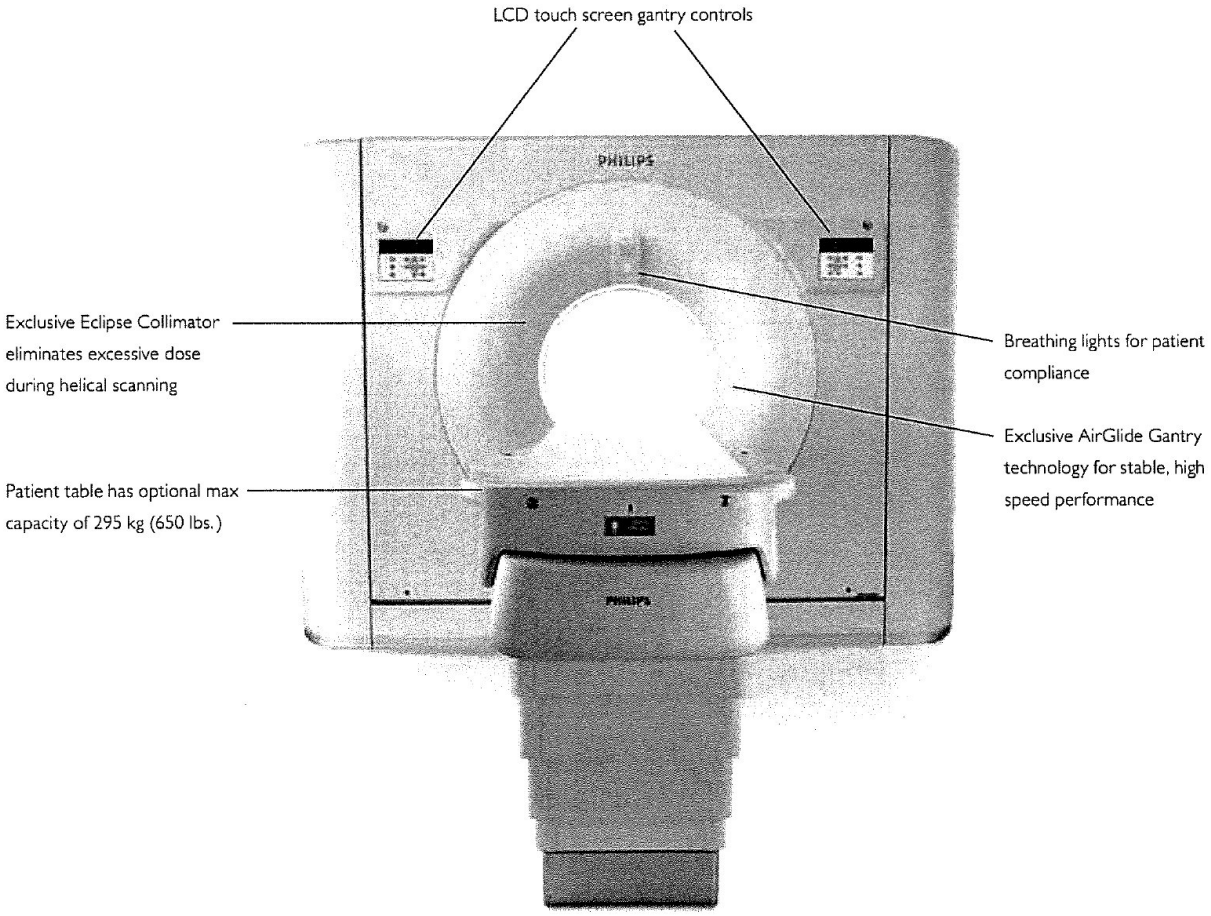
1 Introduction

The Brilliance iCT enables clinical excellence through the optimal combination of speed, power, coverage and dose utility. It sets a benchmark in full coverage whole body scanning while simultaneously setting new standards for advanced cardiovascular imaging. The Brilliance iCT can improve image quality across a wide range of examinations and uses advanced techniques to reduce radiation dose.

Key advantages

- Performance enhanced for routine and emerging applications
- Life-cycle benefits through a scalable hardware and software platform
- Patient specific acquisition protocols balance image quality and dose utility

Leveraging the power of Essence technology, this configuration truly empowers new discoveries in clinical science. The unique Essence technology is at the core of the Brilliance iCT scanner. Consisting of proprietary X-ray tube, detector and reconstruction advancements to improve image quality and reliability, Essence technology provides the inner workings that enable new levels of clinical performance. In synergy with Essence are technologies focused on reducing dose such as the breakthrough Eclipse DoseRight collimator.



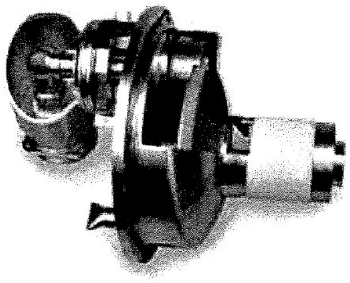
2 Intelligent technology

The Brilliance iCT scanner employs new Intelligent technology to provide the diagnostic confidence required by clinicians to support high levels of patient care. Essence and Intelligent technology work together to deliver image quality and dose utility benefits across the spectrum of routine and advanced imaging protocols.

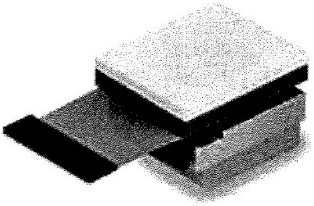
2.1 iMRC X-ray Tube features	Clinical value
Spiral Groove Bearing	Precise anode rotation stability for virtually motion-free, focal spot for better image clarity
Segmented Anode	12 individual anode segments compensate for heating and cooling cycles for higher reliability
Smart Focal Spot	Dynamic focal spot motion doubles the number of projections to yield up to 256 slices and improves in-plane spatial resolution

2.2 NanoPanel^{3D} with ClearRay Collimator features	Clinical value
NanoPanel^{3D} Spherical Detector	First spherical CT with every detector module focused on the tube in a true spherical 3D array. Philips patented ASIC chip provides virtually noise-free signal conversion for better image quality
ClearRay Collimator	Anti-scatter management seeks to improve Hounsfield uniformity and improve low contrast visibility by minimizing the effects of scattered radiation not contributing to image formation – ultimately to improve the image quality
Smart Focal Spot	Improves image definition and image quality through the generation of 128 slices
TACH 2 Detector Electronics	Second generation of TACH technology further reduces the electronic noise enabling improved image quality at low radiation doses
Ultra High Resolution (up to 23 Lp/cm spatial resolution)	High spatial resolution means better definition of small structures

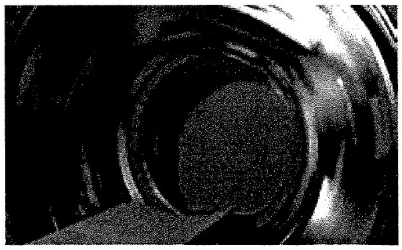
2.3 AirGlide Gantry	Clinical value
AirGlide Gantry	Acquisitions can be performed in as little as 0.27* seconds to shorten total acquisition times, reduce breath hold times, and lower delivered contrast volumes. The air bearing achieves speeds of up to 220* revolutions per minute through frictionless floatation using just a few microns of air



iMRC X-ray Tube



NanoPanel^{3D}



AirGlide Gantry

3 Additional Brilliance iCT highlights

The Brilliance iCT is offered in three designed-around-you configurations capable of achieving rotational speeds up to 0.27 seconds to enhance image quality for emerging applications such as cardiac imaging and can improve patient experience for a variety of general radiology protocols through shortened examination times.

The Brilliance iCT's outstanding rotational speed is supported by up to 120kW of instantaneous power to maximize image quality of the shortest scans.

The ability to perform short scan, high power imaging is enhanced through an extended longitudinal coverage realizing up to 256 slices - enabling the efficient collection of cardiac, perfusion, pediatric, and whole body imaging.

This powerful combination of speed, power, and coverage is further enhanced through new dose management technologies. Unique to Philips iCT is the Eclipse DoseRight collimator eliminating excess dose during helical scanning.

As customary in Philips CT products, the iCT offers high-quality imaging, fast reconstructions, task automation, and an array of features to minimize radiation doses.

Philips iMRC X-ray tube featuring an advanced spiral groove bearing and segmented anode enabling direct cooling to effectively deliver 30 MHU equivalent performance compared to conventional X-ray tubes.

3.1 The Philips advantage	Clinical value
120 kW generator	Improved image quality through ample photon delivery regardless of patient habitus, organ motility, and ability to comply
Flexible slice acquisition modes	Up to 256 slices over a full 500mm FOV for faster and more complete whole body imaging. Gated and non-gated imaging in both axial and helical modes to balance dose delivery and acquisition flexibility
Subsecond 360° Rotation Time (down to 0.27 sec with Rate Responsive Toolkit)	Improved patient compliance and image quality through faster rotation times and less susceptibility to motion artifacts with sub-millimeter image quality for visualization of subtle abnormalities. Rotation speed without compromise for sharp and virtually motion free images of the coronaries and whole body structures during pediatric, non-compliant patient, and trauma scanning
Smart Focal Spot	Improves image definition and image quality through the generation of 256 slices
Up to 23 Lp/cm spatial resolution	High spatial resolution means better definition of small structures
DoseWise	The Philips system-wide approach to radiation dose management focusing on lowering patient dose while providing diagnostic image quality
Eclipse DoseRight collimator	Lowers patient exposure during helical scanning
Clinical applications on console	Nearly all of the Philips Extended Brilliance Workspace applications are available on the console

3.2 RapidView Reconstruction features	Clinical value
3D Cone Beam Reconstruction Algorithm (COBRA)	COBRA provides high image quality without cone beam artifacts
Adaptive Multicycle Reconstruction	Part of the Rate Responsive CV Toolkit for cardiac CT imaging, these features optimize every voxel for the optimal temporal resolution
Ultra High Resolution Matrices	768 and 1024 reconstruction matrices take advantage of high resolution imaging
Quad Core processors	Philips utilizes innovations in computer technology to continuously improve reconstruction performance

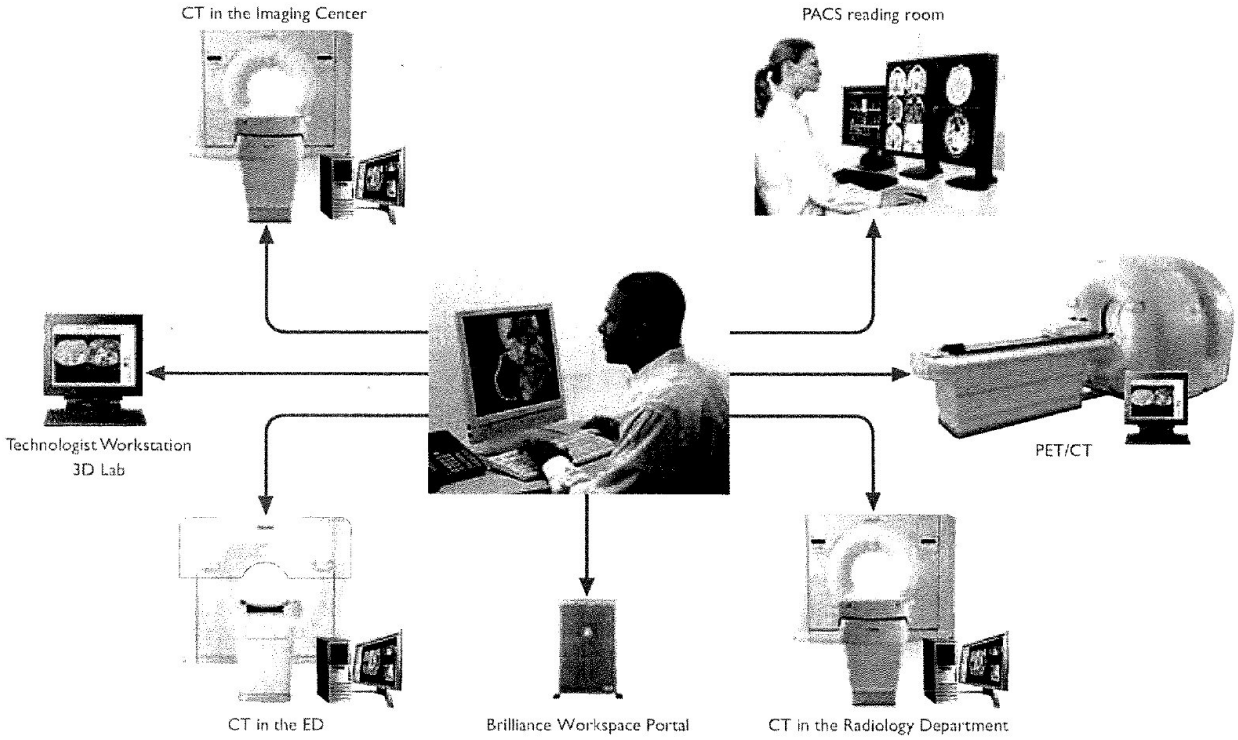
* Optional

4 Console

The console runs Brilliance Workspace on a Dell PC with dual monitors (1,280 x 1,024 Flat Panel LCD each). An optional slave monitor can display the images from the main console at a remote location, such as the radiology reading room.

Brilliance Workspace is a flexible, scalable CT work environment for planning, scanning, visualization, and archiving. Fast, powerful applications are available wherever they're needed—at the console, in the office, even from an airport lounge. The Brilliance Workspace offers a range of clinical applications at the scanner console.

The Extended Brilliance Workspace* delivers advanced clinical applications to a dedicated PC. And finally, the Brilliance Workspace Portal* makes it possible for users to work efficiently with extremely large data sets from a typical laptop or home computer, wherever they are.



* Optional

5 Gantry and table

5.1 Gantry

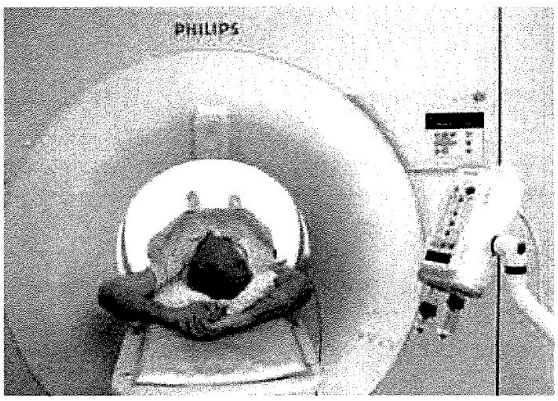
Feature	Specification
X-ray tube and Detectors Architecture	Rotate-rotate
Air Bearing Rotor	Whisper quiet and stable operation up to 220rpm
Rotation Times	0.27 & 0.3, 0.33, 0.375, 0.4, 0.5, 0.75, 1, 1.5 seconds for full 360° scans; 0.18 seconds for partial angle 240° scans
Gantry Aperture, mm	700mm
Intercom System	Two-way connection between the gantry and console areas
Breathing Lights	Visual patient communication to improve study compliance
Operator Controls located on Gantry (left and right, front and back)	Front side LCD with touchscreen activation of Couch In/Out, Couch Up/Down, Emergency Stop, X-ray Indicator and visual display of ECG wave and heart rate
Controls located at Operator's Console	Couch In/Out, Couch Up/Down, Emergency Stop, X-ray Indicator, Start Scan, Pause
Eclipse DoseRight Collimation	Lowers patient exposure during helical scanning
Integrated ECG	Eliminates ECG monitor & Cart
Focus-detector distance	1040mm
Focus-isocenter distance	570mm

5.2 AutoVoice

A standard set of commands for patient communication before, during, and after scanning is available in the following languages:

- English
- Hebrew
- French
- Spanish
- Georgian
- Italian
- Japanese
- Arabic
- Russian
- German
- Swedish
- Danish

Customized messages can also be created.



5.3 Patient table

Feature	Specification
Vertical Range, mm	645 to 1065mm with 1.0 mm increment
Manual Longitudinal Stroke, mm	1900mm
Scannable Range, mm	1750mm
Z Position Accuracy	±0.25mm
Longitudinal Speed, mm/s	0.5 – 185mm/s
Max Load Capacity with Accuracy, lb	450 lbs (204 kg) with 0.25mm Z-axis accuracy 650 lbs (295 kg) with Bariatric Patient Support*
Floating tabletop	Carbon-fiber table top with foot pedal and hand control for easy positioning and quick release

* Optional and included with Rate Responsive CV Toolkit

6 Scan and image acquisition

Brilliance iCT features additional dose management enhancements through the introduction of new wedge and IntelliBeam filters, Eclipse DoseRight collimators, and Step & Shoot Cardiac scanning protocol. Three new wedge filters reduce skin dose for infants, cardiac, body and head imaging through the absorption of unwanted X-rays. Three new IntelliBeam filters optimize image quality and dose delivery for cardiac, head, trauma, and body imaging. Eclipse DoseRight collimator lowers patient exposure during helical scanning. Step & Shoot Cardiac improves dose efficiency during axial scanning.

6.1 Generator

Feature	Specification
Output capacity	Up to 120 kW
kV	80, 100, 120, 140 kVp
mA	10-1,000mA; 1 mA increments

6.2 X-ray Tube

Feature	Specification
Focal Spot – Smart Focal Spot	X & Z deflection
Focal spot (IEC)	Large: 1.1 x 1.2 Small: 0.6 x 0.7
Anode Diameter	200mm
Anode Rotation Speed	10,800rpm
Spiral Groove Bearing	Double supported, direct cooling
Target Angle	8°, Segmented

6.3 Collimator

Feature	Specification
Wedge Filters	Small, Medium, Large, Open
IntelliBeam Filters	3
Eclipse DoseRight collimator	Reduces dose up to 30% during helical scans

6.4 Detector

Feature	Specification
Slices	256 x 0.625
Material	Solid-State GOS with 86,016 elements
Slip Ring	5.3 Gbps transfer rate
Data Sampling Rate	Up to 4,800 views/revolution/element
Collimations Available (Channels x mm)	2 - 128 rows x 0.625 - 1.25mm; fused combinations for axial
Slice Thickness (Spiral mode)	0.67 - 5mm variable
Slice Thickness (Axial mode)	0.625 - 10mm variable
Scan Angles	240°, 360°, 420°
Scan Field of View	250mm (UHR), 500mm

6.5 Image Quality

Feature	Specification
Spatial resolution - Ultra high mode	23.0 Lp/cm @ cut-off
Spatial resolution - High mode	16.0 Lp/cm @ cut-off
Spatial resolution - Standard mode	12.0 Lp/cm @ cut-off
Noise	0.27%
Low contrast resolution	4.0mm @ 0.3%
Absorption range	-1024 to +3072 Hounsfield units

7 Scanning modes

7.1 Spiral scanning

- Multiple contiguous slices acquired simultaneously with continuous table movement during scans
- Multiple, bidirectional acquisitions
- Spiral exposure: Up to 100 seconds
- Spiral pitch: 0.04 to 1.0

7.2 Axial scanning

- Multiple-slice scan with up to 256 slices acquired with incremental table movement between scans
- Fused modes for reconstructing partial volume virtually artifact-free thick slices from thin slice acquisition

7.3 Continuous CT (CCT)

Continuous CT (CCT) biopsy mode delivers a less invasive evaluation of lesions using a foot pedal controlled in-room scanning. Clinician hand exposure is minimized through axial single and series (continuous) 240° scanning centered beneath the patient couch. Features thin "2x1.25" slice display for detailed view of anatomy and needle tip.

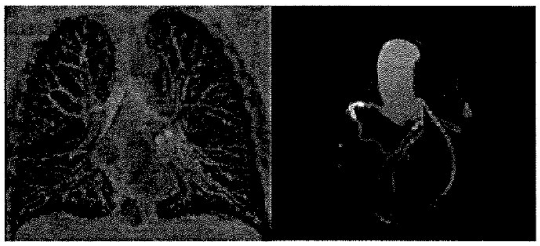
7.4 CT Fluoroscopy package

CT Fluoroscopy delivers real-time guidance for interventional procedures to offer a less invasive evaluation of lesions, drainage, catheter placement, and ablation procedures. Combines CT Fluoroscopy and Continuous CT (CCT) applications for improved scanning flexibility. Features thin "1x2.5" slice display for detailed view of anatomy and needle tip.

8 Clinical enhancements

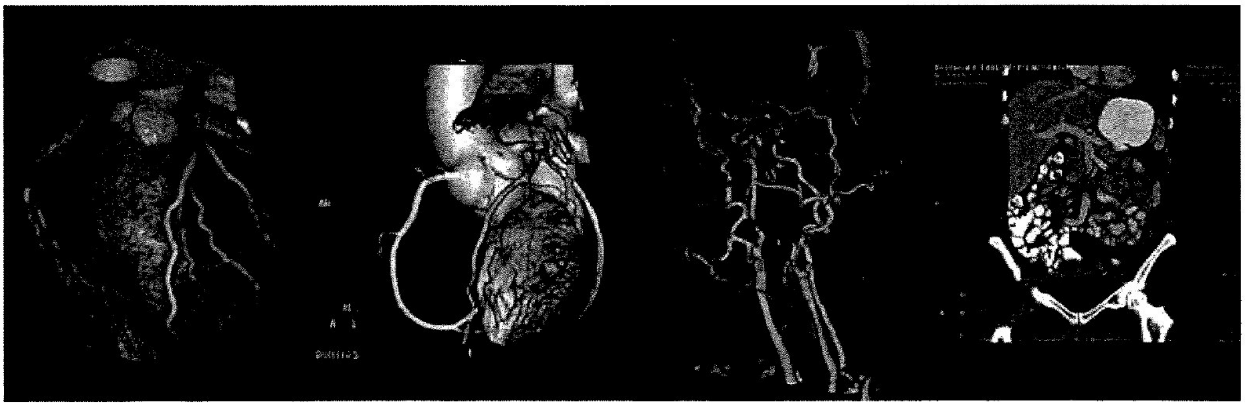
Feature	Specification
Test Injection Bolus Timing	Using a test injection, delay time is calculated to provide optimal contrast enhancement and reduce contrast usage—ideal for CTA
Bolus Tracking	An automated injection planning technique to monitor actual contrast enhancement and initiate scanning at a predetermined level. Combine with SAS for full automation and efficacy
Spiral Auto Start (SAS)	Spiral Auto Start integrates the injector with the scanner, allowing the technologist to monitor the contrast injection and to start and stop the scan (with the predetermined delay) while in the scan room
Step & Shoot 50cm Thorax for iCT*	Step & Shoot Thorax enables low dose, axial CT imaging for the chest. This axial prospective ECG-gated acquisition technique uses large collimations and full 50 cm Field of Views to acquire and reconstruct datasets of the chest 50cm gated FOV Enhancing visualization of coronary, mediastinal, and thoracic structures
Rate Responsive CV Toolkit	Includes ECG Retrospective Tagging for cardiac imaging with 0.18, 0.27 & 0.3 rotation times. The scanner acquires a volume of data while recording the patient's ECG. The acquired data is tagged and reconstructed at the desired phase(s) of the cardiac cycle with Philips patented Beat-to-Beat™ Variable Delay Algorithm
Jog Scan*	Jog Scan provides up to 160mm of imaging area for perfusion studies. The scanner acquires two 80mm volumes of interest by translating the couch back and forth – doubling the standard perfusion coverage

*Optional 50cm Gated Thorax requires S&S Cardiac for iCT and RRCVTK



9 Clinical examples

Protocol	Detector coverage	Slices	Rotation (sec)	Pitch	Tube current (mA)	Scan length (mm)	Scan time (sec)
Cardiac CT Angiography	80mm	256	0.27	0.18	662	141	4.69
Step & Shoot Cardiac	80mm	256	0.27	Axial	945	125	3.9
Head & Neck CTA	80mm	256	0.3	1.0	590	130	2.06
Abdomen / Pelvis	80mm	256	0.4	1.0	400	375	3.4



10 Dose management

Philips DoseWise philosophy focuses on smart beam management, reducing radiation time, and increasing dosage awareness to reduce the cumulative risk of radiation while obtaining high-quality images.

10.1 DoseWise

Feature	Specification
DoseRight ACS (Automatic Current Selection)	Optimizes the dose for each patient based on the planned scan by suggesting the lowest possible mAs settings to maintain constant image quality at low dose throughout the exam
DoseRight D-DOM (Dynamic Dose Modulation)	Automatically controls the tube current rotationally, increasing the signal over areas of higher attenuation (lateral) and decreasing signal over area of less attenuation (AP)
DoseRight Z-DOM (Longitudinal Dose Modulation)	Automatically controls the tube current, adjusting the signal along the length of the scan, increasing the signal over regions of higher attenuation (shoulders, pelvis) and decreasing the signal over regions of less attenuation (neck, legs)
TACH 2	TACH 2 technology improves image quality at reduced doses by virtually eliminating electronic noise
IntelliBeam Filters	Three IntelliBeam filters reduce skin dose through the absorption of unwanted X-rays optimizing image quality and dose delivery for cardiac, head, trauma, and body imaging
Wedges	Three wedge filters provide a more uniform dose delivery across the field-of-view
Eclipse DoseRight collimator	The Eclipse DoseRight collimator overcomes overbeaming found in conventional CT systems through the elimination of dose at the beginning and end of helical scans not contributing to image formation
Dedicated Pediatric Protocols	Developed in collaboration with top children's hospitals, Brilliance age and weight-based infant and pediatric protocols can provide high quality images at Radiation doses tailored to the patient and the study

Dose performance data

CTDI vol	Measurement
Head	13.5 mGy / 100 mAs
Body	6.3 mGy / 100 mAs

Using IEC standard phantoms

11 Reconstruction

RapidView Reconstruction generates up to 20 images per second using a 512^2 matrix.

11.1 RapidView Reconstruction

Feature	Specification
Reconstruction Field of View	• 50 to 500mm continuous • 25 to 250mm UHR • 50cm Gated Thorax
Image Matrix	512^2, 768^2 and $1,024^2$
Cone Beam Reconstruction	Philips patented Cone Beam Reconstruction Algorithm (COBRA) enables true three dimensional data acquisition and reconstruction in spiral scanning
Adaptive Filtering	Adaptive filters reduce pattern noise (streaks) in non-homogenous bodies, improving overall image quality
Adaptive Multicycle Reconstruction	Image data can be prospectively gated or retrospectively tagged. COBRA automatically delivers the best temporal resolution possible (as low as 34mseconds)
Fast Preview	Real-time 512^2 matrix image reconstruction and 5mm x 5mm contiguous slice display in step with spiral acquisition or off-line
Off-Line Reconstruction	Off-Line (batch) background image reconstruction of user-defined groups of raw data files with automatic image storage

12 Networking

The Brilliance iCT supports 100/1000Mbps (100/1000BaseT) network speeds. For optimal performance, Philips recommends a minimum of 100Mbps network speed (1Gbps preferred) and for the CT network to be segmented from the rest of the hospital network.

12.1 Archiving

The full implementation of the DICOM 3.0 communications protocol in the Brilliance Workspace allows connectivity to DICOM 3.0 compliant scanners, workstations, and printers; supports IHE requirements for DICOM connectivity.

Type	Hard Drive	DVD-RAM	DICOM CD Writer
Capacity	292GB	9.4GB	700MB
Images	500,000**	30,000*	1,200**
Patients***	1,667	100	4

* Compressed ** 512 x 512 Matrix Uncompressed *** Based on 300 images per study

12.2 DVD-RAM archive

Philips DVD-RAM solution is an archive solution for storing CT and other modality datasets archived from the Brilliance CT Scanner. The DVD-RAM solution provides an inexpensive, reliable method for high-speed random access recording. Ideally suited for mass storage.

12.3 DICOM CD Writer

A DICOM CD Writer stores DICOM images and associated image viewing software on very low cost CD media. Images on these CDs can be viewed and manipulated on PCs meeting the minimum specifications. Ideally suited for individual result storage and referring physician support.

12.4 Filming

This function allows the user to set up and store filming parameters. Pre-stored protocols can be set to include auto-filming. The operator can film immediately after each image, at the end of a series, or film after the end of a study and review images before printing. The operator can also automatically film the study at three different windows and incorporate "Combine Images" functionality to manage large datasets. Basic monochrome and color DICOM print capability are supported.

12.5 DICOM

Brilliance Workspace supports DICOM connectivity and can work with DICOM 3.0-compliant PACS, scanners, workstations, and printers. It supports IHE requirements for scheduled workflow and other integration profiles as defined in IHE Statement. Brilliance Workspace includes DICOM service classes to communicate with the following modalities:

- CT
- MR
- Nuclear Medicine including PET/CT
- Computed Radiography
- Radiography & Fluoroscopy (R&F)

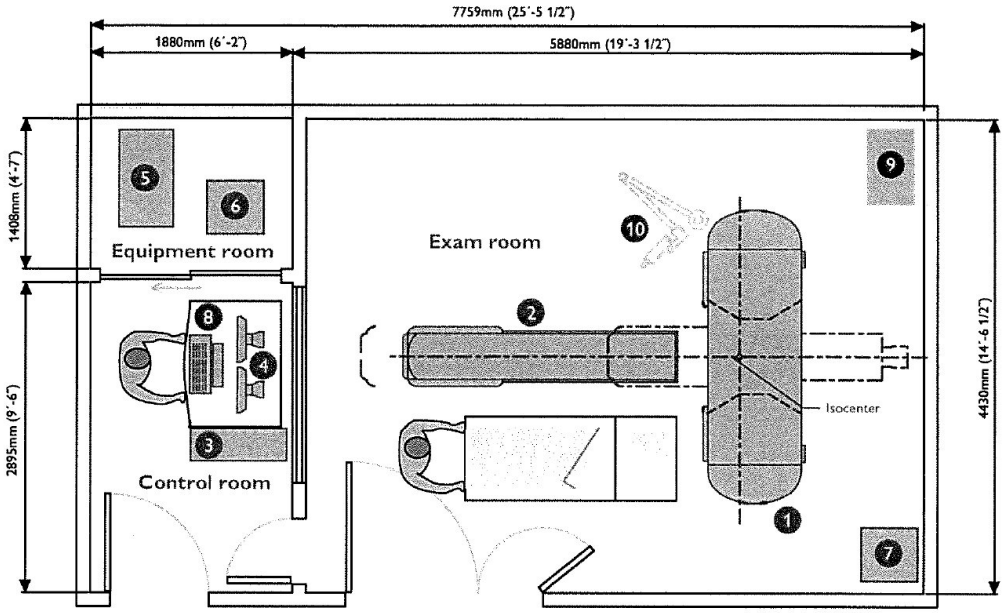
Brilliance Workspace includes the following DICOM functionality:

- Service Class User & Provider (CT, MR, NM, Secondary Capture)
- DICOM Print User
- DICOM Modality Worklist User
- Query/Retrieve User and Provider
- Modality Performed Procedure Step User
- Storage Commitment User
- Removable Media

Site planning

13.1 Room layout

Contact the Philips Site Planning department for specific requirements pertaining to optional imaging/viewing/power equipment, floor space and electrical, mechanical, structural or environmental specifications.



13.2 Dimensions and weights

		weight	height	width	depth
1	Gantry	2570kg (5656lbs.)	198cm (78")	274cm (108")	97cm (38")
2	Patient Couch	445kg (981lbs.)	112cm (44")	69cm (27")	249cm (98")
3	Computer	118kg (260lbs.)	76cm (30")	30cm (12")	91cm (36")
4	LCD monitor	10kg (22lbs.)	48cm (19")	48cm (19")	22cm (8.7")
5	Recon rack	151 kg (332 lbs.)	76 cm (30")	61 cm (24")	91 cm (36")
6	Air compressor	171 kg (377 lbs.)	104 cm (41")	61 cm (24")	61 cm (24")
7	System PDU	522 kg (1150 lbs.)	122 cm (48")	58 cm (23")	86 cm (34")
	Optional features				
8	Console table	56kg (125lbs.)	76cm (30")	119cm (47")	91cm (36")
9	UPS for host and reconstruction	130 kg (286 lbs.)	46 cm (18")	63 cm (25")	66 cm (26")
10	Ceiling injector and control package	–	–	–	–

13.3 Key requirements

Power Requirements

380-480 VAC, three-phase, Wye supply

225 kVA nominal (175 kVA Max. momentary)
50/60 Hz

Environmental Requirements

Temperature:
Gantry Room: 18 to 24°C (64 to 75°F)
Rest of System: 15 to 24°C (59 to 75°F)

Humidity:
Entire System: 35% to 70% non-condensing
Storage/Transport: 10% to 90% non-condensing

Heat Dissipation:
Control Room: 4,781 BTU/hr
Exam Room: 32,888 BTU/hr
Equipment Room: 18,183 BTU/hr
Total System: 55,852 BTU/hr

For more information, please visit www.philips.com/BrillianceiCT

PHILIPS

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Designed around you

Philips Brilliance iCT SP configuration

Olszewski Declaration
Exhibit 2

PHILIPS

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1 Introduction

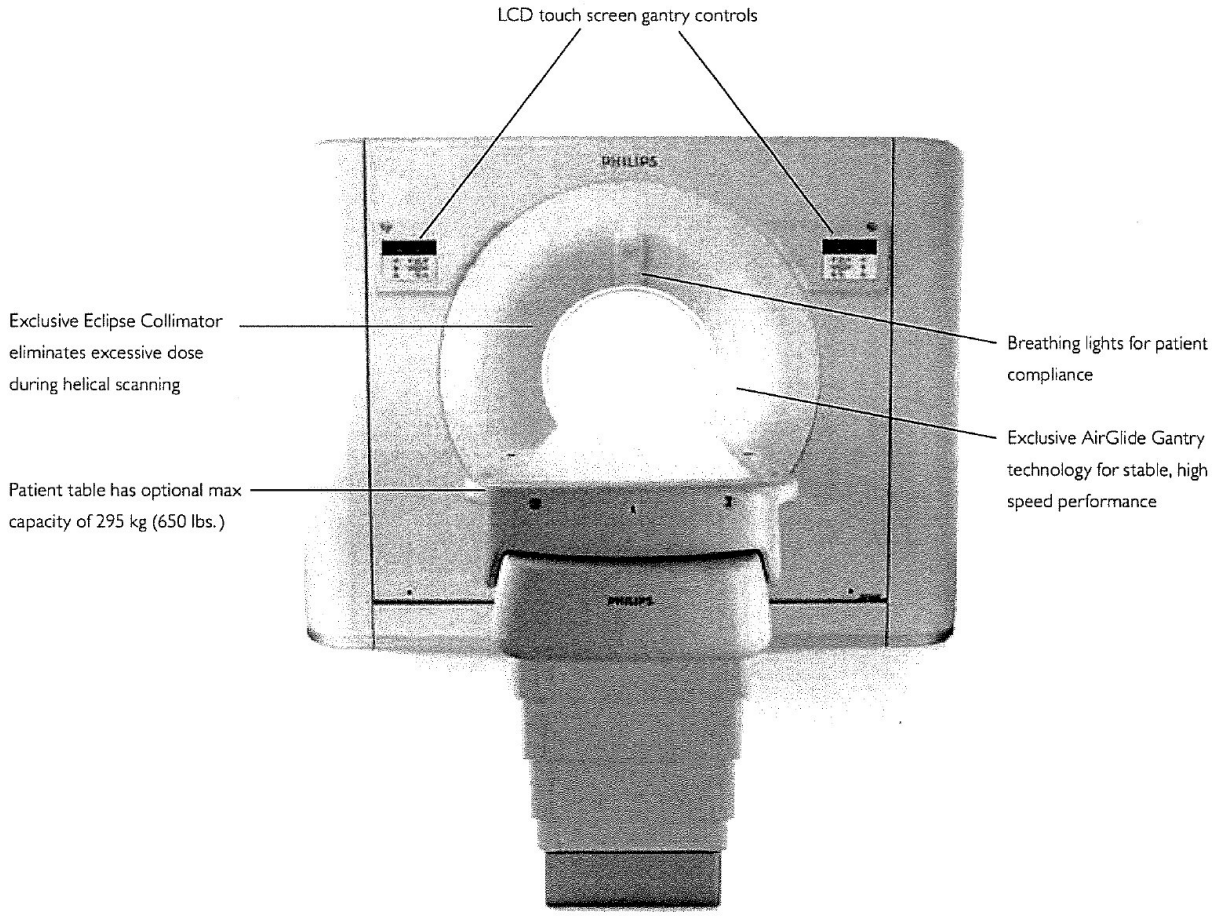
The Brilliance iCT SP is built on a scalable platform that can deliver a range of performance designed to support the diverse imaging needs of any healthcare facility.

A powerful, new combination of X-ray generation and fast gantry rotation time are aimed at shortening total scan times, improving the patient experience, and streamlining workflow for every patient.

The system delivers the boost in performance and clinical capabilities to expand clinical utility while enhancing image quality and diagnostic confidence for all CT imaging procedures.

Key advantages

- Performance enhanced for routine and emerging applications
- Life-cycle benefits through a scalable hardware and software platform
- Patient specific acquisition protocols balance image quality and dose utility



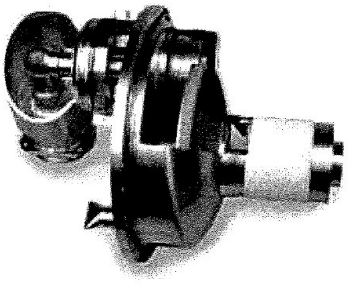
2 Intelligent technology

The Brilliance iCT SP (scalable platform) scanner employs new Intelligent technology to provide the diagnostic confidence required by clinicians to support high levels of patient care. Essence and Intelligent technology work together to deliver image quality and dose utility benefits across the spectrum of routine and advanced imaging protocols.

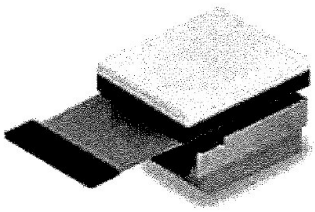
2.1 iMRC X-ray Tube features	Clinical value
Spiral Groove Bearing	Precise anode rotation stability for virtually motion-free, focal spot for better image clarity
Segmented Anode	12 individual anode segments compensate for heating and cooling cycles for higher reliability
Smart Focal Spot	Dynamic focal spot motion doubles the number of projections to yield up to 128 slices and improves in-plane spatial resolution

2.2 NanoPanel^{3D} with ClearRay Collimator features	Clinical value
NanoPanel ^{3D} Spherical Detector	First spherical CT with every detector module focused on the tube in a true spherical 3D array. Philips patented ASIC chip provides virtually noise-free signal conversion for better image quality
ClearRay Collimator	Anti-scatter management seeks to improve Hounsfield uniformity and improve low contrast visibility by minimizing the effects of scattered radiation not contributing to image formation – ultimately to improve the image quality
Smart Focal Spot	Improves image definition and image quality through the generation of 128 slices
TACH 2 Detector Electronics	Second generation of TACH technology further reduces the electronic noise enabling improved image quality at low radiation doses
Ultra High Resolution (up to 23 Lp/cm spatial resolution)	High spatial resolution means better definition of small structures

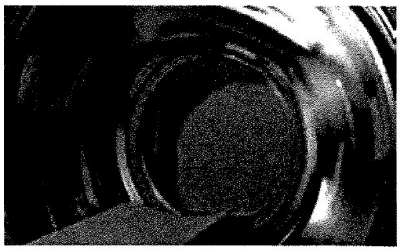
2.3 AirGlide Gantry	Clinical value
AirGlide Gantry	Acquisitions can be performed in as little as 0.27* seconds to shorten total acquisition times, reduce breath hold times, and lower delivered contrast volumes. The air bearing achieves speeds of up to 220* revolutions per minute through frictionless floatation using just a few microns of air



iMRC X-ray Tube



NanoPanel^{3D}



AirGlide Gantry

3 Additional Brilliance iCT SP highlights

At Philips, we understand that the gate-keeping aspects of CT require you to do more, better, in less time, and with lower dose over a wider range of body mass indexes and patient conditions.

For this reason, the Brilliance iCT SP has been configured with a powerful combination of 100kW X-ray generation and 0.3 second rotation time aimed at shortening total scan times, improving the patient's experience, and streamlining workflow.

This powerful combination of scalable speed and power is further enhanced through new dose management technologies. Within the Brilliance iCT SP is a combination of patient specific SmartShape body wedges and IntelliBeam filters along with the Eclipse DoseRight collimator designed to balance dose and image quality.

The Brilliance iCT SP offers life-cycle benefits through a scalable, designed around you hardware and software configuration capable of delivering the performance you need to enhance image quality for routine and emerging applications such as cardiac imaging.
Key performances can be configured at time of purchase or anytime in the future.

Performance enhancements are available as factory configured or field upgrade and include 120kW X-ray generation, 0.27 second rotation time, and 8cm of detector coverage along with workflow additions that include the Extended Brilliance Workspace and Portal Server.

3.1 The Philips advantage	Clinical value
Scalable generator	Featuring 100 kW (120kW option) improved image quality through ample photon delivery accommodating a wide range of patient size, organ motility, and ability to comply
Flexible slice acquisition modes	Gated and non-gated imaging in both axial and helical modes to balance dose delivery and acquisition flexibility
Subsecond 360° Rotation Time	Improved patient compliance and image quality through faster rotation times (down to 0.3 sec standard, 0.27 sec optional) and less susceptibility to motion artifacts with sub-millimeter image quality for visualization of subtle abnormalities Rotation speed without compromise for sharp and virtually motion free images of the coronaries and whole body structures during pediatric, non-compliant patient, and trauma scanning
Smart Focal Spot	Improves image definition and image quality through the generation of 256 slices
DoseWise	The Philips system-wide approach to radiation dose management focusing on lowering patient dose while providing diagnostic image quality
Eclipse DoseRight collimator	Lowers patient exposure during helical scanning
Clinical applications on console	Nearly all of the Brilliance Workspace advanced applications are available on the console
Scalable Coverage	Field upgradable to 8cm

3.2 RapidView Reconstruction features	Clinical value
3D Cone Beam Reconstruction Algorithm (COBRA)	COBRA provides high image quality without cone beam artifacts
Adaptive Multicycle Reconstruction	Part of the Rate Responsive CV Toolkit for cardiac CT imaging, these features optimize every voxel for the optimal temporal resolution
Ultra High Resolution Matrices	768 and 1024 reconstruction matrices take advantage of high resolution imaging
Quad Core processors	Philips utilizes innovations in computer technology to continuously improve reconstruction performance

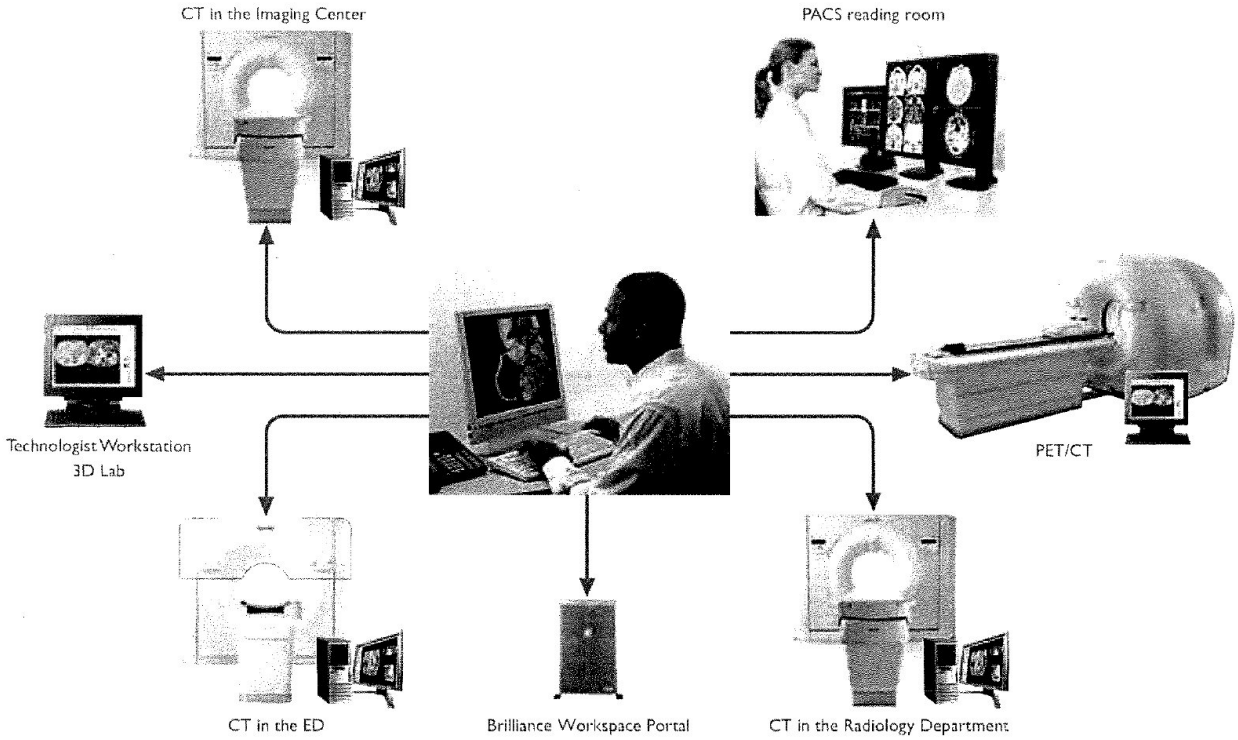
* Optional

4 Console

The console runs Brilliance Workspace on a Dell PC with dual monitors (1,280 x 1,024 Flat Panel LCD each). An optional slave monitor can display the images from the main console at a remote location, such as the radiology reading room.

Brilliance Workspace is a flexible, scalable CT work environment for planning, scanning, visualization, and archiving. Fast, powerful applications are available wherever they're needed—at the console, in the office, even from an airport lounge. The Brilliance Workspace offers a range of clinical applications at the scanner console.

The Extended Brilliance Workspace* delivers advanced clinical applications to a dedicated PC. And finally, the Brilliance Workspace Portal* makes it possible for users to work efficiently with extremely large data sets from a typical laptop or home computer, wherever they are.



5 Gantry and table

5.1 Gantry

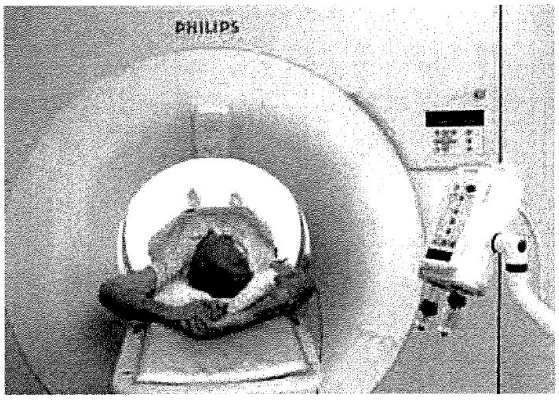
Feature	Specification
X-ray tube and Detectors Architecture	Rotate-rotate
AirGlide Gantry	Whisper quiet and stable operation up to 220rpm*
Rotation Times	0.27*, 0.3, 0.33, 0.375, 0.4, 0.5, 0.75, 1, 1.5 seconds for full 360° scans; 0.18* , 0.2 seconds for partial angle 240° scans
Gantry Aperture, mm	700mm
Intercom System	Two-way connection between the gantry and console areas
Breathing Lights	Visual patient communication to improve study compliance
Operator Controls located on Gantry (left and right, front and back)	Front side LCD with touchscreen activation of Couch In/Out, Couch Up/Down, Emergency Stop, X-ray Indicator and visual display of ECG wave and heart rate
Controls located at Operator's Console	Couch In/Out, Couch Up/Down, Emergency Stop, X-ray Indicator, Start Scan, Pause
Eclipse DoseRight Collimation	Lowers patient exposure during helical scanning
Integrated ECG	Eliminates ECG monitor & Cart
Focus-detector distance	1040mm
Focus-isocenter distance	570mm

*0.18 & 0.27 are optional through Speed & Power Upgrade

5.2 AutoVoice

A standard set of commands for patient communication before, during, and after scanning is available in the following languages:

- English
- Hebrew
- French
- Spanish
- Georgian
- Italian
- Japanese
- Arabic
- Russian
- German
- Swedish
- Danish



5.3 Patient table

Feature	Specification
Vertical Range, mm	645 to 1065mm with 1.0 mm increment
Manual Longitudinal Stroke, mm	1900mm
Scannable Range, mm	1750mm
Z Position Accuracy	±0.25mm
Longitudinal Speed, mm/s	0.5 – 185mm/s
Max Load Capacity with Accuracy, lb	450 lbs (204 kg) with 0.25mm Z-axis accuracy 650 lbs (295 kg) with Bariatric Patient Support*
Floating tabletop	Carbon-fiber table top with foot pedal and hand control for easy positioning and quick release

* Optional

6 Scan and image acquisition

Brilliance iCT features additional dose management enhancements through the introduction of new SmartShape body wedge and IntelliBeam filters, Eclipse DoseRight collimators, and Step & Shoot Cardiac* scanning protocol. Three new SmartShape wedge filters reduce skin dose for infants, cardiac, body and head imaging through the absorption of unwanted X-rays. Three new IntelliBeam filters optimize image quality and dose delivery for cardiac, head, trauma, and body imaging. Eclipse DoseRight collimator lowers patient exposure during helical scanning. Step & Shoot Cardiac* improves dose efficiency during axial scanning.

6.1 Generator

Feature	Specification
Output capacity	Up to 100kW (120 kW*)
kV	80, 100, 120, 140 kVp
mA	10-925mA (1,000 mA*); 1 mA increments

6.2 X-ray Tube

Feature	Specification
Focal Spot – Smart Focal Spot	X & Z deflection
Focal spot (IEC)	Large: 1.1 x 1.2 Small: 0.6 x 0.7
Anode Diameter	200mm
Anode Rotation Speed	10,800rpm
Spiral Groove Bearing	Double supported, direct cooling
Target Angle	8°, Segmented

6.3 Collimator

Feature	Specification
Wedge Filters	Small, Medium, Large, Open
IntelliBeam Filters	3
Eclipse DoseRight collimator	Reduces dose up to 30% during helical scans

6.4 Detector

Feature	Specification
Slices	128 x 0.625
Material	Solid-State GOS with 43,008 elements
Slip Ring	5.3 Gbps transfer rate
Data Sampling Rate	Up to 4,800 views/revolution/element
Collimations Available (Channels x mm)	2 - 64 (128*) rows x 0.625 - 1.25mm; fused combinations for axial
Slice Thickness (Spiral mode)	0.67 - 5mm variable
Slice Thickness (Axial mode)	0.625 - 10mm variable
Scan Angles	240°, 360°, 420°
Scan Field of View	250mm (UHR), 500mm

6.5 Image quality

Feature	Specification
Spatial resolution - Ultra high mode	23.0 Lp/cm @ cut-off
Spatial resolution - High mode	16.0 Lp/cm @ cut-off
Spatial resolution - Standard mode	12.0 Lp/cm @ cut-off
Noise	0.27%
Low contrast resolution	4.0mm @ 0.3%
Absorption range	-1024 to + 3071 Hounsfield units

7 Scanning modes

7.1 Spiral scanning

- Multiple contiguous slices acquired simultaneously with continuous table movement during scans
- Multiple, bidirectional acquisitions
- Spiral exposure: Up to 100 seconds
- Spiral pitch: 0.04 to 1.4 and user-selectable

7.2 Axial scanning

- Multiple-slice scan with up to 128 (256*) slices acquired with incremental table movement between scans
- Fused modes for reconstructing partial volume virtually artifact-free thick slices from thin slice acquisition

7.3 Continuous CT (CCT)

Continuous CT (CCT) biopsy mode delivers a less invasive evaluation of lesions using a foot pedal controlled in-room scanning. Clinician hand exposure is minimized through axial single and series (continuous) 240° scanning centered beneath the patient couch. Features thin "2x1.25" slice display for detailed view of anatomy and needle tip.

7.4 CT Fluoroscopy package

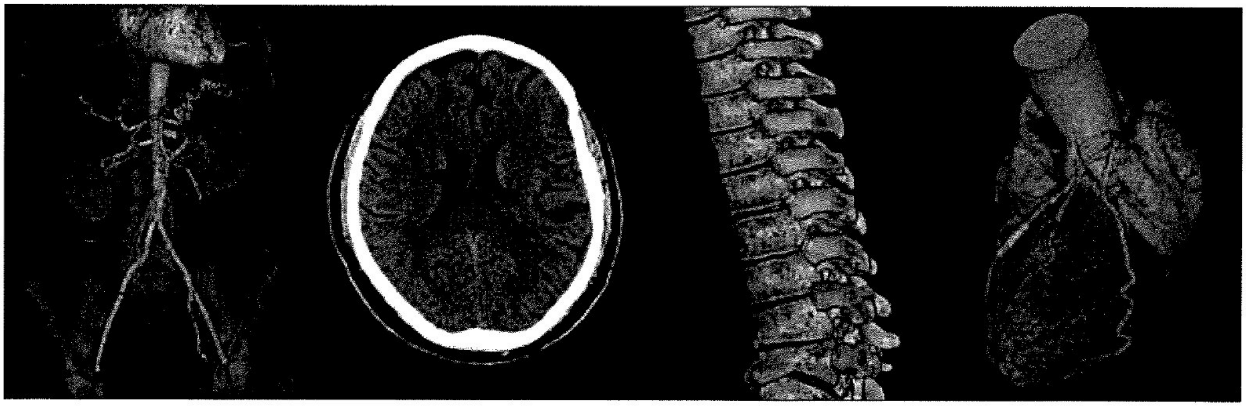
CT Fluoroscopy delivers real-time guidance for interventional procedures to offer a less invasive evaluation of lesions, drainage, catheter placement, and ablation procedures. Combines CT Fluoroscopy and Continuous CT (CCT) applications for improved scanning flexibility. Features thin "1x2.5" slice display for detailed view of anatomy and needle tip.

8 Clinical enhancements

Feature	Specification
Test Injection Bolus Timing	Using a test injection, delay time is calculated to provide optimal contrast enhancement and reduce contrast usage—ideal for CTA
Bolus Tracking	An automated injection planning technique to monitor actual contrast enhancement and initiate scanning at a predetermined level. Combine with SAS for full automation and efficacy
Spiral Auto Start (SAS)	Spiral Auto Start integrates the injector with the scanner, allowing the technologist to monitor the contrast injection and to start and stop the scan (with the predetermined delay) while in the scan room
Rate Responsive CV Toolkit	Includes ECG Retrospective Tagging for cardiac imaging. The scanner acquires a volume of data while recording the patient's ECG. The acquired data is tagged and reconstructed at the desired phase(s) of the cardiac cycle with Philips patented Beat-to-Beat™ Variable Delay Algorithm
Jog Scan*	Jog Scan provides up to 80mm of imaging area for perfusion studies. The scanner acquires two 40mm volumes of interest by translating the couch back and forth – doubling the standard perfusion coverage

9 Clinical examples

Protocol	Detector Coverage	Slices	Rotation (sec)	Pitch	Tube Current (mA)	Scan Length (mm)	Scan Time (sec)
Renal	40mm	128	0.4	0.3	297	145	6.6
Brain	40mm	128	0.5	0.99	690	378	5.7
T Spine	40mm	128	0.75	0.61	406	282	10
Cardiac	40mm	128	0.27	1	615	164	8.5



* Optional

10 Dose management

Philips DoseWise philosophy focuses on smart beam management, reducing radiation time, and increasing dosage awareness to reduce the cumulative risk of radiation while obtaining high-quality images.

10.1 DoseWise

Feature	Specification
DoseRight ACS (Automatic Current Selection)	Optimizes the dose for each patient based on the planned scan by suggesting the lowest possible mAs settings to maintain constant image quality at low dose throughout the exam
DoseRight D-DOM (Dynamic Dose Modulation)	Automatically controls the tube current rotationally, increasing the signal over areas of higher attenuation (lateral) and decreasing signal over area of less attenuation (AP)
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- DICOM Print User
- DICOM Modality Worklist User
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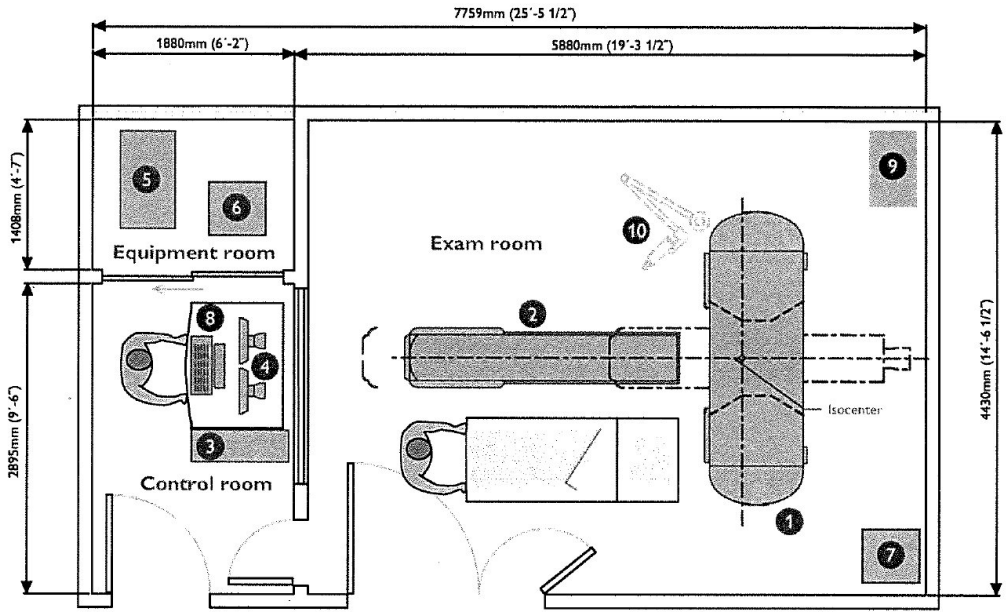
- Storage Commitment User
- Removable Media

13 Brilliance iCT SP site planning

13.1 Room layout

Contact the Philips Site Planning department for specific requirements pertaining to optional imaging/viewing/power equipment, floor space and electrical, mechanical, structural or environmental specifications.



13.2 Dimensions and weights

		weight	height	width	depth
1	Gantry	2570kg (5656lbs.)	198cm (78")	274cm (108")	97cm (38")
2	Patient Couch	445kg (981lbs.)	112cm (44")	69cm (27")	249cm (98")
3	Computer	118kg (260lbs.)	76cm (30")	30cm (12")	91cm (36")
4	LCD monitor	10kg (22lbs.)	48cm (19")	48cm (19")	22cm (8.7")
5	Recon rack	151 kg (332 lbs.)	76 cm (30")	61 cm (24")	91 cm (36")
6	Air compressor	171 kg (377 lbs.)	104 cm (41")	61 cm (24")	61 cm (24")
7	System PDU	522 kg (1150 lbs.)	122 cm (48")	58 cm (23")	86 cm (34")
	Optional features				
8	Console table	56kg (125lbs.)	76cm (30")	119cm (47")	91cm (36")
9	UPS for host and reconstruction	130 kg (286 lbs.)	46 cm (18")	63 cm (25")	66 cm (26")
10	Ceiling injector and control package	–	–	–	–

13.3 Key requirements

Power Requirements

380-480 VAC, three-phase, Wye supply

225 kVA nominal (175 kVA Max. momentary)
50/60 Hz

Environmental Requirements

Temperature:
Gantry Room: 18 to 24°C (64 to 75°F)
Rest of System: 15 to 24°C (59 to 75°F)

Humidity:
Entire System: 35% to 70% non-condensing
Storage/Transport: 10% to 90% non-condensing

Heat Dissipation:
Control Room: 4,781 BTU/hr
Exam Room: 32,888 BTU/hr
Equipment Room: 18,183 BTU/hr
Total System: 55,852 BTU/hr

For more information, please visit www.philips.com/BrillianceiCT

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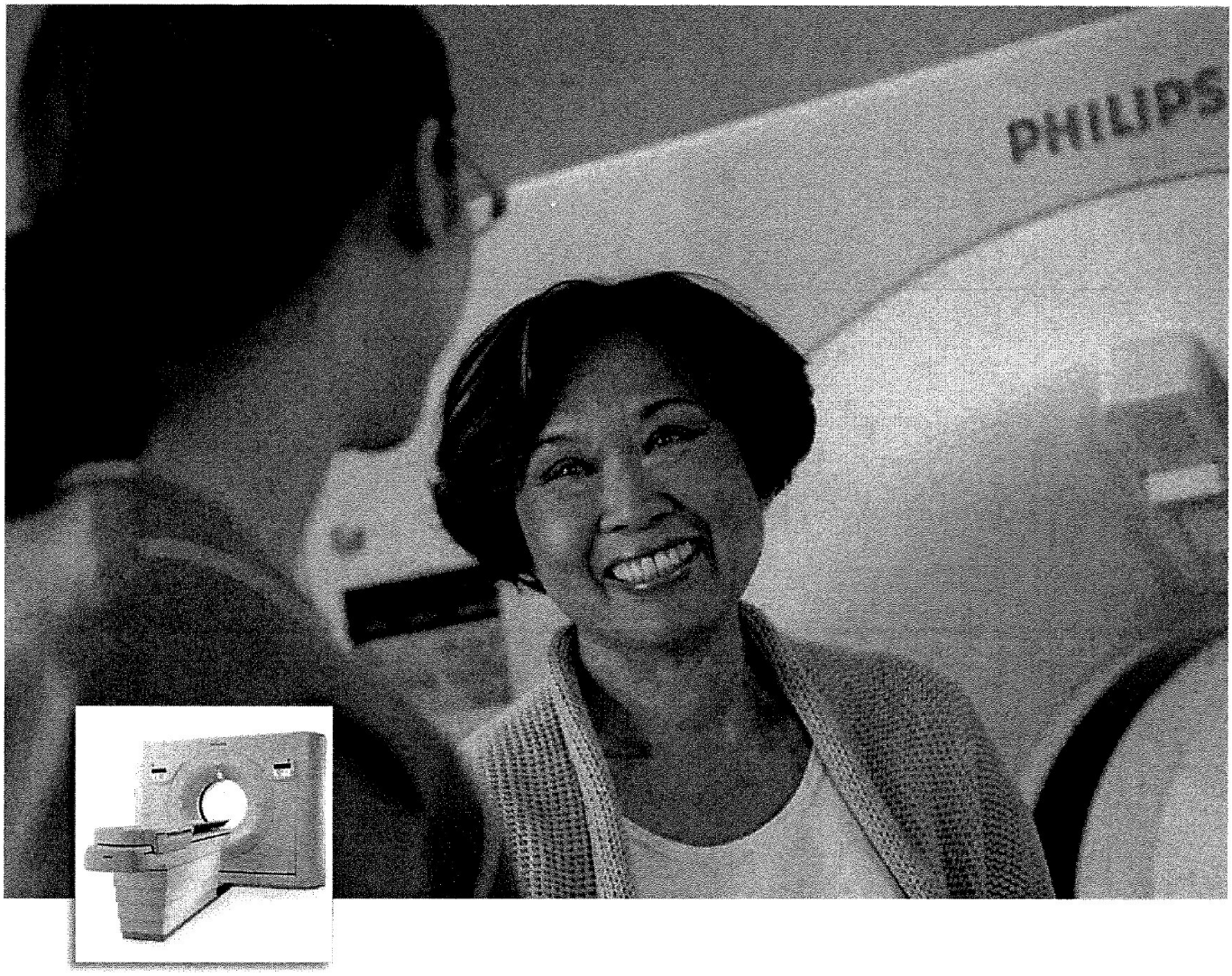


Premium results

Philips iCT family

Olszewski Declaration
Exhibit 3

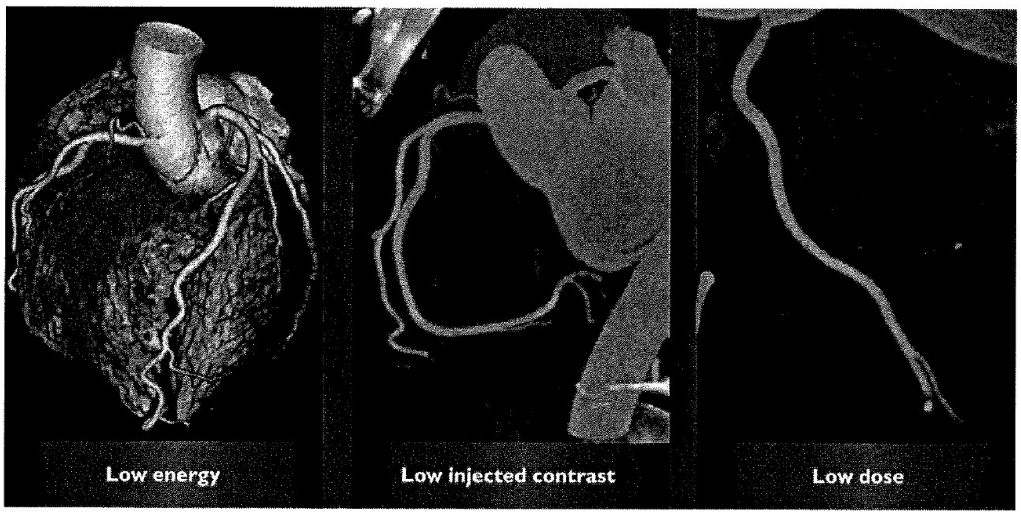
PHILIPS

Outstanding, head to toe

The Philips iCT family is specifically designed to meet the unique needs of imaging from head to toe. With a focus on clinical collaboration and integration, patient care, and economic value, this family – including the iCT Elite, iCT SP, and iCT – provides the high image quality and fast iterative reconstruction you seek with the outstanding lows that are becoming increasingly important (low energy, low dose, and low contrast sensitivity).

The iCT family is built on technologies that enhance the entire imaging chain and uphold patient-centric clinical excellence. The foundation of these systems includes NanoPanel^{3D} and NanoPanel Elite, the iDose^{4} Premium Package, advanced cardiovascular features, and iPatient – and the iCT family is IMR-ready. The iCT family helps you experience a pathway to premium results now, and in the future.

Elite results



" ... had the iCT for a couple of years, and it has been bulletproof for cardiology. It is phenomenal ...."

Director – Collected about Brilliance iCT 256 by KLAS in April 2011;

KLAS
ACCURATE. HONEST. IMPARTIAL.

Revolutionizing imaging

The unique combination of hardware innovations, state-of-the art acquisitions, and IMR – knowledge-based iterative reconstruction – offers you premium results for stroke, cardiovascular, thoracic, and runoff imaging.

Clinical integration and collaboration

- Chest CT near the dose of a chest X-ray
- More patients eligible for low-dose coronary CTA
- Full cardiac function at near background radiation levels
- Facilitate delivering appropriate contrast dose with SyncRight injector integration

Patient focus

- Sub-mSv coronary CTA for the majority of patients
- Low-dose brain perfusion protocol
- Low-dose calcium scoring
- Simultaneous 60–80% lower dose, 43–80% improved low-contrast detectability, and 70–83% lower noise with IMR*

Improved economic value

- iPatient helps increase working speed and efficiency, integrating functionality at the point of care
- Demonstrated capability to image over 100 vascular patients per day
- 72% of iDose[4] reference protocols reconstructed in 60 seconds or less
- Majority of IMR reference protocols reconstruct in under five minutes

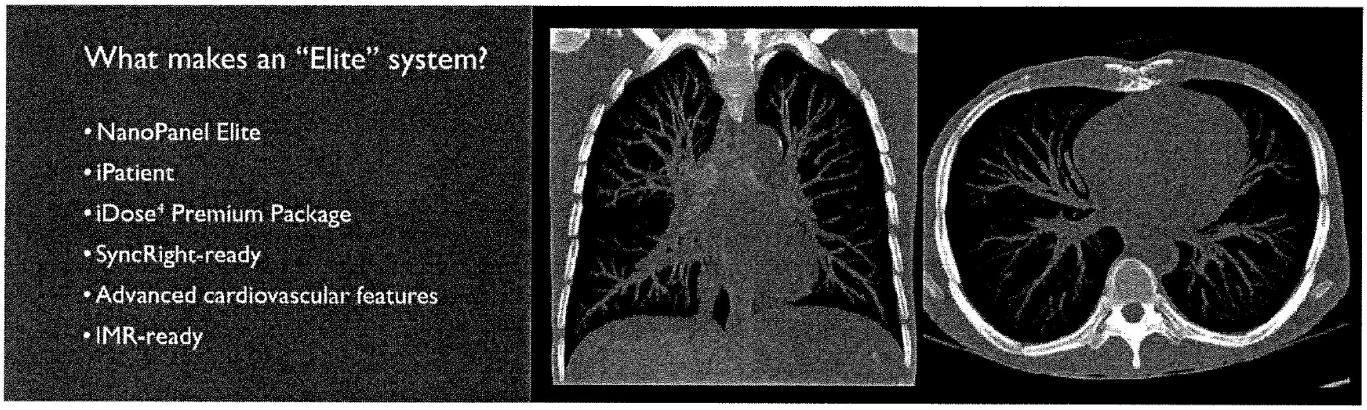
"I have used IMR for several months under various clinical conditions. I believe that IMR changes the face of CT in many ways. It improves the image quality by reducing the noise and increasing low contrast detectability even at lower radiation dose."

Emmanuel Coche, MD, PhD
Professor, Head of CT Unit, Department of Medical Imaging, Cliniques Universitaires St-Luc, Belgium

* In clinical practice, the use of IMR may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. Low-contrast detectability and noise were assessed using Reference Factory Protocol comparing IMR to FBP; measured on 0.8 mm slices, tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers.

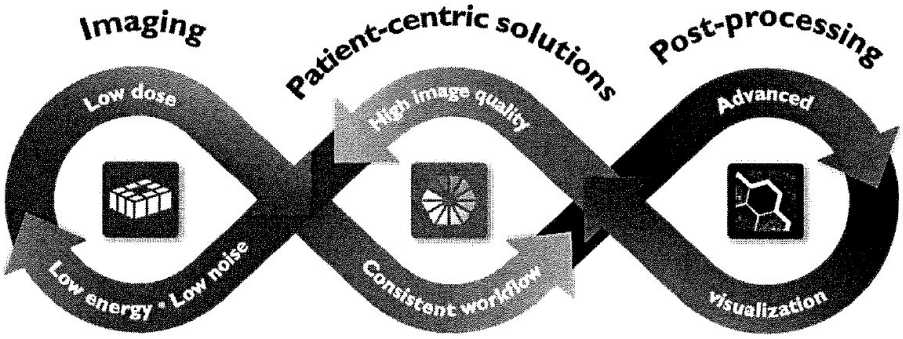
An Elite level of CT imaging

Keep the "lows" low and your quality high.



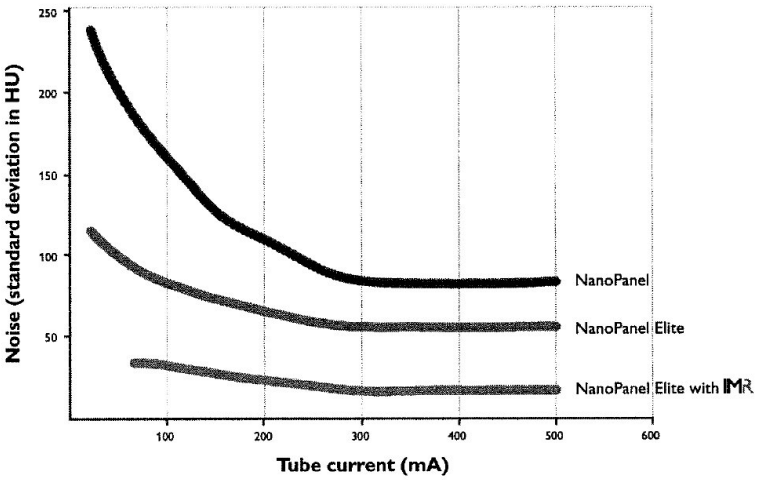
Low dose, low energy, low noise – outstanding results.

The iCT Elite configuration balances innovative technologies that enhance the entire imaging chain and uphold patient-centric clinical excellence. From the NanoPanel Elite – engineered for low dose, low energy and low noise imaging – to iPatient that puts you in control of innovative workflow solutions, the iCT Elite is in a class of its own. And it's IMR-ready, enabling industry-leading low-contrast resolution, and virtually noise-free image quality.



New NanoPanel Elite

Continuing our leadership in meaningful innovations that provide low dose, low energy and low noise with outstanding results, Philips CT is pleased to announce the iCT Elite. The foundation of the iCT Elite is the NanoPanel Elite – Philips 2nd-generation tile detector technology – engineered for low-dose, low-energy and low-noise imaging.



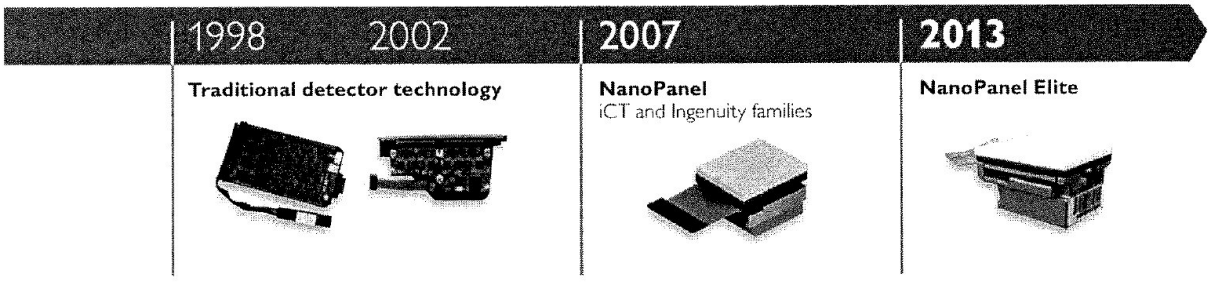
Philips was first to bring integrated, modular CT tile detector technology to the market in 2007. With thousands of NanoPanel-based systems installed globally, Philips continues to lead in CT detector design with the introduction of the NanoPanel Elite – our latest tile-detector and a 4th-generation solid-state detector.

Image noise measured in a 40 cm water phantom at low energy (80 kVp). Introduced in 2007, Philips NanoPanel demonstrated less noise than prior-generation detectors. The NanoPanel Elite continues to set the pace in CT detector technology by demonstrating further improvements in image noise at low energy, an even more impressive accomplishment. This low-noise performance is further enhanced when combined with IMR.

Elite detector technology

- Reduces image noise at low energy and low dose
- Direct integration technology
- Miniaturization and integration provide low-noise, high-fidelity signal
- Marked image noise improvement

Detector innovation



Driving operator-to-operator consistency

iCT workflow powered by **iPatient**

iPatient key benefits

- Plan the results, not the acquisition
- Patient-specific methods facilitate optimal** management of image quality and radiation dose
- Up to 24%* faster time-to-results
- Up to 66%* fewer clicks
- SyncRight – facilitates delivering appropriate contrast dose with CT/injector integration
- Enables advanced capabilities such as IMR and future technologies
- Confidence and consistency 24/7 with iPatient

Easy and efficient communication between the CT system and injector facilitates the delivery of appropriate contrast dose and consistent image quality.

Philips iPatient is an advanced platform that puts you in control of enhancing your CT system today, while getting you ready for the challenges of tomorrow.

Focus on the patient

When you're truly in control, new opportunities can emerge. In control means a multitude of ways to facilitate patient-centered imaging. It means that although every day may be different, you're confident the results can be consistent. It's having the knowledge to define what you need in terms of image characteristics, and allows you to adjust the settings automatically.

While you're working to boost return on investment now, you're also accessing a flexible platform that will support future innovations.

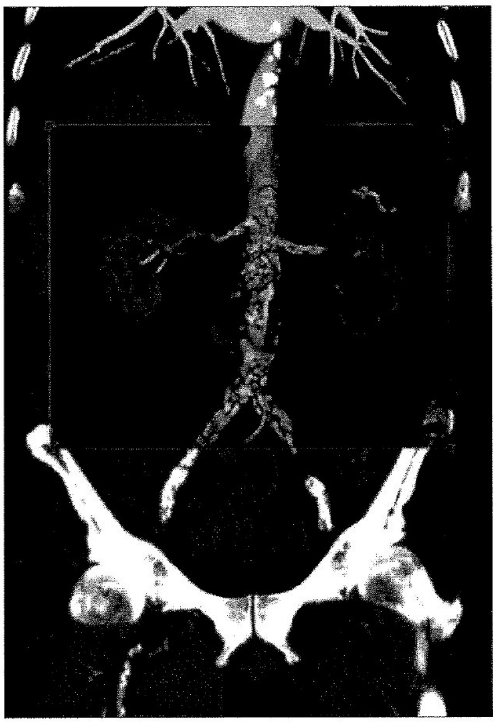
Personalize your control with iPatient and IMR

No two patients are identical, and truly focusing on the patient requires the ability to personalize your control. This means consistently achieving high image quality and managing dose appropriately every day. When iPatient and IMR work together, you have new methods that facilitate patient-specific dose management and increased diagnostic confidence.

* In a study done using multiphasic liver CT exams, the iPatient software platform reduced time-to-results by 24% and clicks per exam by 66%. Impact of workflow tools in reducing total exam and user interaction time – four-phase liver computed tomography exams. Nicholas Ardley, Southern Health; Kevin Buchan, Philips Healthcare; Ekta Dharaiya, Philips Healthcare.

** Optimal refers to the use of strategies and techniques that facilitate the management and control of both image quality and dose.

Industry-leading low-contrast resolution using IMR



Philips IMR sets a new direction in CT image quality with virtually noise-free images, unlocking significant image quality benefits combined with significantly lower doses.* This improvement is a breakthrough made possible through Philips first iterative reconstruction technique built on knowledge-based models. IMR gives you confidence through enhanced visualization of fine detail and improved accuracy.

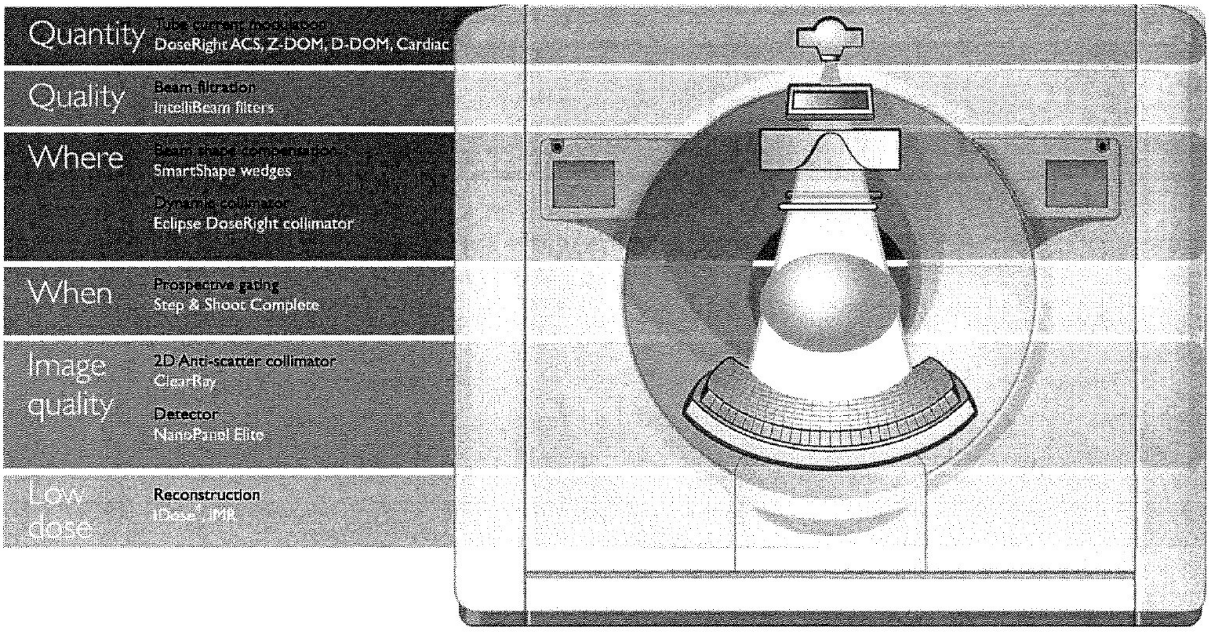
- Cardiac, perfusion, pulmonary gated
- Majority of reference protocols < 5 min recon
- IMR is an available option and upgrade for existing iCT family scanners, respectively

Simultaneously

* In clinical practice, the use of IMR may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. Low-contrast detectability and noise were assessed using Reference Factory Protocol comparing IMR to FBP; measured on 0.8 mm slices, tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers. All metrics tested on phantoms. Data on file.

Premium innovation

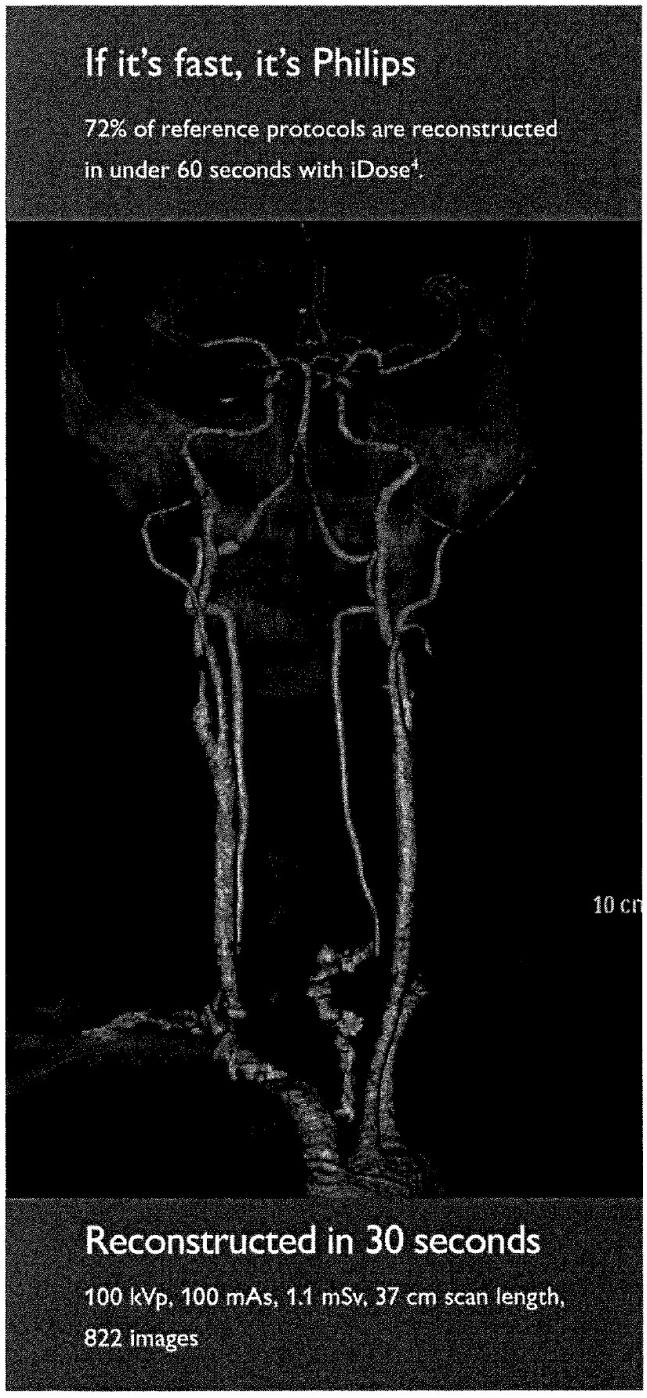
At Philips, we understand that the day-to-day aspects of CT require you to do more, in less time, and with low dose, over a wide range of body types, heart rates, and patient conditions. The iCT family is built on the best in Philips class intelligent technologies for the speed, accuracy, and reliability to enhance your workflow on a daily basis.



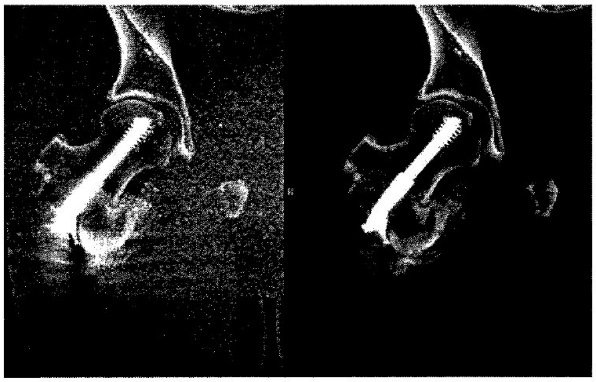
"While CT radiation dose is an important issue in modern times, it is equally important to perform a high-quality exam that adequately addresses the clinical issues affecting our patients. Managing the appropriate radiation without compromising the image remains critical."

Scott Logan, MD, MBA, Senior Medical Director of Medical Imaging
Southern Ohio Medical Center, Portsmouth, OH, USA

Award-winning premium results



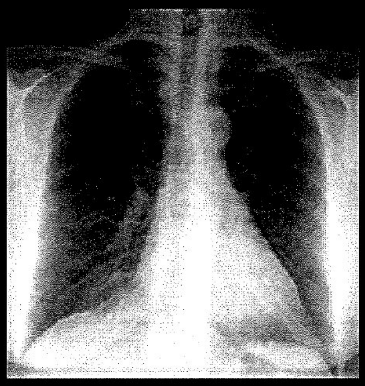
The iCT family features the award-winning iDose⁴ Premium Package, which includes two leading technologies that can improve image quality: iDose⁴ and metal artifact reduction for large orthopedic implants (O-MAR). iDose⁴ improves image quality* through artifact prevention and increased spatial resolution at low dose. O-MAR reduces artifacts caused by large orthopedic implants. Together they produce high image quality with reduced artifacts.



Artifacts from large metal objects such as orthopedic implants can be problematic in imaging. These artifacts typically result in loss of anatomical information, impeding visualization of tissue and critical structures. That is why Philips is offering the iDose⁴ Premium Package.

* Improved image quality as defined by improvements in spatial resolution and/or noise reduction as measured in phantom studies.

Clinical case study collection



Chest X-ray, 0.05 mSv

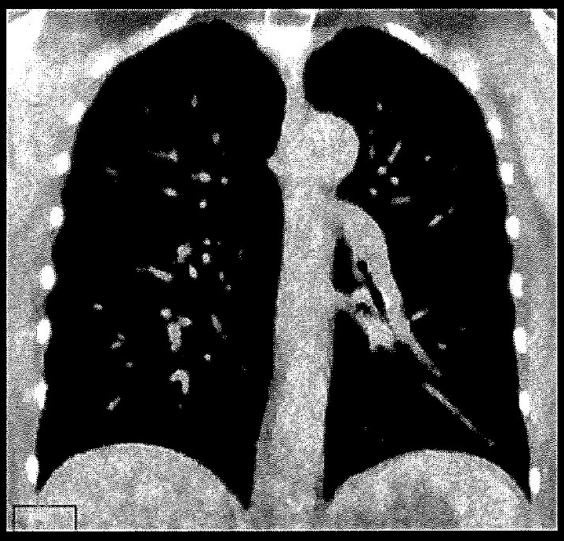
Chest CT with IMR, 0.11 mSv

Ground-glass opacity visualized on chest CT with IMR demonstrating low dose and high image quality, simultaneously

Scan parameters

- 80 kVp
- 10 mAs
- $CTDI_{vol}$ – 0.2 mGy
- DLP – 8.2 mGy*cm
- Effective dose – 0.11 mSv (k=0.014*)

Filtered back projection



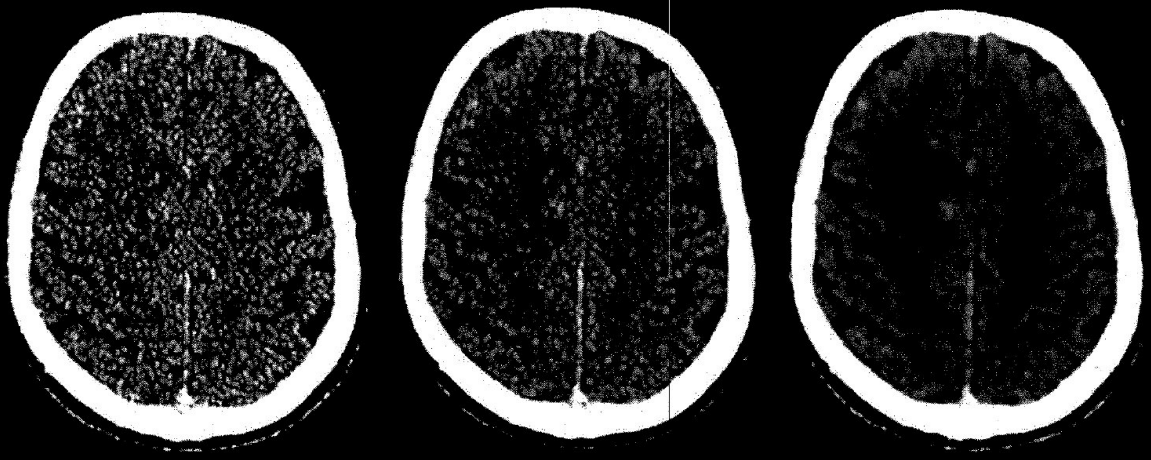
Reconstruction using IMR

*AAPM Technical Report 96.
Images courtesy of Cliniques Universitaires St-Luc, Belgium.

71-year-old man with hemorrhagic lesions not seen on filtered back projection image – low contrast, low noise, and high detail

Scan parameters

- 120 kVp
- 300 mAs
- $CTDI_{vol}$ – 14.3 mGy
- DLP – 1.8 mGy*cm
- Effective dose – 1.8 mSv (k=0.0021*)



Standard reconstruction (FBP)
1 mm slice thickness

Standard reconstruction (FBP)
3 mm slice thickness

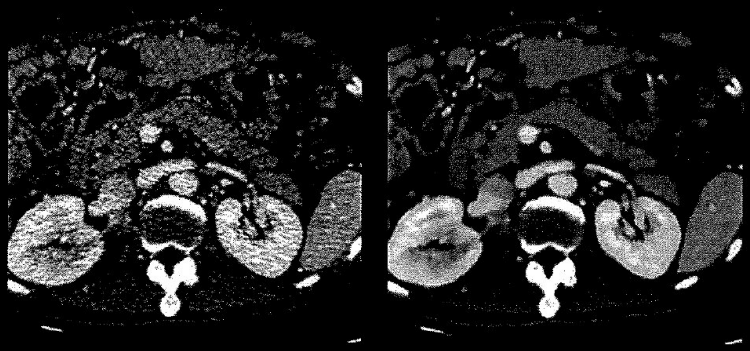
Reconstruction using IMR
1 mm slice thickness

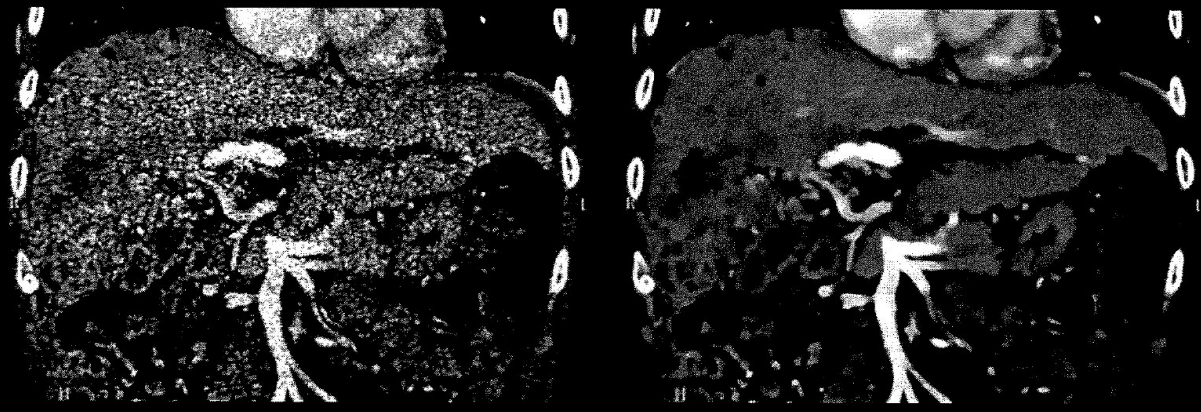
*AAPM Technical Report 96.
Images courtesy of Cliniques Universitaires St-Luc, Belgium.

Improve low-contrast detectability – detect small and subtle differences

Scan parameters

- 80 kVp
- 500 mAs
- $CTDI_{vol}$ – 9.8 mGy
- DLP – 170.5 mGy*cm
- Effective dose – 2.5 mSv (k=0.015*)
- Slice thickness – 0.68 mm





Standard reconstruction (FBP)

Reconstruction using IMR

"We have been using IMR for routine body imaging, and are extremely excited about the virtually noise-free benefits of improving lesion conspicuity and anatomical detail. This new technological development provides diagnostic information that helps us increase our confidence in making a diagnosis. These significant benefits are likely to help strengthen CT's position as the backbone of radiology."

Barry Daly, MD, FRCR

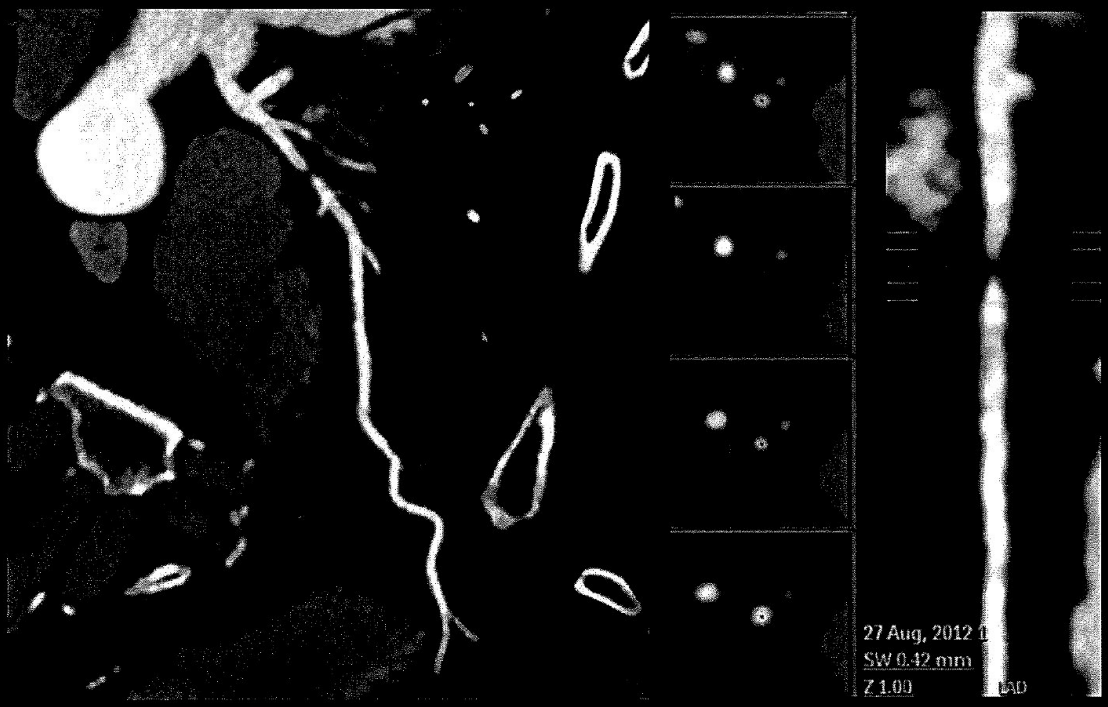
Professor of Radiology, University of Maryland School of Medicine Chief of Abdominal Imaging and Vice Chair for Research University of Maryland Medical Center, USA

*AAPM Technical Report 96.
Images courtesy of Guangdong General Hospital, China.

Industry-leading – first knowledge-based iterative reconstruction for gated acquisitions

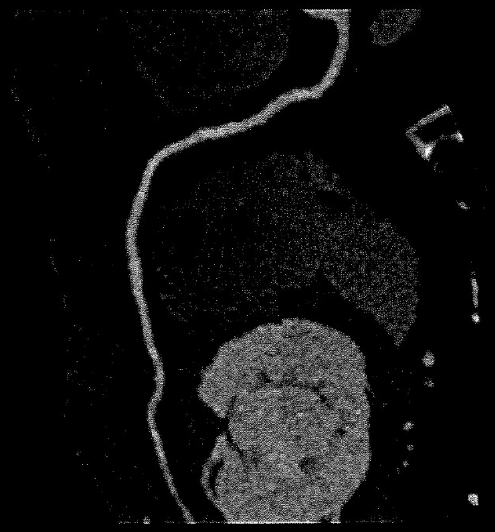
Scan parameters

- 100 kVp
- 110 mAs
- $CTDI_{vol}$ – 5.2 mGy
- DLP – 67.1 mGy*cm
- Effective dose – 0.9 mSv (k=0.014*)



*AAPM Technical Report 96.
Images courtesy of Amakusa Medical Center, Japan.

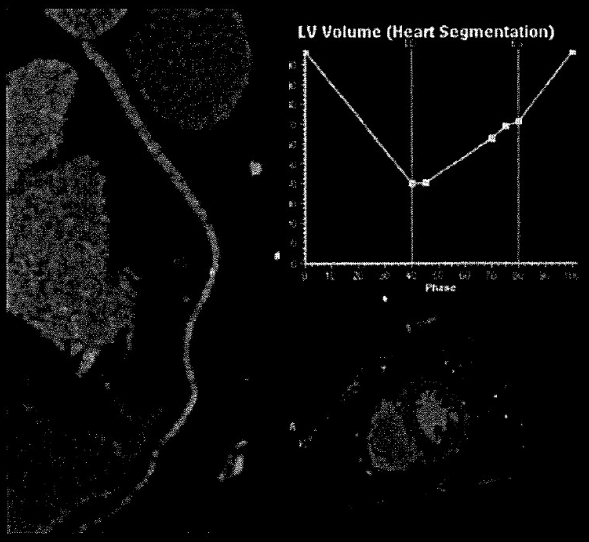
Step & Shoot Complete
sub-mSv coronary CTA with iDose[4]



Scan parameters

- 100 kVp
- 75 mAs
- Collimation – 2 x 112 x 0.625 mm
- Coverage – 10.9 cm
- iDose[4] – Level 7
- $CTDI_{vol}$ – 3.8 mGy
- DLP – 40.9 mGy*cm
- Effective dose – 0.6 mSv (k = 0.014*)
- Reconstruction time – 14 s (241 images)

Full cardiac function below background radiation



Scan parameters

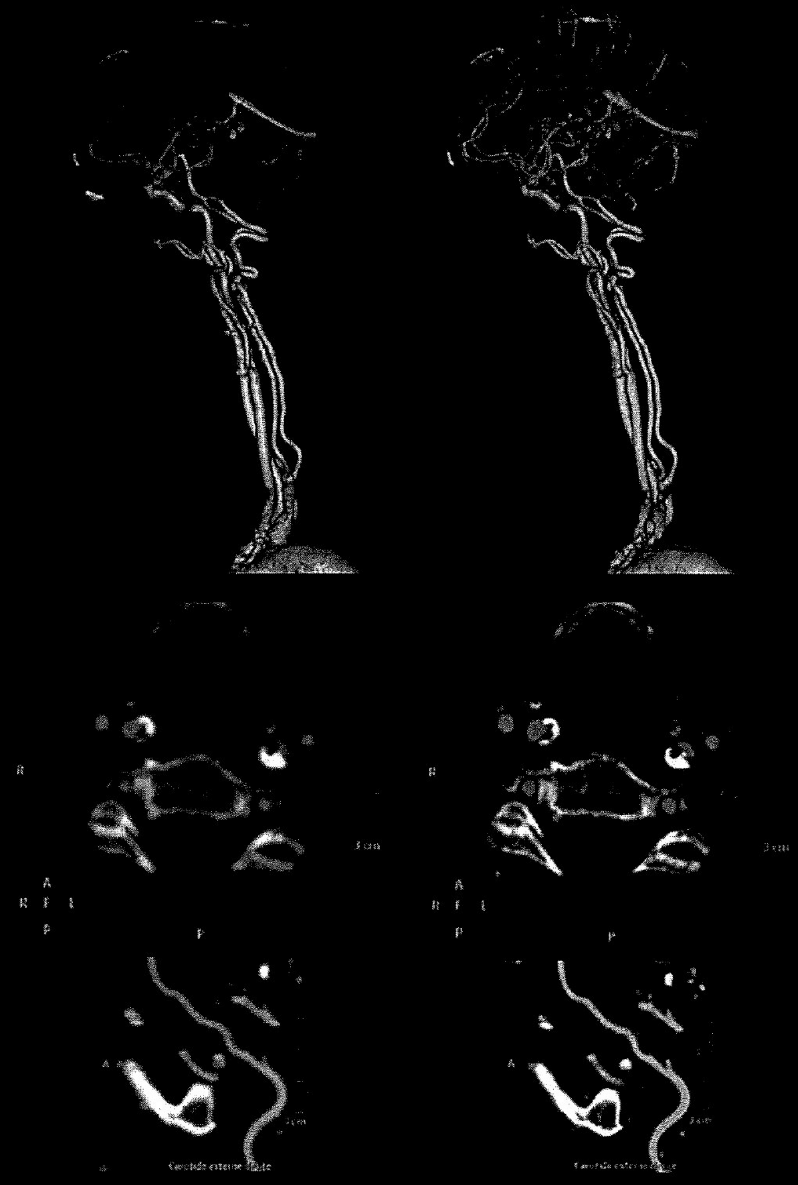
- 100 kVp
- 273 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 16.5 cm
- iDose[4] – Level 4
- $CTDI_{vol}$ – 10.5 mGy
- DLP – 223.2 mGy*cm
- Effective dose – 3.1 mSv (k = 0.014*)
- Reconstruction time – 13 s (165 images)

*AAPM Technical Report 96

Neurovascular imaging –
high resolution with low noise

Scan parameters

- 100 kVp
- 200 mAs
- $CTDI_{vol}$ – 8.8 mGy
- DLP – 35.1 mGy*cm
- Effective dose – 0.7 mSv
  (k=0.0021*)



Standard reconstruction (FBP)

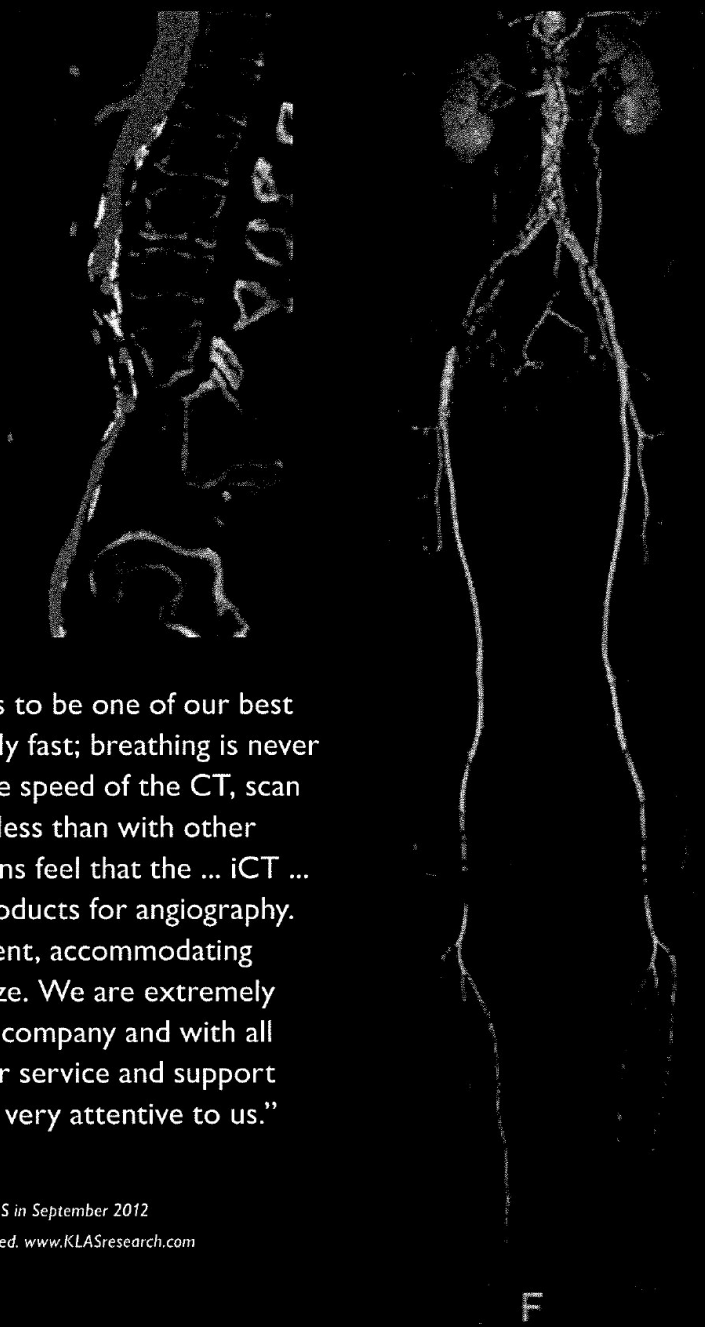
Reconstruction using IMR

*AAPM Technical Report 96.
Images courtesy of Cliniques Universitaires St-Luc, Belgium.

Low energy, low contrast
CTA runoff

Scan parameters

- 100 kVp
- 42 mAs
- Collimation – 2 x 64 x 0.625 mm
- Coverage – 120.1 cm
- iDose[4] – Level 3
- $CTDI_{vol}$ – 1.8 mGy
- DLP – 228.0 mGy*cm
- Effective dose – 3.4 mSv
  (k = 0.015*)
- Reconstruction time – 90 s
  (1714 images)



"The ... iCT ... continues to be one of our best scanners. It is extremely fast; breathing is never an issue. Because of the speed of the CT, scan times are dramatically less than with other products. Our physicians feel that the ... iCT ... is one of the better products for angiography. The bore size is excellent, accommodating patients of most any size. We are extremely happy with Philips as a company and with all of their products. Their service and support are excellent. Philips is very attentive to us."

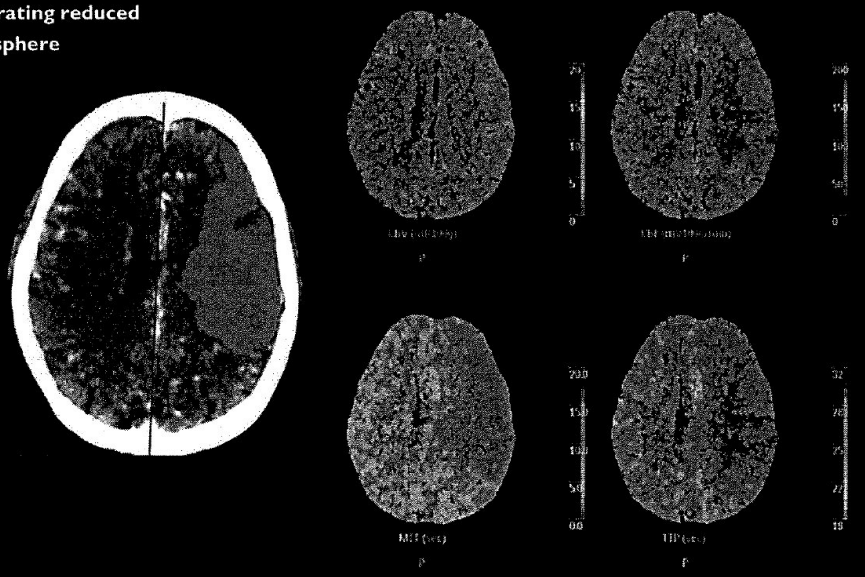
Director

Collected about Brilliance iCT 256 by KLAS in September 2012

*AAPM Technical Report 96

F

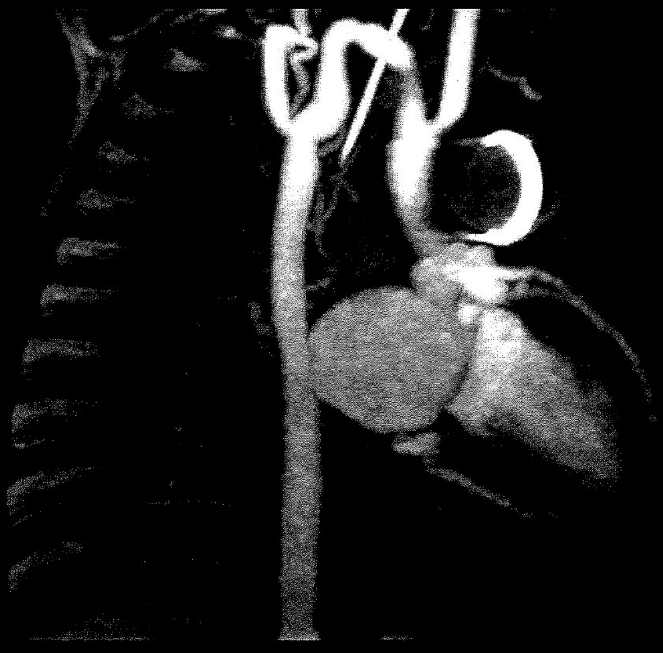
CT brain perfusion exam demonstrating reduced mean-transit time in the left hemisphere



Scan parameters

- 80 kVp
- 70 mAs
- Coverage – 16 cm
- iDose^4 – Level 3
- $CTDI_{vol}$ – 2.7 mGy
- Effective dose – 1.8 mSv (k = 0.021*)
- Reconstruction time – 12 s

Pediatric CTA with fast scan speed, high heart rate



Scan parameters

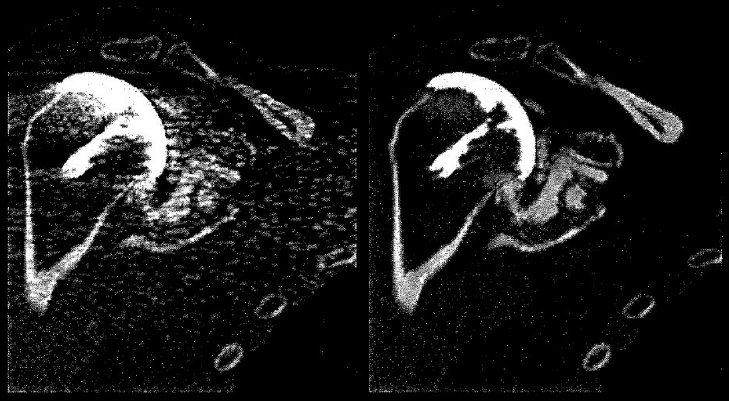
- 80 kVp
- 100 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 10.3 cm
- iDose^4 – Level 3
- $CTDI_{vol}$ (16 cm) – 4.4 mGy
- DLP – 45.2 mGy*cm
- Effective dose – 1.8 mSv (k = 0.039*)
- Heart rate – 143 bpm
- Reconstruction time – 12 s

*AAPM Technical Report 96

High image quality shoulder with reduced artifacts

Scan parameters

- 120 kVp
- 201 mAs
- Collimation – 64 x 0.625 mm
- Coverage – 14.7 cm
- iDose^4 – Level 4
- O-MAR – On
- Focal spot resolution – High
- Image matrix – 768 x 768
- DLP – 204.3 mGy*cm
- $CTDI_{vol}$ – 13.9 mGy
- Effective dose – 2.9 mSv (k = 0.014*)



Bi-lateral hip implants with the iDose^4 Premium Package

Scan parameters

- 120 kVp
- 380 mAs
- Collimation – 128 x 0.625 mm
- Coverage – 59 cm
- Scan time – 7.6 s
- iDose^4 – Level 4
- O-MAR – On
- Focal spot resolution – High
- Image matrix – 768 x 768

"I cannot say enough positive things about Philips and the ... iCT .... It is reliable, and we get excellent images. The quality of these images is amazing, and the machine does exactly what Philips said it would do. We think it was a good purchase."

Director

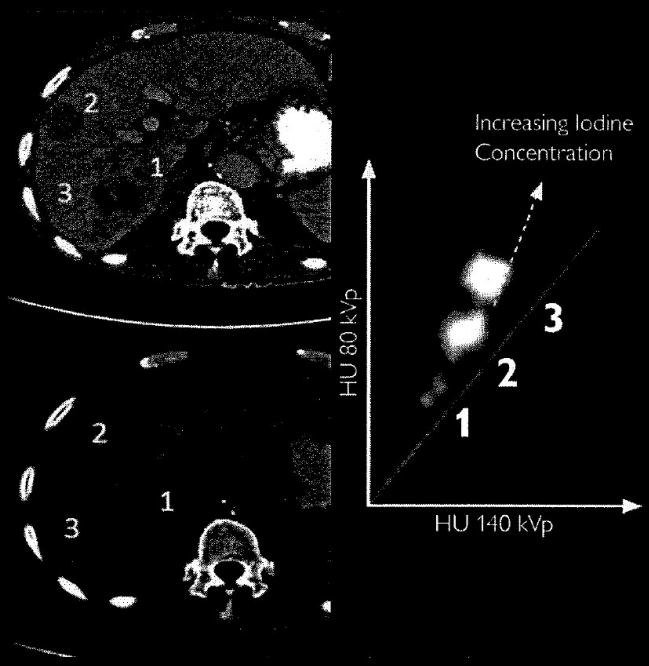
Collected about Brilliance iCT 256 by KLAS in March 2013.

*AAPM Technical Report 96

Dual-energy scan demonstrating quantitative analysis of iodine enhancement

Scan parameters

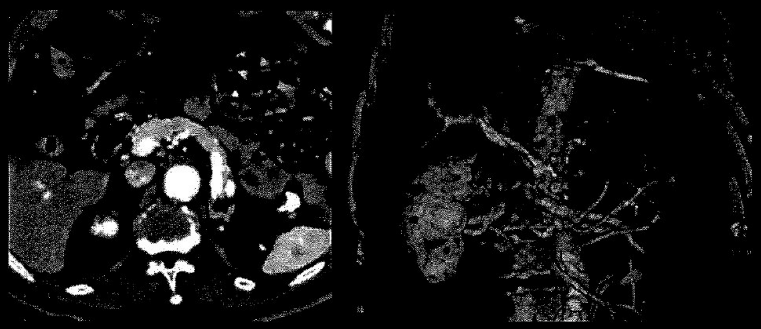
- 80/140 kVp
- 460/90 mAs
- Collimation – 64 x 0.625 mm
- iDose[4] – Level 4
- DLP – 75.2 mGy*cm
- $CTDI_{vol}$ – 9.4 x 2 mGy
- Effective dose – 1.1 mSv (k = 0.015*)



Low-energy, low-dose, thin-slice abdominal CTA reconstructed with IMR demonstrating simultaneously high spatial and low-contrast resolution

Scan parameters

- 80 kVp
- 500 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 19.5 cm
- DLP – 191 mGy*cm
- $CTDI_{vol}$ – 9.8 mGy
- Effective dose – 2.9 mSv (k = 0.015*)

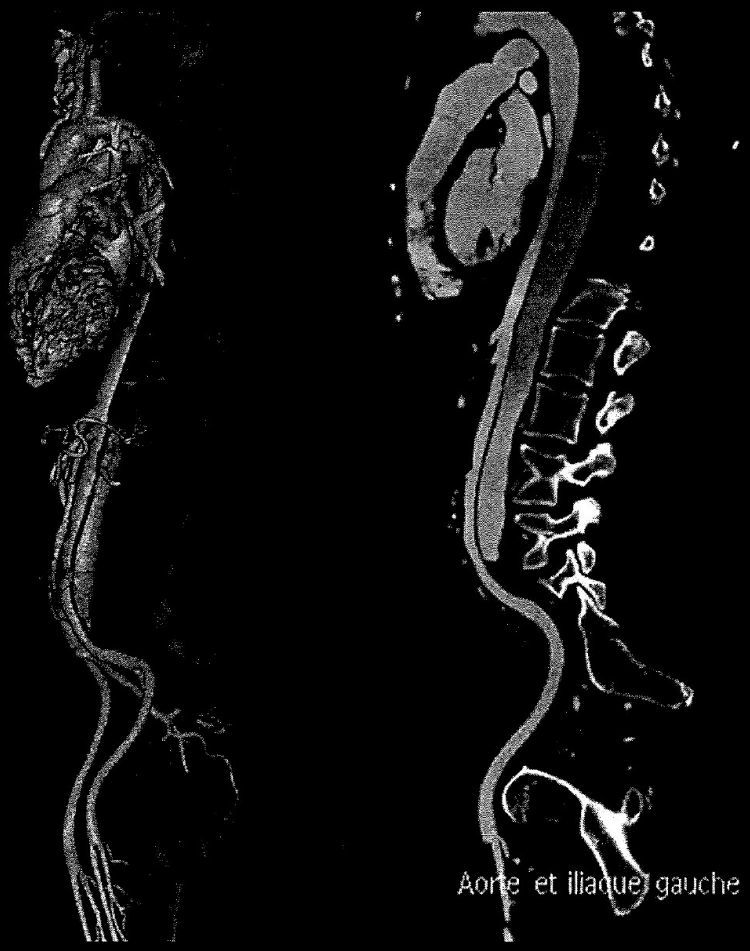


*AAPM Technical Report 96

Step & Shoot Complete
with automatic bone removal

Scan parameters

- 100 kVp
- 140 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 65.9 cm
- iDose^4 – Level 5
- DLP – 545.3 mGy*cm
- $CTDI_{vol}$ – 8.3 mGy
- Effective dose – 8.2 mSv (k = 0.015*)



*AAPM Technical Report 96

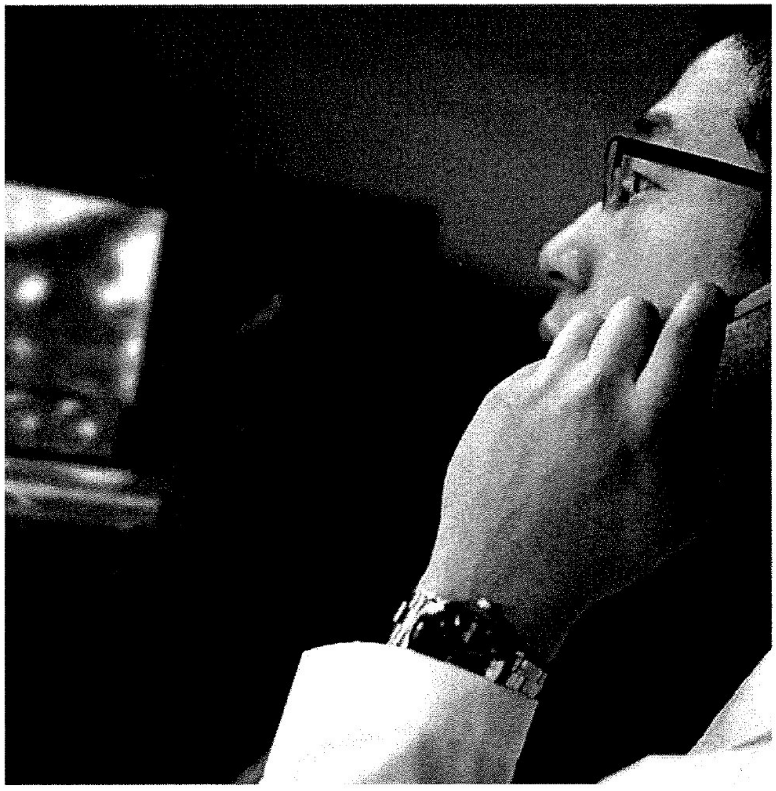
Advanced applications

Key advantages

- Rich clinical applications: Unlock the full potential of your imaging systems in order to quickly quantify and diagnose
- Multimodality access anywhere: Advanced clinical applications, new workflow and collaboration tools available anywhere
- Enhanced zero-click preprocessing accelerates multimodality imaging analysis for increased diagnostic confidence

Philips offers best-in-KLAS applications for extracting information from low-dose, high-quality images.

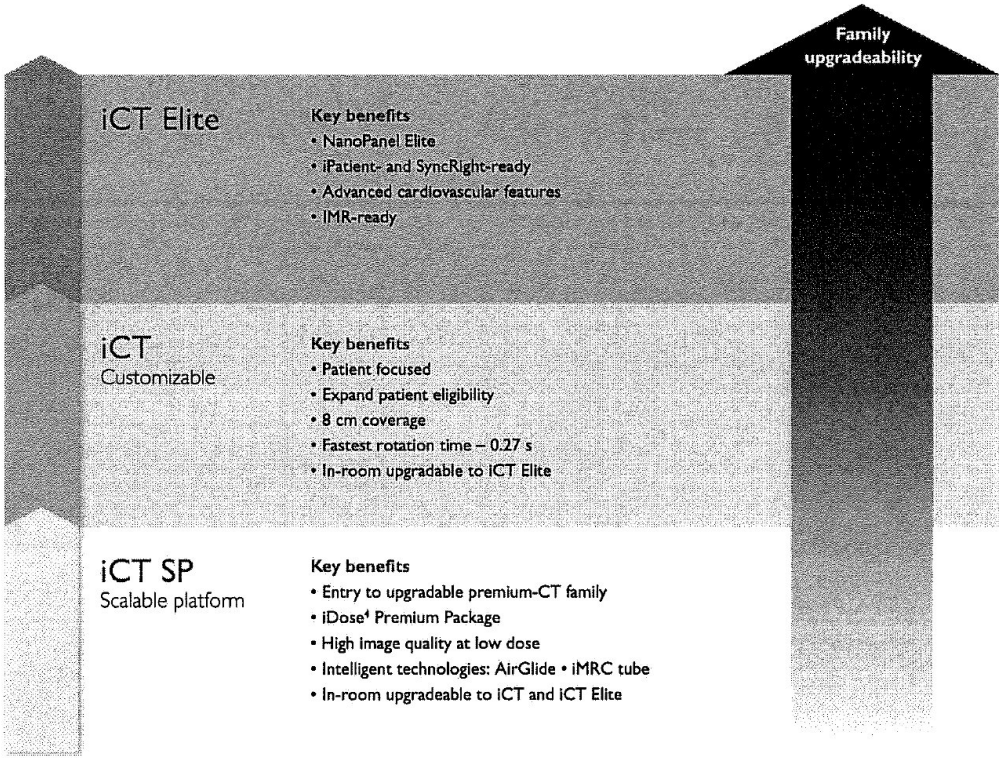
Philips IntelliSpace Portal makes real-time radiology a reality. Combining proven clinical applications, workflow, and collaboration tools, Philips IntelliSpace Portal offers exceptional flexibility to access CT, MR, and MI images, analyze and quantify information, and collaborate* with colleagues.



*Collaboration enables viewing and sharing – it is not to be used for diagnosis.

On the SmartPath with you

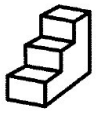
We understand how critical it is to elevate quality and efficiency in your daily work routine and we know that no two practices are alike. This is why we developed a customizable premium approach to the iCT family of scanners. Our goal is to put you at the forefront of new clinical innovations, and Philips SmartPath is your way to obtain access to the latest innovations throughout the cycle of your ownership.



Philips SmartPath provides you easy access to solutions and innovations for the full life of your computed tomography system, so you can boost your clinical and operational potential and achieve your organizational goals.

Optimize

Optimize your system's performance both now and in the future with regular and ongoing updates, including functionality improvements and remote technical support.



Enhance

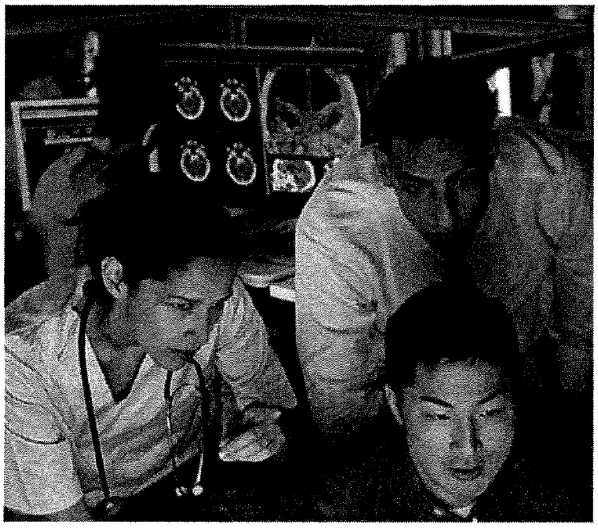
Enhance your equipment with regular technology upgrades, and take advantage of the newest features and capabilities.

Transform

Transform your investment at the end of your system's life by transitioning seamlessly to a next-generation solution or refurbished option.

We've got you covered

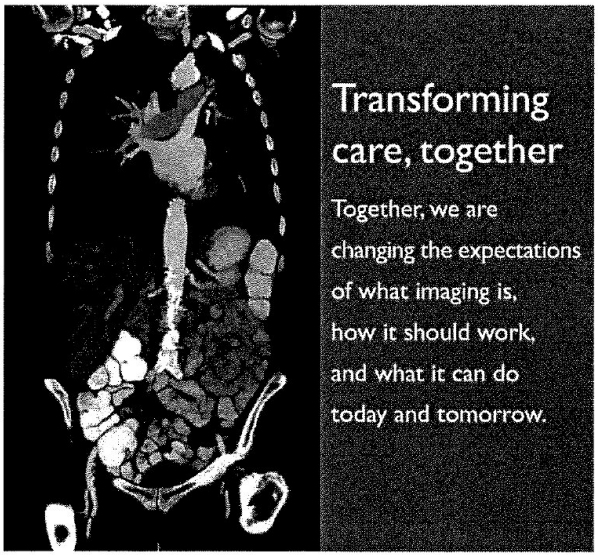
The excellent uptime of the iCT family is due in part to proactive monitoring and visual diagnostics, which allow us to address issues quickly for our customers.



Link to hospital information systems.

Remote means we're close and quick. Philips Remote Services have been engineered to automatically probe your scanner in order to address problems before they occur, help reduce disruption, and keep your workflow on track.

By proactively monitoring the health of your system, a service engineer can arrive at your site with the proper knowledge and parts to help reduce the critical time to repair.



NetForum Community

NetForum is a virtual clinical community where users from around the globe share clinical experiences, learn from peers, and optimize their own results. See our commitment to this mission to expand the clinical effectiveness of diagnostic imaging, demonstrated in our online user community: **www.philips.com/netforum**

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Please visit www.philips.com/iCT

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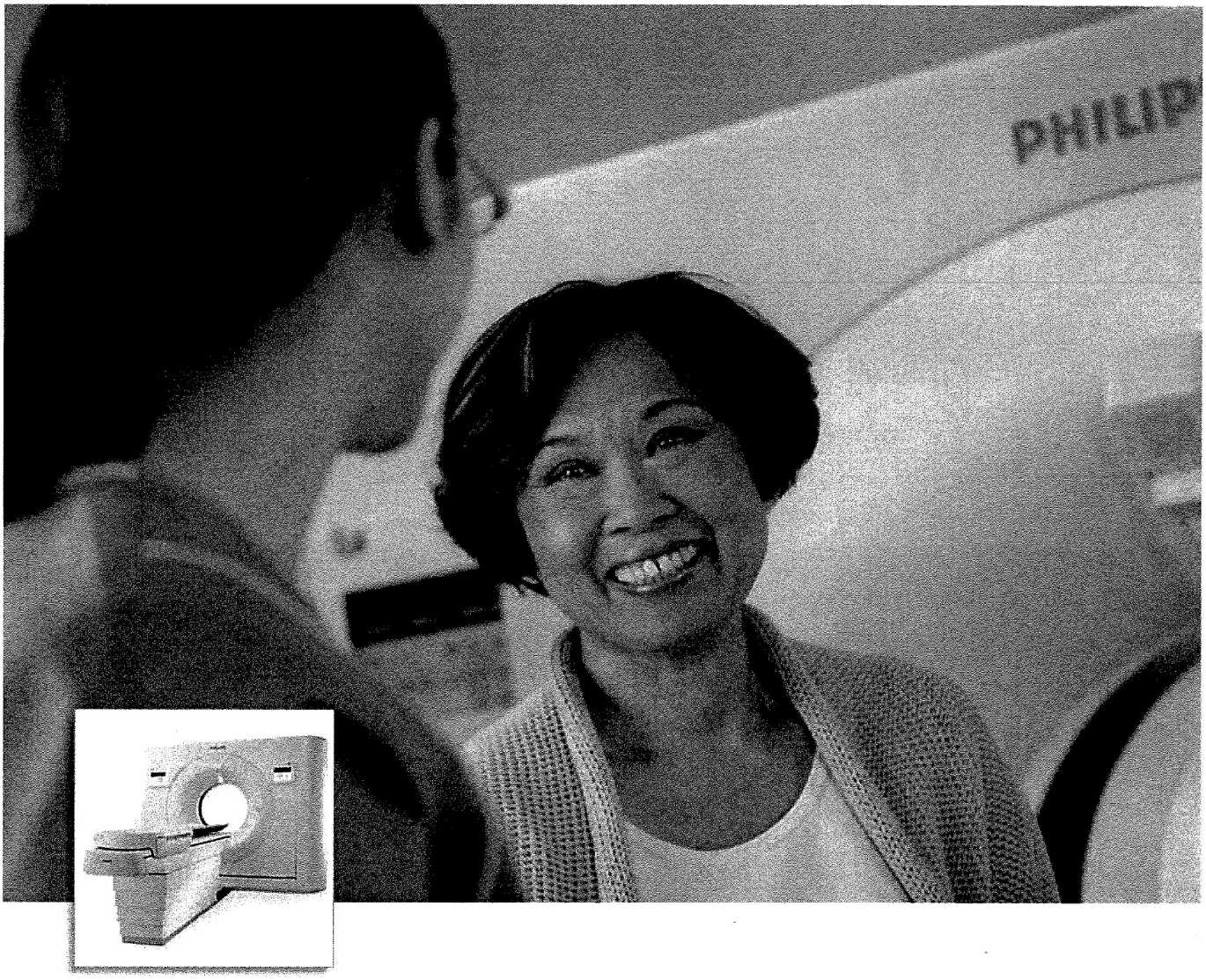


Premium results

Philips iCT family

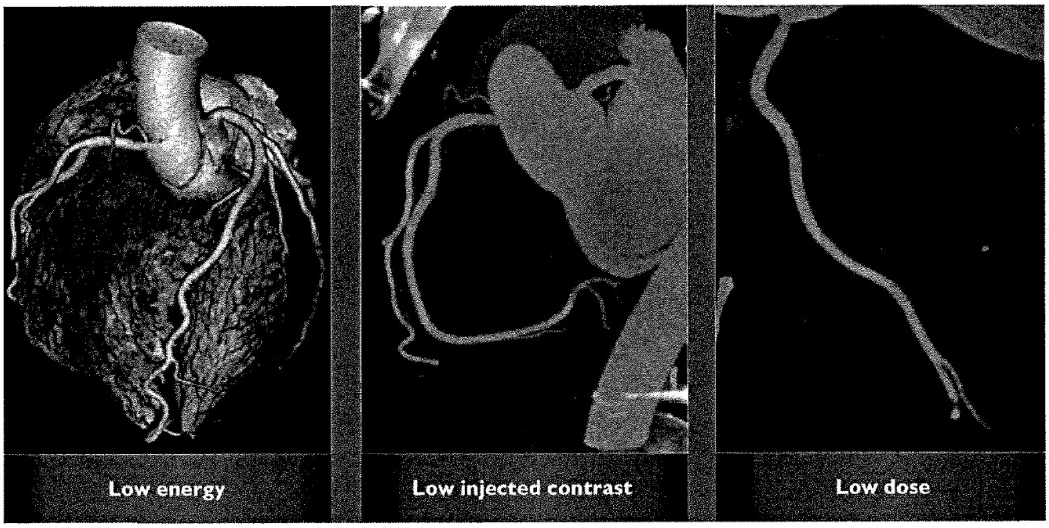
Olszewski Declaration
Exhibit 4

PHILIPS
sense and simplicity

Outstanding, head to toe

The Philips iCT family is specifically designed to meet the unique needs of imaging from head to toe. With a focus on clinical collaboration and integration, patient care, and economic value, this system will provide the high image quality you seek with the outstanding lows that are becoming increasingly important (low energy, low dose, and low injected contrast). The iCT TVI is a new approach to total vascular imaging.

High quality results



The iCT is taking CT imaging to a whole new level. Not only does this scanner deliver exceptional image quality, its advanced technology can also help you to reduce X-ray dose and injected contrast, important factors for managing patient risk. And it's a new approach to total vascular imaging through a unique combination of low-kVp scanning and an iterative reconstruction technique that improves low contrast sensitivity.

Revolutionizing imaging

The unique combination of hardware innovations, state-of-the art acquisitions, and iDose[4] iterative reconstruction technique offers you premium results for stroke, cardiovascular, thoracic, and runoff imaging.

Clinical integration and collaboration

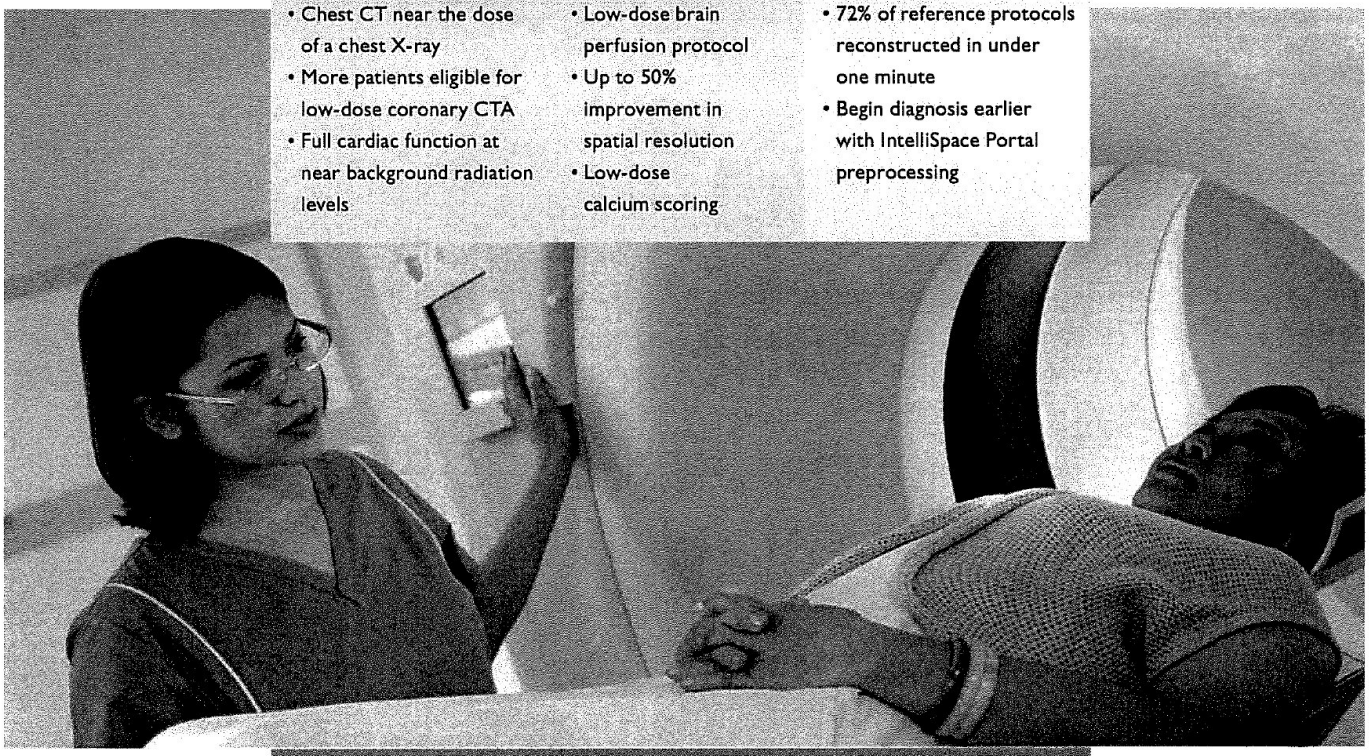
- Low-energy imaging for the majority of patients
- Chest CT near the dose of a chest X-ray
- More patients eligible for low-dose coronary CTA
- Full cardiac function at near background radiation levels

Patient focus

- Sub-mSv coronary CTA for the majority of patients
- Low-dose brain perfusion protocol
- Up to 50% improvement in spatial resolution
- Low-dose calcium scoring

Economic value

- Demonstrated capability to image over 100 vascular patients per day
- 72% of reference protocols reconstructed in under one minute
- Begin diagnosis earlier with IntelliSpace Portal preprocessing



What is Imaging 2.0?

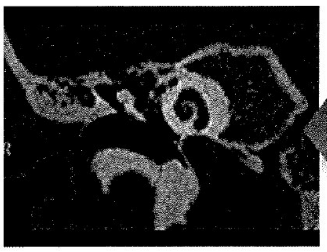
Web 2.0 described the evolution of the web from being data-driven to user-centric, redefining the way people connect, share, and use the Internet. Imaging 2.0 is doing the same, bringing a new world of possibilities for radiology. It is about integration and collaboration, and new levels of patient focus and care that can help clinicians achieve what was unimaginable just a few short years ago.

The results you want

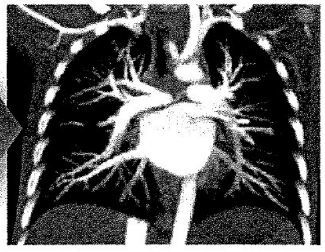
Philips iDose[4] gives you control of the dial so you can personalize image quality based on your patients' needs at low dose. This is a 4th-generation advanced iterative reconstruction technique that, when used in combination with the advanced technologies of the iCT family, provides a unique approach to managing important factors in patient care – low-energy, low-dose, and low injected contrast imaging.

Which setting do you need?

Increase resolution with low dose
120 kVp; 150 mAs
$CTDI_{vol}$ (16 cm) – 10.2 mGy
DLP – 187 mGy*cm
Effective dose – 0.6 mSv*



Significantly improve resolution
120 kVp; 230 mAs
$CTDI_{vol}$ (16 cm) – 38.3 mGy
DLP – 187.0 mGy*cm
Effective dose – 0.75 mSv*



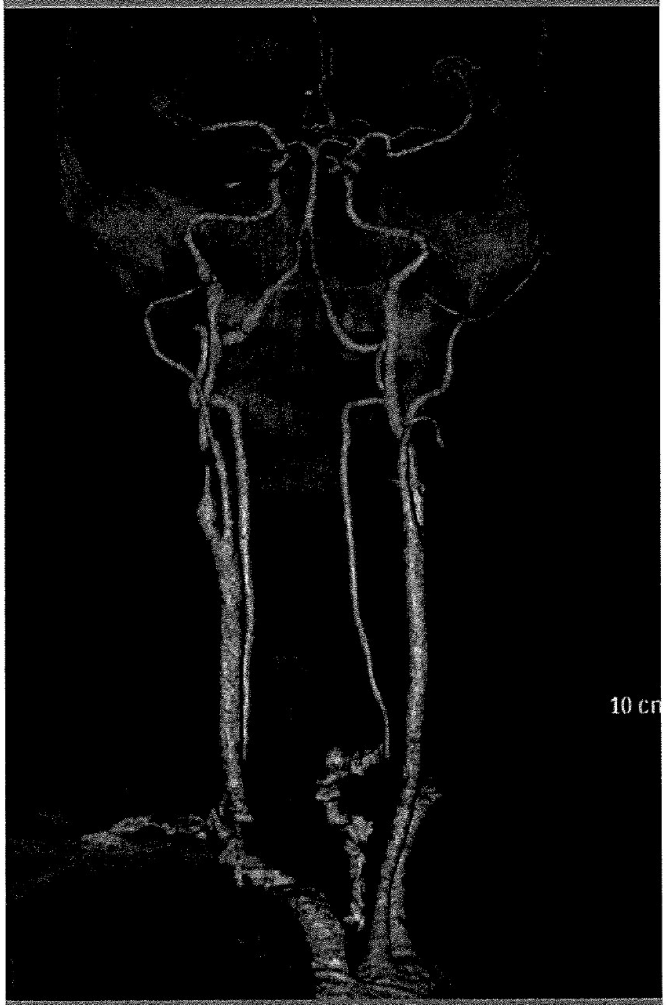
Manage dose without sacrificing image quality
80 kVp; 10 mAs
$CTDI_{vol}$ (32 cm) – 0.12 mGy
DLP – 2.9 mGy*cm
Effective dose – 0.16 mSv*

*AAPM Technical Report 96

at the speeds you need

If it's fast, it's Philips

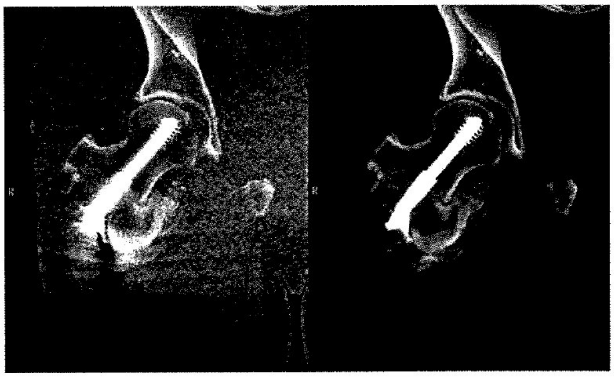
72% of reference protocols are reconstructed in under 60 seconds with the iDose[4] iterative reconstruction technique.



Reconstructed in 30 seconds

100 kVp, 100 mAs, 1.1 mSv, 37 cm scan length, 822 images

With iDose[4], reconstruction is achieved in seconds rather than minutes. This is due to the innovative RapidView IR reconstruction engine. Designed to support iDose[4], this proprietary technology allows for this iterative reconstruction technique to be used routinely in inpatient, outpatient, and emergency-care settings. The design seamlessly integrates into your CT department, and provides you the look and feel of conventional, higher-dose images without long processing times.



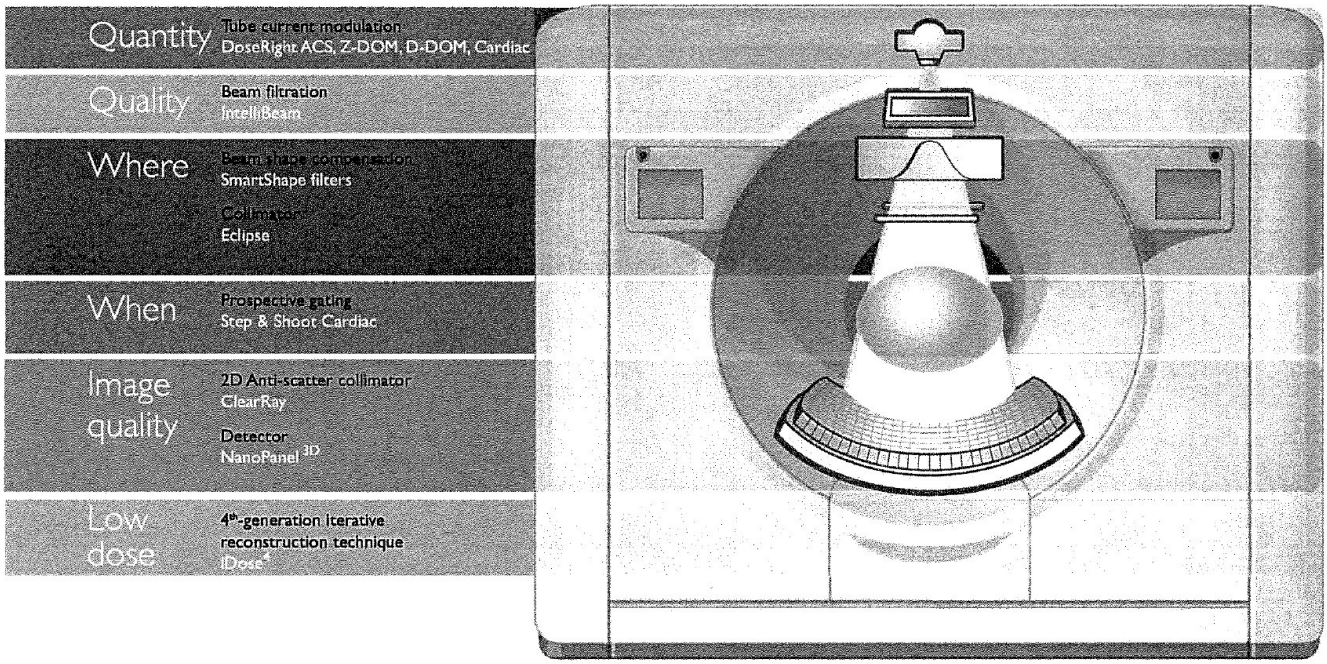
iDose[4] Premium Package

Artifacts from large metal objects such as orthopedic implants can be problematic in imaging. These artifacts typically result in loss of anatomical information, impeding visualization of tissue and critical structures. That is why Philips is offering the iDose[4] Premium Package. iDose[4], Philips 4th-generation iterative reconstruction technique, improves image quality* through artifact prevention and increased spatial resolution. O-MAR reduces artifacts caused by large orthopedic implants.

* Improved image quality as defined by improvements in spatial resolution and/or noise reduction as measured in phantom studies.

Premium innovation

At Philips, we understand that the day-to-day aspects of CT require you to do more, in less time, and with low dose, over a wide range of body types, heart rates, and patient conditions. The iCT family is built on the best in Philips class intelligent technologies for the speed, accuracy, and reliability to enhance your workflow on a daily basis.

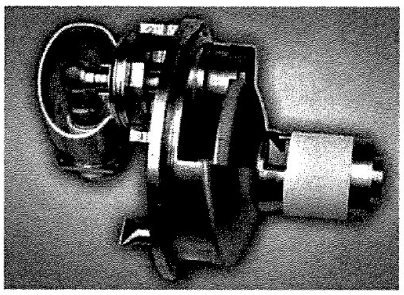


"While CT radiation dose is an important issue in modern times, it is equally important to perform a high-quality exam that adequately addresses the clinical issues affecting our patient. Managing the appropriate radiation without compromising the image remains critical."

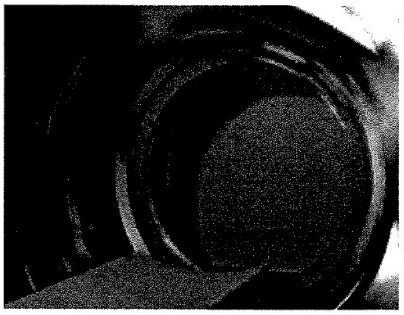
Scott Logan, MD, MBA, Senior Medical Director of Medical Imaging
Southern Ohio Medical Center, Portsmouth, OH, USA

Leading the industry

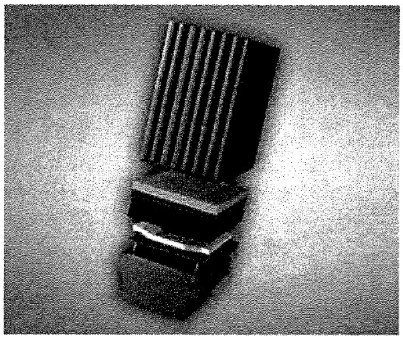
iMRC X-ray tube
- Most powerful scanner available globally
- Segmented anode and direct liquid cooling allow high-throughput scanning
- Smart Focal Spot doubles the number of projections for high image quality



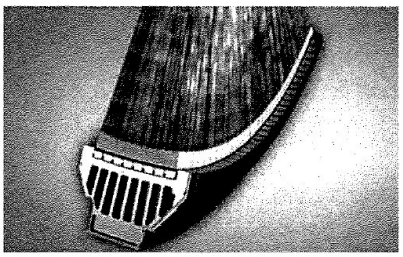
AirGlide gantry
- Fastest scanner available globally
- Floats on a frictionless cushion of air for high-speed stability
- 0.27 second rotation time*



NanoPanel^{3D} detector
- Industry's first modular, integrated, and scalable detector
- Reduces electronic noise by 86% versus conventional detector design
- Industry's first 2D antiscatter grid – ClearRay collimator reduces the effects of scattered radiation not contributing to image formation



Spherical detector
- World's first true spherical detector geometry
- Allows each NanoPanel^{3D} to be focused directly at the source to allow high image quality



*Option

Clinical case study collection

Sub-mSv coronary CTA

0.6 mSv Step & Shoot Cardiac with iDose[4]

Scan parameters

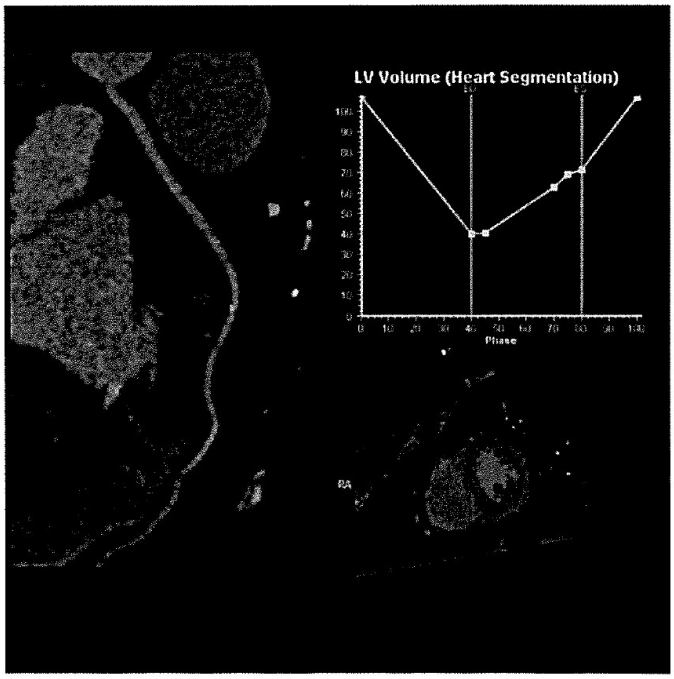
- 100 kVp
- 75 mAs
- Collimation – 2 x 112 x 0.625 mm
- Coverage – 10.9 cm
- iDose[4] – Level 7
- $CTDI_{vol}$ – 3.8 mGy
- DLP – 40.9 mGy*cm
- Effective dose – 0.6 mSv (k = 0.014*)
- Reconstruction time – 14 s (241 images)

Full cardiac function below background radiation

3.1 mSv retrospective cardiac with iDose[4]

Scan parameters

- 100 kVp
- 273 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 16.5 cm
- iDose[4] – Level 4
- $CTDI_{vol}$ – 10.5 mGy
- DLP – 223.2 mGy*cm
- Effective dose – 3.1 mSv (k = 0.014*)
- Reconstruction time – 13 s (165 images)



*AAPM Technical Report 96

Low energy, low contrast CTA

3.4 mSv CTA runoff

Scan parameters

- 100 kVp
- 42 mAs
- Collimation – 2 x 64 x 0.625 mm
- Coverage – 120.1 cm
- iDose^4 – Level 3
- $CTDI_{vol}$ – 1.8 mGy
- DLP – 228.0 mGy*cm
- Effective dose – 3.4 mSv (k = 0.015*)
- Reconstruction time – 90 s (1714 images)

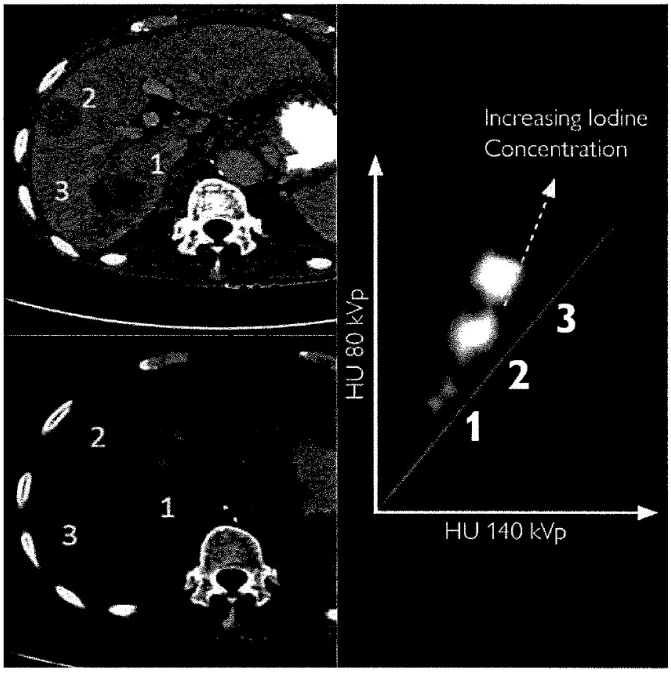
*AAPM Technical Report 96

Quantitative analysis of iodine enhancement

Dual energy and the iDose[4] iterative reconstruction technique

Scan parameters

- 80/140 kVp
- 500/100 mAs
- Collimation – 128 x 0.625 mm
- Scan time – 2.9 s
- iDose[4] – Level 6
- DLP – 155.2 mGy*cm
- $CTDI_{vol}$ – 19.4 mGy
- Effective dose – 2.3 mSv (k = 0.015*)



Automatic bone removal

Step & Shoot Complete

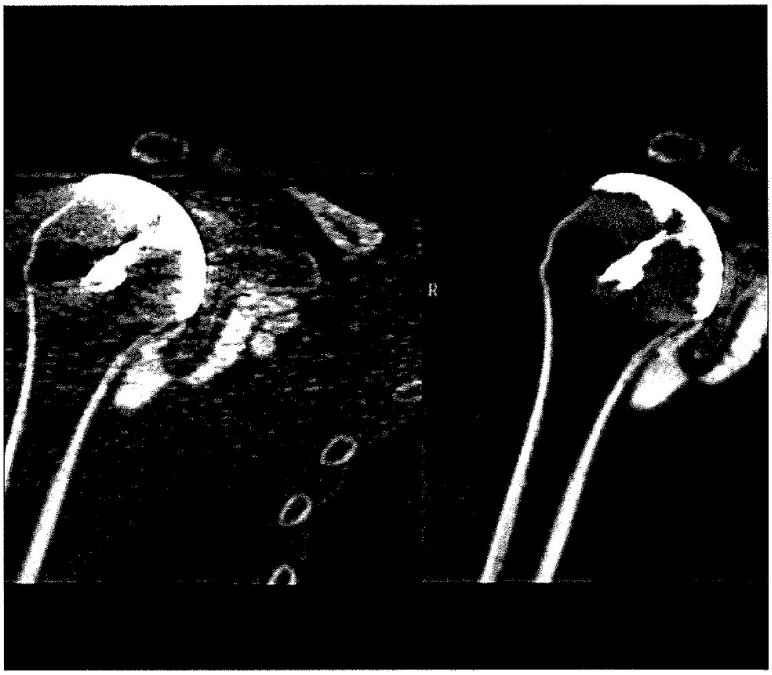
Scan parameters

- 100 kVp
- 140 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 65.9 cm
- iDose[4] – Level 5
- DLP – 545.3 mGy*cm
- $CTDI_{vol}$ – 8.3 mGy
- Effective dose – 8.2 mSv (k = 0.015*)

*AAPM Technical Report 96

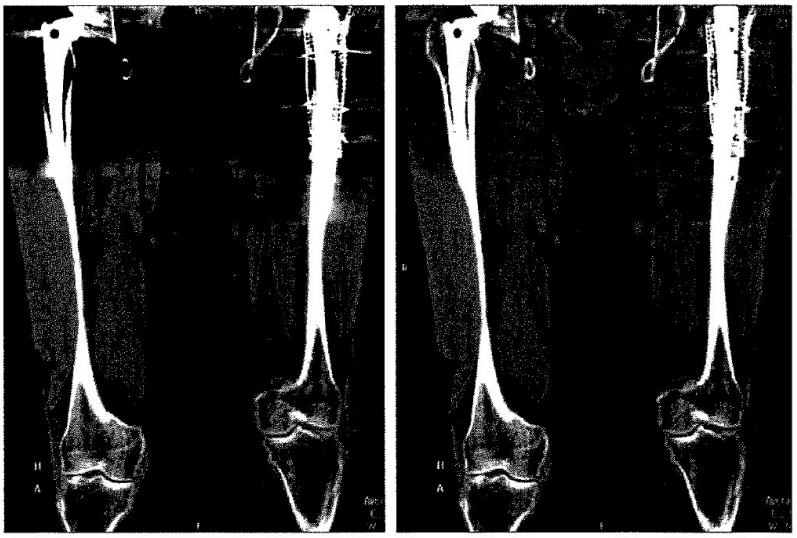
High image quality with reduced artifacts
2.9 mSv shoulder

Scan parameters
- 120 kVp
- 201 mAs
- Collimation – 64 x 0.625 mm
- Coverage – 14.7 cm
- iDose^4 – Level 4
- O-MAR – On
- Focal spot resolution – High
- Image matrix – 768 x 768
- DLP – 204.3 mGy*cm
- $CTDI_{vol}$ – 13.9 mGy
- Effective dose – 2.9 mSv (k = 0.014*)



Metal artifact reduction for orthopedic implants
Bi-lateral hip implants with O-MAR

Scan parameters
- 120 kVp
- 380 mAs
- Collimation – 128 x 0.625 mm
- Coverage – 59 cm
- Scan time – 7.6 s
- iDose^4 – Level 4
- O-MAR – On
- Focal spot resolution – High
- Image matrix – 768 x 768



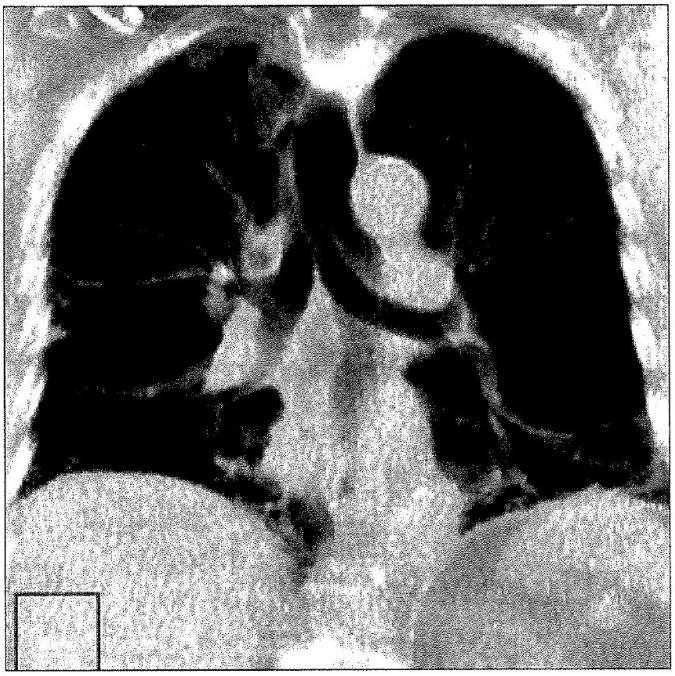
*AAPM Technical Report 96

Chest CT near the dose of a chest X-ray

0.08 mSv chest with iDose^4

Scan parameters

- 80 kVp
- 10 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 25.5 cm
- iDose^4 – Level 3
- $CTDI_{vol}$ – 0.2 mGy
- DLP – 5.1 mGy*cm
- Effective dose – 0.08 mSv (k = 0.014*)
- Reconstruction time – 12 s (253 images)

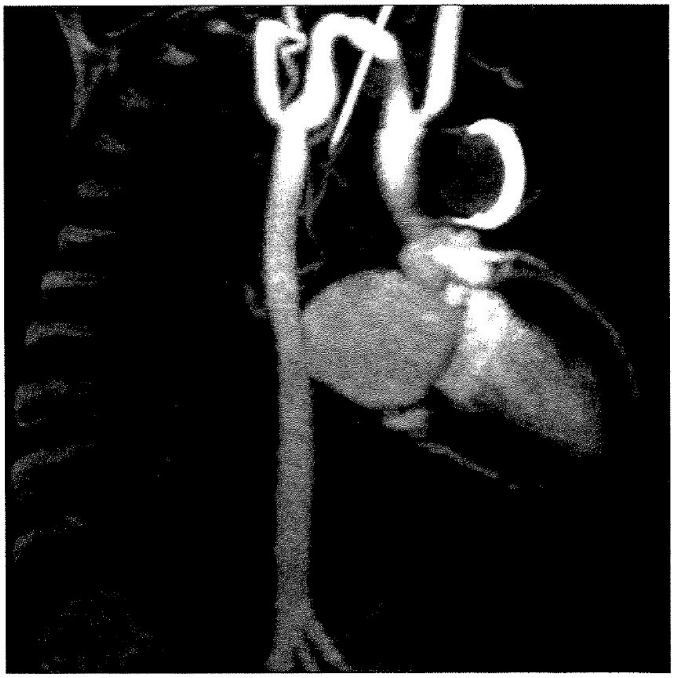


Fast scan speed, high heart rate

Pediatric CTA

Scan parameters

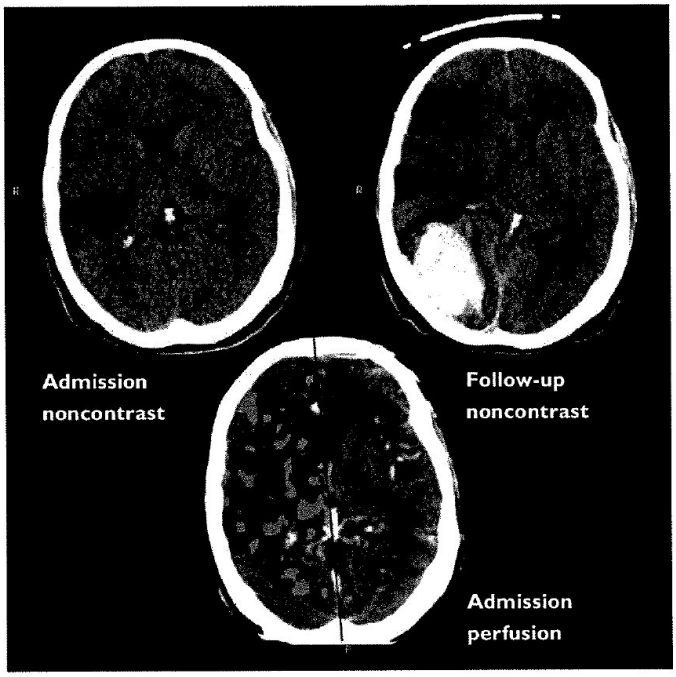
- 80 kVp
- 100 mAs
- Collimation – 2 x 128 x 0.625 mm
- Coverage – 10.3 cm
- iDose^4 – Level 3
- $CTDI_{vol}$ (16 cm) – 4.4 mGy
- DLP – 45.2 mGy*cm
- Effective dose – 1.8 mSv (k = 0.039*)
- Heart rate – 143 bpm
- Reconstruction time – 12 s



*AAPM Technical Report 96

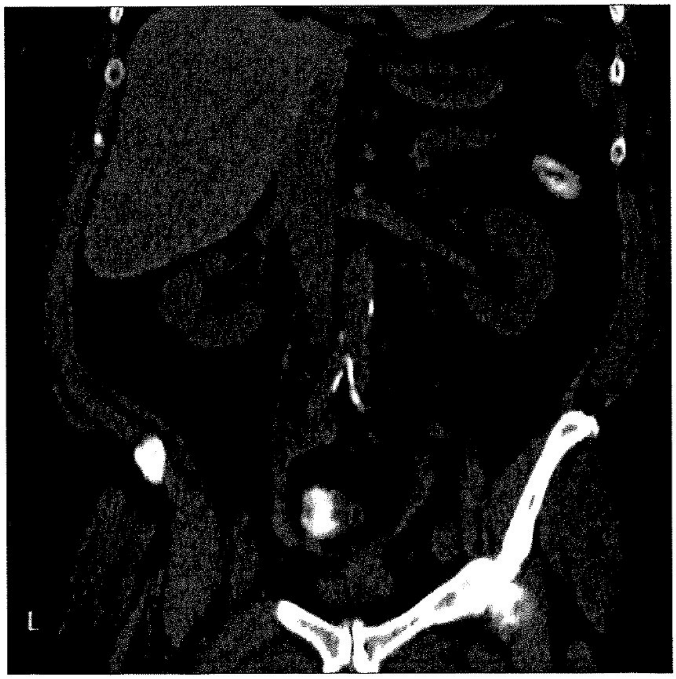
Increased permeability and subsequent hemorrhage
Brain perfusion and permeability

Scan parameters
- 80 kVp
- 150 mAs
- Collimation – 2 x 128 x 0.625 mm
- $CTDI_{vol}$ – 5.8 mGy
- DLP – 2041.6 mGy*cm
- Effective dose – 4.3 mSv (k = 0.0021*)



High quality bariatric imaging
55.3 kg/m² BMI abdomen

Scan parameters
- 120 kVp
- 398 mAs
- iDose⁴ – Level 2
- $CTDI_{vol}$ – 29.2 mGy
- DLP – 1383.2 mGy*cm
- BMI – 55.3 kg/m²



*AAPM Technical Report 96

Simplifying dose management

"Users report the radiation dose package is best in today's market."

Philips Healthcare CT Scanner
User Satisfaction Report dated September 23, 2011

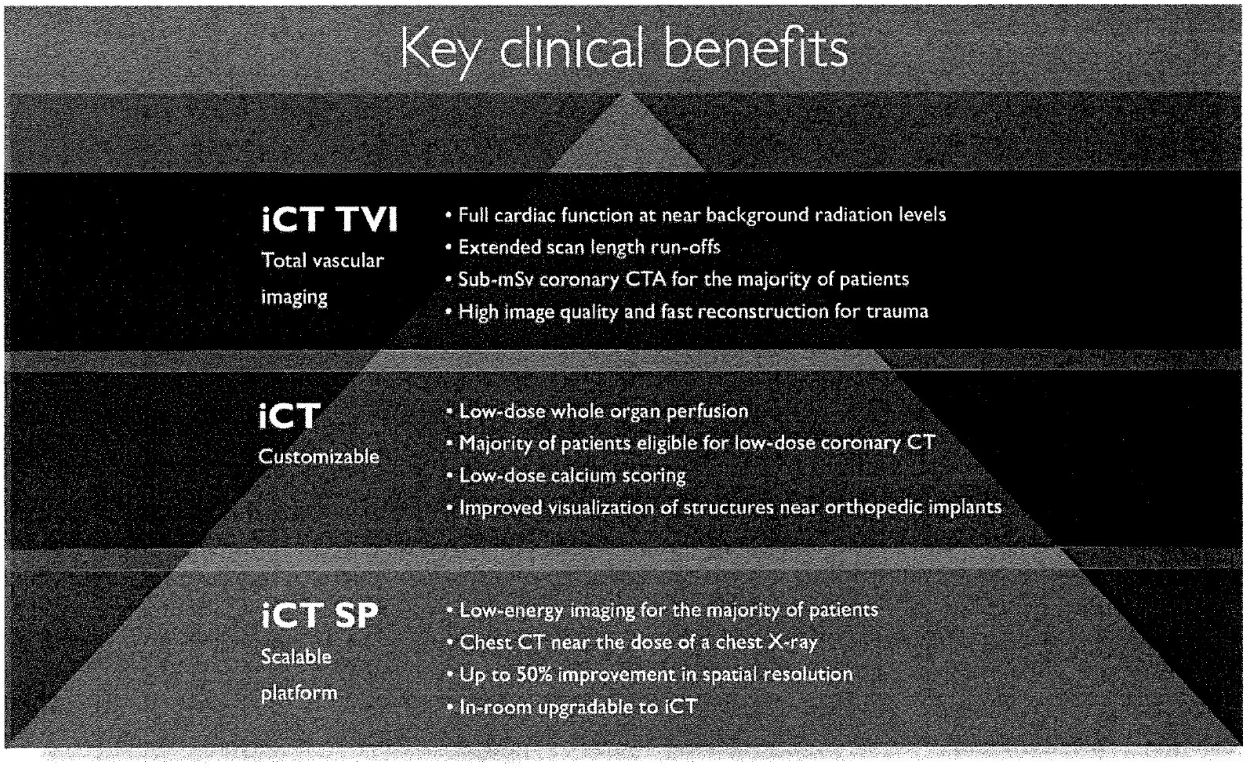
md buyline

Why DoseWise is so smart

Philips DoseWise philosophy is a comprehensive approach to dose management focused on delivering the right quantity and quality of radiation where and when it is needed. The advanced design enhances dose efficiency without compromise to image quality through a combination of features including low-kV imaging protocols, dose modulation techniques, protocol-specific SmartShape and IntelliBeam filtration, low-noise NanoPanel^{3D} spherical detector array with ClearRay collimator, and the Eclipse collimator. All of which are designed to manage dose for your patients.

On the SmartPath with you

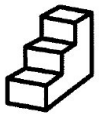
We understand how critical it is to elevate quality and efficiency in your daily work routine and know no two practices are alike. That is why we developed a customizable premium approach to the iCT family of scanners. Our goal is to put you at the forefront of new clinical innovations, and Philips SmartPath is your way to obtain access to the latest innovations throughout the cycle of your ownership.



Philips SmartPath provides you easy access to solutions and innovations for the full life of your computed tomography system, so you can boost your clinical and operational potential and achieve your organizational goals.

Optimize

Optimize your system's performance both now and in the future with regular and ongoing updates, including functionality improvements and remote technical support.



Enhance

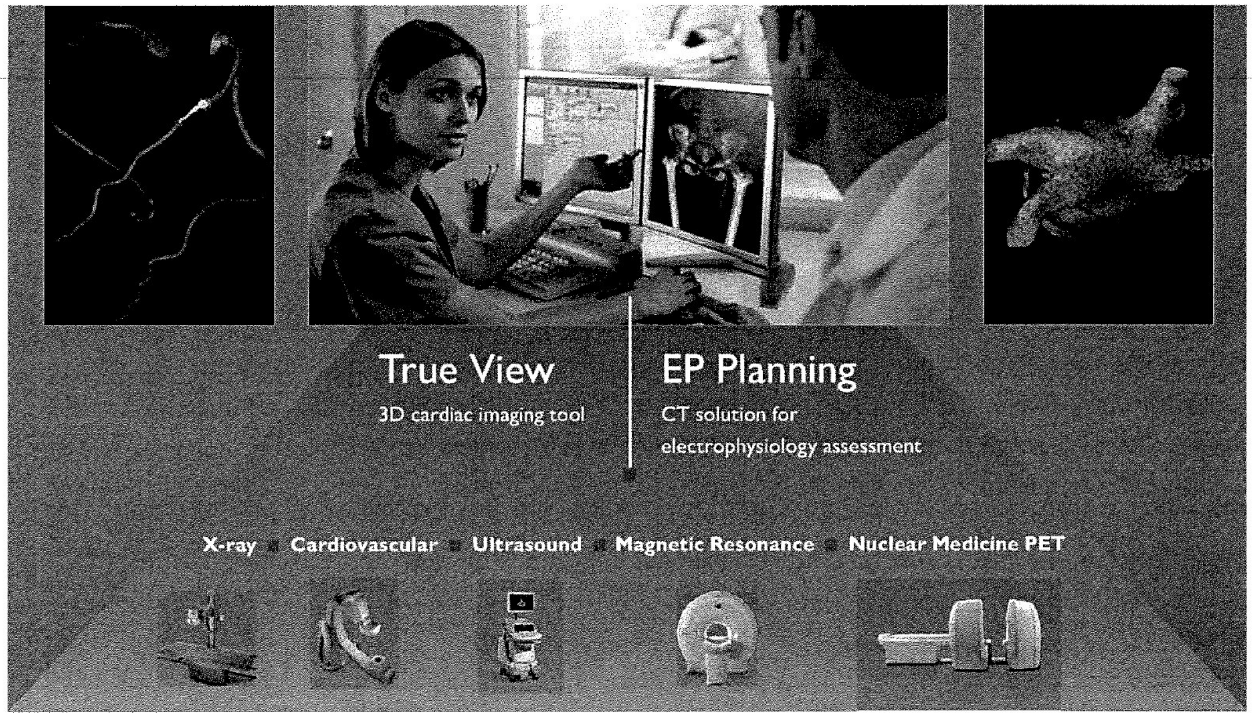
Enhance your equipment with regular technology upgrades, and take advantage of the newest features and capabilities.

Transform

Transform your investment at the end of your system's life by transitioning seamlessly to a next-generation solution or refurbished option.

Simplifying cardiac care

Philips supports you in identifying high-risk cardiac patients at early stages of disease progression with a full range of diagnostic tools that provide clear data for the full spectrum of patients. We offer intelligent solutions to help you quantify data to get fast clinical answers and provide exceptional treatment and management.



"We have had the Brilliance iCT for a couple of years, and it has been bulletproof for cardiology. It is phenomenal. The user interface for the iCT is the same as the Brilliance 16, and it has been nice to have the same look and feel to the systems."

– Director

Collected about Brilliance iCT 256 by KLAS in April 2011

KLAS
ACCURATE HONEST IMPARTIAL

EP Planning
EP Planning, Philips CT solution for electrophysiology, provides fast, overall assessment of pulmonary vein, left atrial, and appendage anatomy.

Comprehensive Cardiac Analysis (CCA)
CCA is a revolutionary cardiac evaluation application using CT data in a simplified workflow.

Cardiac CTA
Gives you the ability to include or exclude calcium from vessel segmentation and volume calculations and assists clinicians with stent planning

Plaque analysis
Plaque analysis software utilizes proprietary automatic algorithms and editing tools to facilitate efficient vascular analysis and simplify workflow.

CT TrueView
CT TrueView is the use of 3D coronary tree datasets from CT to plan the best 2D X-ray projection angle to view a particular coronary segment.

CT for pre-planning TAVI procedures
Philips pre-TAVI planning from CT data provides both peripheral and aortic root anatomy assessment for proper access route, device size, and a recommendation for cath lab C-arm angles for device deployment.

Glass View
Creates a transparent mode of the unaffected structure and an opaque model of the affected structure.

Advanced brain perfusion
Expand your clinical capabilities with automatic vascular identification for easy diagnosis and treatment. Summary maps provide relevant clinical information that is easy to achieve and readily accessible.

Connecting you to more

Designed for a lifetime of value, the iCT family is able to offer clinical integration with HIS/RIS, IntelliSpace Portal, PACS, the Brilliance Workspace, and other technologies.

Collaborate like never before

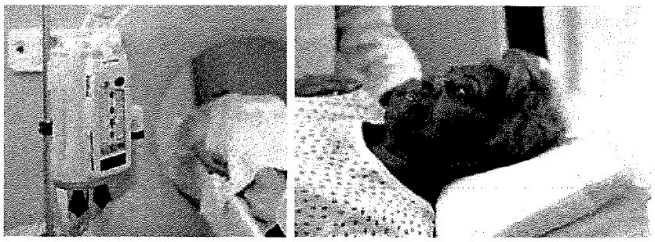
The IntelliSpace Portal option provides a multimodality workspace that facilitates a high level of collaboration among radiologists and referring physicians while streamlining imaging workflow. Advanced networking capabilities facilitate collaboration among clinicians.

The IntelliSpace Portal offers several exclusive features, including:

- Thin client architecture that makes image data and applications available virtually anywhere for CT, MR, and NM images
- Award winning and easy-to-use applications (based on the Best-in-KLAS Brilliance Workspace)
- Tooling to allow easy communication among clinicians of advanced visualization results

KLAS®

ACCURATE HONEST IMPARTIAL



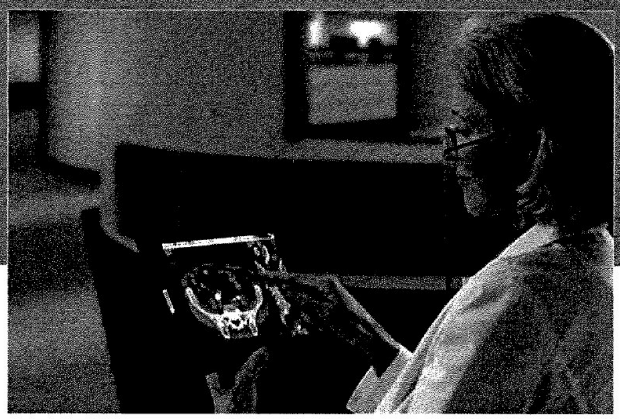
We've got you covered

The excellent uptime of iCT is also due in part to proactive monitoring and visual diagnostics, which allow us to address issues quickly for our customers.

Remote means we're close and quick. Philips Remote Services have been engineered to automatically probe your scanner in order to address problems before they occur, help reduce disruption, and keep your workflow on track.

By proactively monitoring the health of your system, a service engineer can arrive at your site with the proper knowledge and parts to help reduce the critical time to repair.

Link to hospital information systems.



Leverage the IntelliSpace Portal.*

NetForum Community

NetForum is a virtual clinical community where users from around the globe share clinical experiences, learn from peers, and enhance their own results. Our commitment to this mission to expand the clinical effectiveness of diagnostic imaging is demonstrated in our online user community: **www.philips.com/netforum**

* Note: Images are not for diagnosis except when using cleared software for mobile application.

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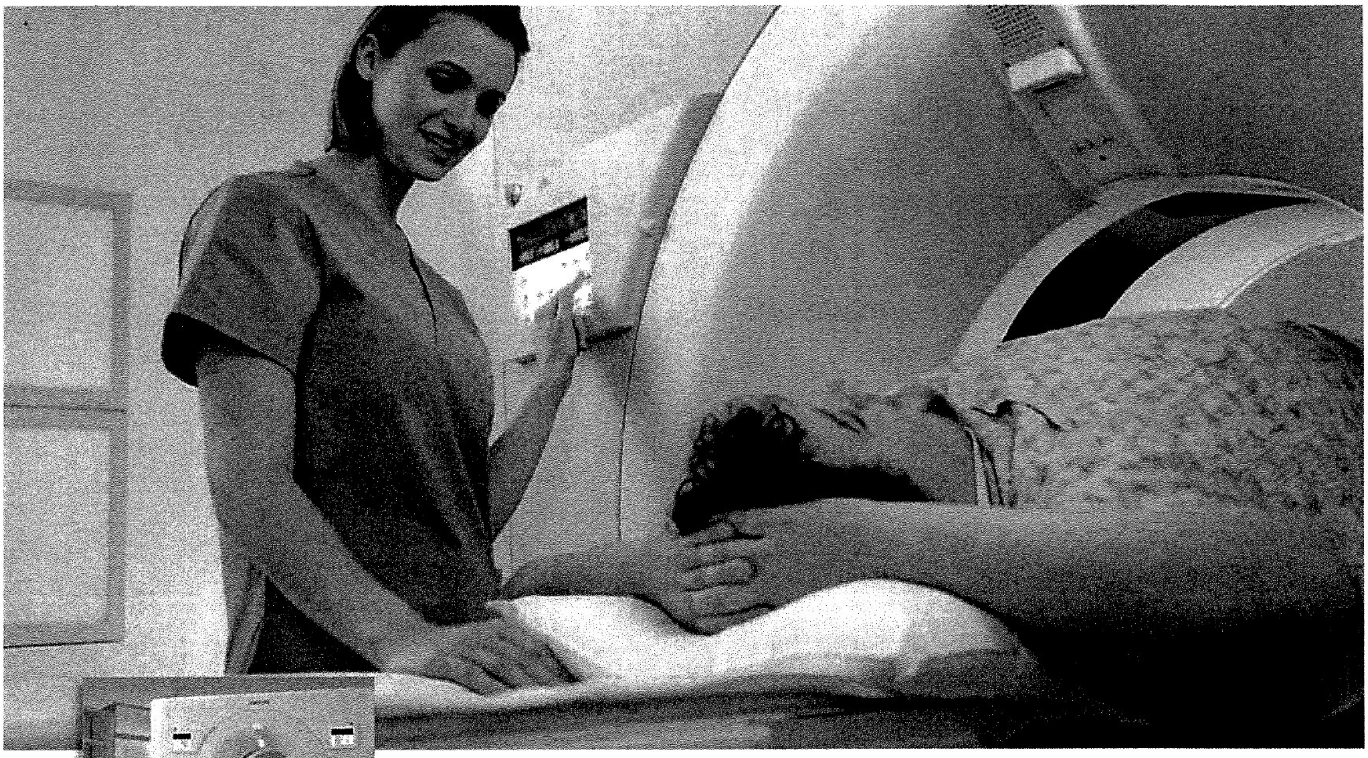

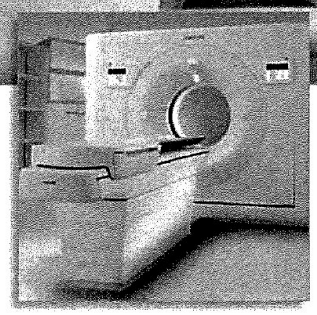

Premium results

Philips iCT specifications

Olszewski Declaration
Exhibit 5

PHILIPS

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1. Introduction

Philips iCT is specifically designed to meet the unique needs of imaging from head to toe. With a focus on clinical collaboration and integration, patient care, and economic value, this system will provide the high image quality you seek with the outstanding lows that are becoming increasingly important (low energy, low dose, and low injected contrast). Built upon our latest advances in iterative reconstruction techniques, workflow, and detector technologies, the iCT is designed to redefine CT imaging.

Clinical integration and collaboration

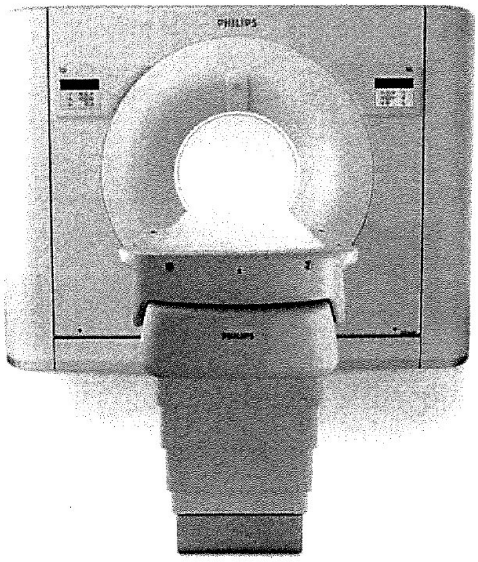
- Chest CT near the dose of a chest X-ray
- More patients eligible for low-dose coronary CTA
- Full cardiac function at near background radiation levels
- Facilitate delivering appropriate contrast dose with SyncRight injector integration

Patient focus

- Sub-mSv coronary CTA for the majority of patients
- Low-dose brain perfusion protocol
- Low-dose calcium scoring
- Simultaneous 60–80% lower dose, 43–80% improved low-contrast detectability, and 70–83% lower noise with IMR*

Improved economic value

- iPatient helps increase working speed and efficiency, integrating functionality at the point of care
- Demonstrated capability to image over 100 vascular patients per day
- 72% of iDose[4] reference protocols reconstructed in 60 seconds or less
- Majority of IMR reference protocols reconstruct in under five minutes



Generator power	120 kW
Slices	256
Coverage	80 mm
Maximum scannable range	2,100 mm
Bore size	700 mm
iDose[4] reconstruction speed	24 ips
Standard reconstruction speed	33 ips
Anode effective heat capacity	30 MHU

* Lower image noise assessed using Reference Chest Protocol. Improved spatial resolution using Reference Abdomen and Thorax Protocols. Improved low-contrast detectability using Reference Abdomen Protocol. Dose reduction using Reference Abdomen Protocol. All metrics tested on phantoms. Dose reduction assessed on 0.8 mm slices, tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers.

2. iPatient (optional)

Philips iPatient is an advanced platform that puts you in control of enhancing your CT system today, while preparing you for the challenges of tomorrow. While you're working to boost return on investment now, you're also accessing a flexible platform that will support future innovations.

2.1 iPatient key benefits

- Plan the results, not the acquisition
- Up to 24%* faster time to results; up to 66%* fewer clicks
- Facilitates optimal** management of image quality and radiation dose with patient-specific methods
- Easy and efficient communication between the CT system and the injector in order to facilitate delivering appropriate contrast dose and consistent image quality with SyncRight
- Optimizes collimation, pitch, and rotation time automatically
- Automates routine tasks
- Increases your ability to do complex and advanced procedures
- Enables advanced capabilities such as IMR and future technologies

* In a study done using multiphasic liver CT exams, the iPatient software platform reduced time-to-results by 24% and clicks per exam by 66%. Impact of workflow tools in reducing total exam and user interaction time – four-phase liver computed tomography exams. Nicholas Ardley, Southern Health; Kevin Buchan, Philips Healthcare; Ekta Dharaiya, Philips Healthcare.

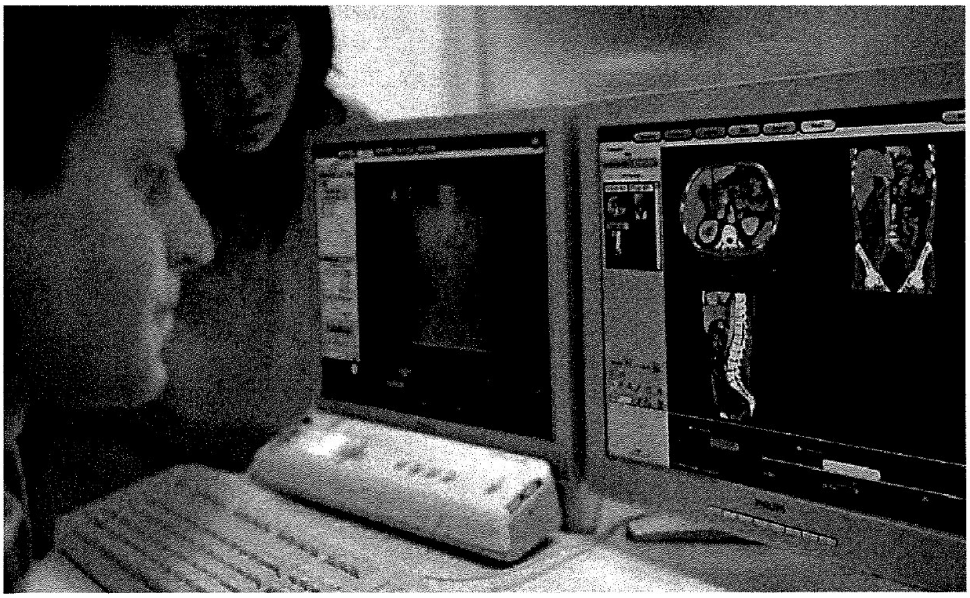
** Optimal refers to the use of strategies and techniques that facilitate the management and control of both image quality and dose.

2.2 ExamCards

ExamCards are the evolution of the scanning protocol. With ExamCards, the results are planned, not the acquisition; this reduces decision points and clicks, saves time, and is a means to share protocols among colleagues to allow for scan-to-scan consistency. ExamCards can include axials, coronals, sagittals, MPRs, MIPS, and other results, all of which will be automatically reconstructed and can be sent to where they will be read with no additional work required by the operator.

2.3 ScanRuler

An interactive timeline of the study that provides the operator a quick overview of important events such as Surview, acquisition, bolus tracking, AutoVoice, and injection.



3. DoseWise

Philips DoseWise is a holistic approach to dose management that is active in every level of product design. It encompasses a set of techniques, programs and practices based on the ALARA (As Low As Reasonably Achievable) principle and supports outstanding image quality at low dose.

3.1 DoseRight Index (optional with iPatient)

DoseRight Index (DRI) is a single number used to specify the image quality required for the diagnostic task at hand. DRI includes organ-specific DRI for the liver and the head/neck to provide appropriate dose and image quality within a single acquisition. 11 weight-based protocols can be generated for ExamCards, including 1 infant, 7 child, and 3 adult reference sizes.

3.2 DoseRight automatic current selection

Personalizes dose for each patient by automatically suggesting tube current settings according to the estimated patient diameter in the scan region.

3.3 DoseRight angular dose modulation

Angular dose modulation varies the tube current during helical scans according to changes in patient shape (eccentricity) and tissue attenuation as the tube rotates. For each rotation, projections are processed to determine the maximum and minimum patient diameter. The tube current for the next rotation is then modulated between these limits.

3.4 DoseRight Z-DOM (Longitudinal dose modulation)

Longitudinal dose modulation (Z-DOM) aids in adapting dose to an individual patient's size and shape. In particular, Z-DOM adjusts the tube current-time product (mAs) in the craniocaudal or caudocranial (z-axis) direction based on the Surview by comparing the actual patient's attenuation at each longitudinal location to a reference.

3.5 3D-DOM (optional with iPatient)

3D-DOM combines angular and longitudinal information to modulate dose in three dimensions.

3.6 Dose warning messages

Provided to the user when the $CTDI_{vol}$ for a planned scan, such as a brain-perfusion scan, exceeds 250 mGy.

3.7 Dedicated pediatric protocols

Developed in collaboration with top children's hospitals, age- and weight-based infant and child protocols provide high-quality images at low doses tailored to the patient's size and the clinical indication.

3.8 Locking protocols

Unauthorized protocol modifications may be prevented through password-protected access.

3.9 Dose display and reports

Philips CT scanners include intuitive reporting and recording of estimated dose indices, dose reduction, and dose efficiency. Dose estimates are displayed on the operator's console for all scan protocols prior to and throughout the examination. Volume computed tomography dose index ($CTDI_{vol}$) and dose-length product (DLP) are automatically updated as the operator plans the scan. Also, a dose report may be included as a DICOM secondary capture with the reconstructed data set.

3.10 Dose performance data

$CTDI_{vol}$	Measurement
Head	12.8 mGy/100 mAs
Body	6.5 mGy/100 mAs

Measured on head and body CTDI phantoms (IEC 60601-2-44 ed.3) at 120 kVp.

3.11 Eclipse DoseRight collimator

Lowers patient exposure during helical scanning.

3.12 IntelliBeam filters

Beam hardness is controlled with IntelliBeam filters. The filter selection is automatically configured through the protocol, and is used in combination with the X-ray tube's intrinsic filtration to balance low contrast resolution and dose.

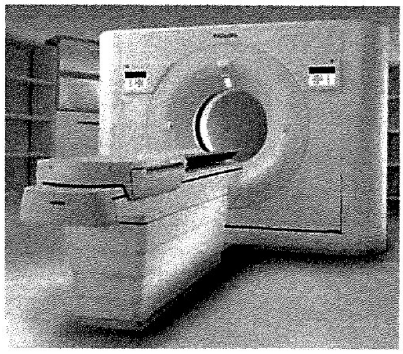
3.13 SmartShape wedges

Filter beam intensity according to the patient's size. Each wedge provides less medial filtering – where the patient thickness is greatest – than laterally, thereby facilitating a uniform dose and noise distribution as the tube rotates.

4. Gantry

4.1 AirGlide gantry

Feature	Specification
Aperture	700 mm
Focus-isocenter distance	570 mm
Focus-detector distance	1040 mm
Rotation times	0.27, 0.3, 0.33, 0.375, 0.4, 0.5, 0.75, 1 1.5 seconds for full 360° scans; 0.18 0.2 seconds for partial angle 240° scans
Intercom system	Two-way connection between the gantry and console area
Breathing lights	Visual communication to facilitate patient compliance



4.2 Gantry control panels

- Multi-directional control for fast movement
- Fine movement in/out control
- Start button
- Pause button
- Visual countdown
- Zero table location
- Lasers

Audio notification 10 seconds before X-ray On so that operator and staff can exit room before X-ray On.

4.3 Operator's console control panel

- Table in/out/up/down
- Emergency stop
- X-ray indicator
- Start button
- Pause button

4.4 AutoVoice

A standard set of commands for patient communication before, during, and after scanning in the following languages:

- English
- French
- Spanish
- Italian
- Japanese
- Hebrew
- Arabic
- Russian
- Georgian
- Turkish
- German
- Danish
- Swedish
- Dutch
- Norwegian

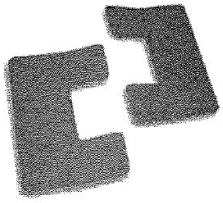
Customized messages can also be created.

5. Patient table

Feature	Standard table	Bariatric table	Long table
Maximum scannable range	1,750 mm	1,750 mm	2,100 mm
Pitch	0.5 – 1.5	0.5 – 1.5	0.5 – 1.5
Z-position accuracy	+/- 0.25 mm	+/- 0.25 mm	+/- 0.25 mm
Longitudinal speed	0.5 mm/s – 185 mm/s	0.5 mm/s – 185 mm/s	0.5 mm/s – 185 mm/s
Vertical range	645 mm to 1,065 mm from the floor; 1.0 mm increments	645 mm to 1,065 mm from the floor; 1.0 mm increments	645 mm to 1,065 mm from the floor; 1.0 mm increments
Maximum load capacity	450 lbs (204 kg)	650 lbs (295 kg)	450 lbs (204 kg)

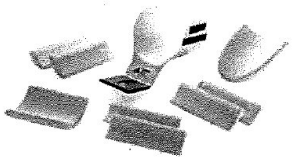
6. Accessories

6.1 Standard accessories

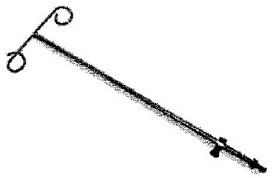


Arm rests

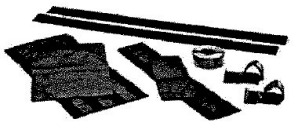
Cushions and pads



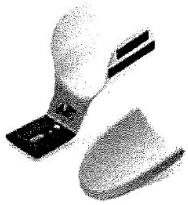
Head holder cushions and pads



IV pole



Patient restraint kit



Standard head holder

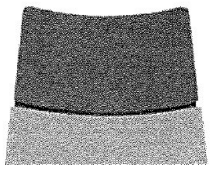


Table extension

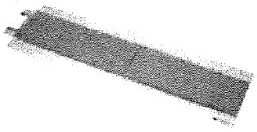
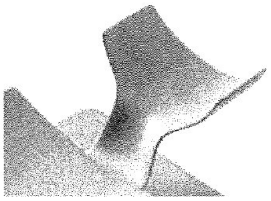
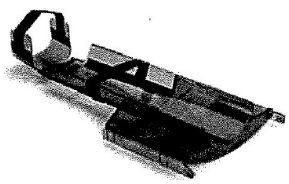


Table pad

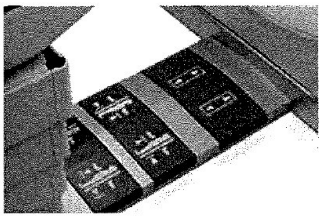
6.2 Optional accessories



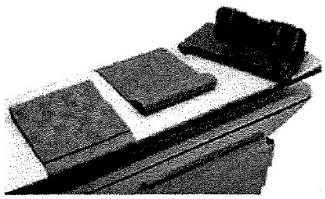
Flat head holder



Infant cradle



Load and unload foot pedals



Radiology Flat Top Kit

Therapy table top
(available only with bariatric table)

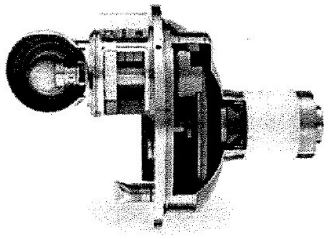
7. Imaging chain

7.1 Generator

Feature	Specification
Power rating	120 kW
kVp setting	80, 100, 120, 140
mA range (step size)	10 – 1,000 (1 mA)

7.2 X-ray tube

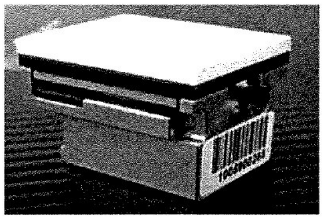
Feature	Specification
Focal spot sizes, quoted	Small: 0.6 mm x 0.7 mm
to IEC 336/93 standard	Large: 1.1 mm x 1.2 mm
Anode effective heat capacity	30 MHU; direct cooling
Maximum anode cooling rate	1,608 kHU/min
Anode diameter	200 mm
Anode rotation speed	10,800 rpm
Target angle	8 degrees
Maximum helical exposure time	100 s
Smart focal spot	x- and z-deflection
Spiral-groove bearing	Double supported



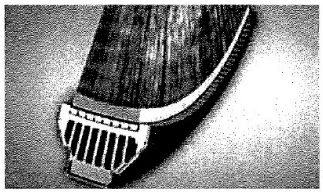
The segmented anode and direct liquid cooling of the iMRC X-ray tube allow high-throughput scanning.

7.3 NanoPanel^{3D} detector

Feature	Specification
Slices	256
Coverage	80 mm
Material	Solid-state GOS with 86,016 elements
Dynamic range	1,000,000:1
Slip ring	Optical – 5.3 Gbps transfer rate
Data sampling rate	Up to 4,800 views/revolution/element
Collimations available	128 (256) x 0.625 mm
	112 (224) x 0.625 mm
	96 (192) x 0.625 mm
	64 (128) x 0.625 mm
	32 (64) x 0.625 mm
	20 (40) x 0.625 mm
	16 (32) x 0.625 mm
	8 (16) x 0.625 mm
	4 (8) x 0.625 mm
	2 (4) x 0.625 mm
	64 (128) x 1.25 mm
	32 (64) x 1.25 mm
Slice thickness (helical mode)	0.67 mm – 5 mm
Slice thickness (axial mode)	0.625 mm – 10 mm
Scan angles	240°, 360°, 420°
Scan field of view	250 mm, 500 mm
ClearRay collimator	2D antiscatter grid provides up to 3x improvement in scatter-to-primary ratio



Philips was first to bring integrated, modular CT tile detector technology to the market in 2007 with the NanoPanel^{3D}, the foundation of the iCT. Today, there are thousands of NanoPanel-based systems installed globally.



The world's first true spherical detector geometry allows each NanoPanel^{3D} to be focused directly at the source to allow high image quality.

8. Image quality

8.1 Spatial resolution

Spatial resolution	Cut-off (+/- 2 lp/cm)
Ultra-high mode (lp/cm)	24
High mode (lp/cm)	16
Standard mode (lp/cm)	12

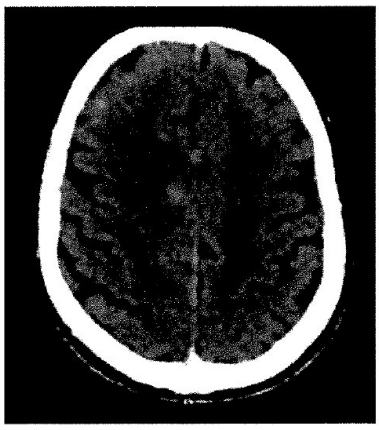
8.2 Low-contrast resolution

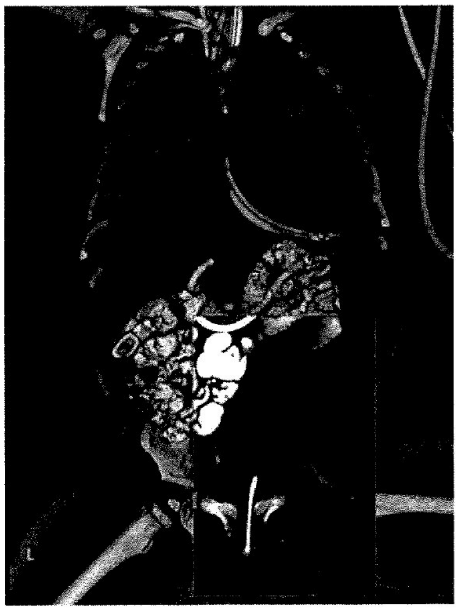
Feature	Specification
Low-contrast resolution*	4 mm @ 0.3% @ 25 mGy $CTDI_{vol}$
Low-contrast resolution with IMR**	2 mm @ 0.3% @ 10 mGy $CTDI_{vol}$

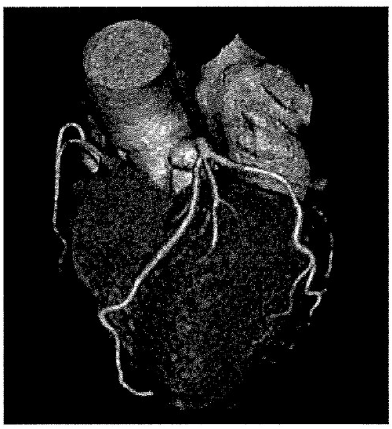
* 20 cm Catphan phantom; 10 mm slice thickness
** 20 cm Catphan phantom; 7 mm slice thickness
body CTDI phantom (IEC 60601-2-44, Ed. 3); at 120 kVp.

8.3 Other

Feature	Specification
Absorption range	-1,024 to +3,071 Hounsfield units
Noise	0.27%







9. Reconstruction

9.1 Reconstruction speed

Feature	Specification
Reconstruction speed with iDose^4	24 IPS
Reconstruction speed without iDose^4	33 IPS

Optional

9.2 IMR

Iterative Model Reconstruction (IMR) sets a new direction in CT image quality with virtually noise-free images and industry-leading low-contrast resolution. Moreover, for the first time physicians are also able to simultaneously combine image quality improvements with significantly lower doses.* This improvement is a breakthrough made possible through Philips first iterative reconstruction built on knowledge-based models.

The majority of reference protocols are reconstructed in less than five minutes.

Example reference protocols

Protocol	Number of images	Scan length (mm)	Total reconstruction time (min)
Brain	355	160	2.7
Brain CTA	333	150	2.5
Chest	777	350	4.1
Aorta CTA	1555	700	4.9
Coronary CTA	311	140	3.3
Abdomen	888	401	2.9

9.3 iDose^4 Premium Package

iDose^4 Premium Package, includes two leading technologies that can improve image quality – iDose^4 and metal artifact reduction for large orthopedic implants (O-MAR). iDose^4 improves image quality** through artifact prevention and increased spatial resolution at low dose. O-MAR reduces artifacts caused by large orthopedic implants. Together they produce high image quality with reduced artifacts.

9.4 RapidView IR reconstructor

RapidView IR is specifically designed to provide reconstruction speed that allows iDose^4 to be routinely used in inpatient, outpatient, and emergency care settings.

9.5 Cone Beam Reconstruction Algorithm – COBRA

Philips patented Cone Beam Reconstruction Algorithm (COBRA) enables true three-dimensional data acquisition and reconstruction in both axial and helical spiral scanning.

9.6 ClearRay reconstruction

A revolutionary solution pre-computes and stores beam hardening and scatter corrections in a database later referenced to create a correction that is personalized to each individual patient. As a fully three-dimensional technique, contrast scale stability is preserved across different patient sizes, image uniformity is improved, and organ boundaries are better visualized.

9.7 Adaptive filtering

Adaptive filters reduce pattern noise (streaks) in nonhomogenous bodies, improving overall image quality.

9.8 Adaptive multicycle reconstruction

Image data can be prospectively gated or retrospectively tagged. Automatically delivers the best temporal resolution possible for the current scan (as high as 34 ms).

9.9 Reconstruction field of view

50 to 500 mm continuous
25 to 250 mm (ultra-high resolution)

9.10 Image matrix

512 x 512
768 x 768
1,024 x 1,024

9.11 Off-line reconstruction

Off-line (batch) background image reconstruction of user-defined groups of raw data files with automatic image storage.

9.12 Preview images

Real-time 512^2 matrix image reconstruction and 5 mm x 5 mm contiguous slice display with helical acquisition or off-line reconstruction.

* In clinical practice, the use of IMR may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. Low-contrast detectability and image noise were assessed using Reference Protocol comparing IMR to FBP; measured on 0.8 mm slices, tested on the MITA CT IQ Phantom (CCT183, The Phantom Laboratory), using human observers. Data on file.

** Improved image quality is defined by improvements in spatial resolution and/or noise reduction as measured in phantom studies.

10. Clinical enhancements

Optional with iPatient

10.1 SyncRight

The Philips CT SyncRight option enables easy and efficient communication between the CT system and the injector in order to facilitate delivering appropriate contrast dose and consistent image quality.

10.2 Bolus tracking

An automated injection planning technique to monitor actual contrast enhancement and initiate scanning at a predetermined level.

10.3 Spiral Auto Start (SAS)

Spiral Auto Start allows the injector to communicate with the scanner. This allows the technologist to monitor the contrast injection and to start the scan (with a predetermined delay) while in the scan room.

10.4 Patient centering on surview

Traditionally, patients are centered using the gantry laser lights; with this feature it is possible to improve patient centering using the lateral surview with real-time feedback.

10.5 Clinical applications

- CT Reporting
- CT Viewer
- Cardiac Viewer
- Calcium Scoring
- Filming

Optional

10.6 Clinical applications

- Dental Analysis
- Functional CT
- Advanced Brain Perfusion

10.7 RateResponsive CV toolkit for iCT

Enables cardiac imaging and includes an ECG monitor, Retrospective Tagging, Prospective Gating, Cardiac Viewer, Heartbeat-CS, and CT Reporting. Uses Philips exclusive Adaptive Multicycle Reconstruction algorithm to enhance temporal resolution – as low as 34 ms – and uses Philips patented Beat-to-Beat Algorithm to automatically find the best phase for cardiac imaging. Includes automatic arrhythmia detection and management.

10.8 Dual Energy-ready

Includes a Dual Energy scan type that allows the acquisition and reconstruction of sequential dual-energy scans.

The Spectral Analysis application is available with an optional IntelliSpace Portal IX. The Spectral Analysis application may allow separation and analysis of materials such as calcium, iodine and uric acid when used with dual-energy scan data.

Optional

10.9 Step & Shoot Complete

Step & Shoot Complete enables low-dose, prospectively ECG-triggered, axial thoracic imaging. Step & Shoot Complete allows gated, submillimeter, isotropic imaging of the entire thorax (up to 50 cm transaxial field of view), including the coronary arteries.

Step & Shoot Complete is well suited for patients with heart rates below 75 bpm. Arrhythmias are managed in real-time using proprietary, prospective-detection algorithms to pause acquisition during unstable heart rhythms.

10.10 Jog Scan

Provides up to 160 mm of organ coverage for perfusion studies. An axial scan is taken in one location, the couch translates to another location within a few seconds, and another axial scan is taken. These multiple datasets are registered automatically to provide the extended coverage.

10.11 Continuous CT (CCT)

Allows a clinician to perform in-room single or continuous scans using a foot pedal. Each acquisition is a 240° scan beneath the table to shield the clinician's hands from direct X-ray exposure. A cart- or ceiling-mounted remote monitor is included for visualization.

10.12 CT fluoroscopy

Delivers real-time guidance for interventional procedures. The user can view one fused image while time and dose displays keep the interventional radiologist aware of exposure levels throughout the procedure. In addition to the real-time mode, CCT biopsy mode enables the clinician to perform in-room scans using a foot pedal. Each acquisition is a 240° scan beneath the table to shield the clinician's hands from direct X-ray exposure. A cart- or ceiling-mounted remote monitor is included for visualization.

10.13 Interventional couch controls

Allow operational efficiency during CT-guided interventional procedures through tableside control of longitudinal movements for patient positioning.

11. Networking and storage

11.1 Networking

Supports 10/100/1000 Mbps (10/100/1000 BaseT) networks. For optimal performance, Philips recommends a minimum 100 Mbps network (1 Gbps preferred) and for the CT network to be segmented from the rest of the hospital network.

11.2 DICOM

DICOM 3.0-compliant image format. Lossless image compression/decompression is used during image storage/retrieval to/from all local storage areas. Images can be auto-stored to selected archive media.

Includes the following DICOM functionality:

- Service class user and profile (CT, MR, NM, Secondary Capture)
- DICOM Print
- DICOM Modality Worklist
- Query/Retrieve User and Provider
- Modality Performed Procedure Step User
- Storage Commitment User
- Removable Media

11.3 DICOM connectivity

Full implementation of the DICOM 3.0 communications protocol allows connectivity to DICOM 3.0-compliant scanners, workstations, and printers; supports IHE requirements for DICOM connectivity. Further details on connectivity and interoperability are provided within the DICOM Conformance statement.

11.4 DICOM DVD/CD writer

Stores DICOM images and associated image viewing software on DVD/CD media. Images on these DVD/CDs can be viewed and manipulated on PCs meeting the minimum specifications. Suited for individual result storage and referring physician support.

11.5 Filming

This function allows the user to set up and store filming parameters. Pre-stored protocols can be set to include auto-filming. The operator can film immediately after each image, at the end of a series, or after the end of a study, and review images before printing. The operator can also automatically film the study at three different windows and incorporate "Combine Images" functionality to manage large datasets. Basic monochrome and color DICOM print capability are supported.

Type	Hard drive		DVD	CD	DVD RAM
Capacity	262 GB	262 GB	4.7 GB	700 MB full disk	9.4 GB
Approximate images	473,000	826,000*	8,500	1,200	30,000
Patients**	1,577	2,755	28	4	100

* 512 x 512 matrix; compressed

** Based on 300 images per study

12. Site planning

12.1 Power requirements

- 380-480 VAC
- 50/60 Hz
- 225 kVA supply (175 kVA momentary)
- Three-phase distribution source

Optional

12.2 Console Uninterrupted Power Supply (UPS)

Provides up to 30 minutes of backup power for host and reconstruction system.

12.3 Isolation transformer

May be used in conjunction with a full-system UPS to provide voltage correction; or, may be used stand-alone when an isolated ground is not present or when a Wye supply is not available. Refer to Planning Reference Documentation for more details.

12.4 Voltage regulator

Regulates the utility line voltage, protects for excess surges and spikes, and isolates the power line so that incoming power meets Philips Healthcare specifications for excellent CT usage reliability and performance. Refer to Planning Reference Documentation for more details.

12.5 Environmental requirements

Temperature

Gantry room	18° to 24° C (64° to 75° F)
Control room	15° to 24° C (59° to 75° F)
Storage/Transport	-5° to +35° C (23° F to 95° F)

Humidity

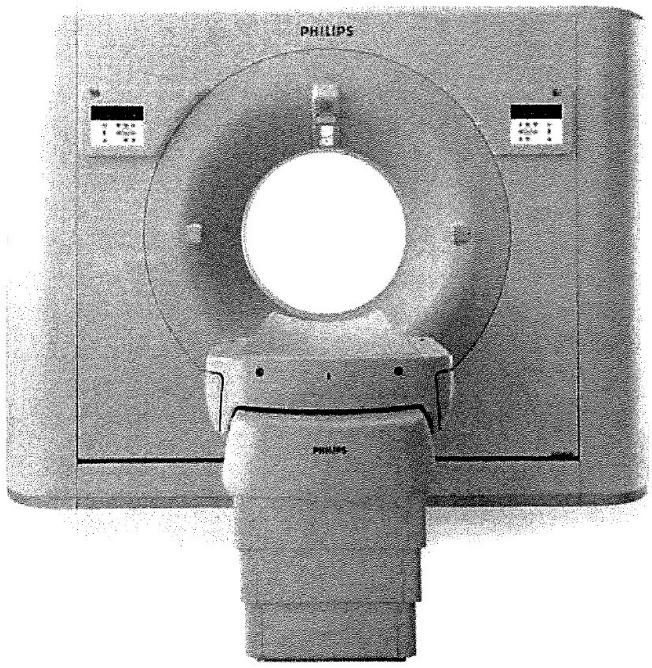
Gantry/Control	35% to 70% non-condensing
Storage/Transport	10% to 90% non-condensing

Heat dissipation

Gantry	32,888 BTU/hr
Computer (CRC)*	3,572 BTU/hr
PDU	5,220 BTU/hr
Air compressor	5,093 BTU/hr

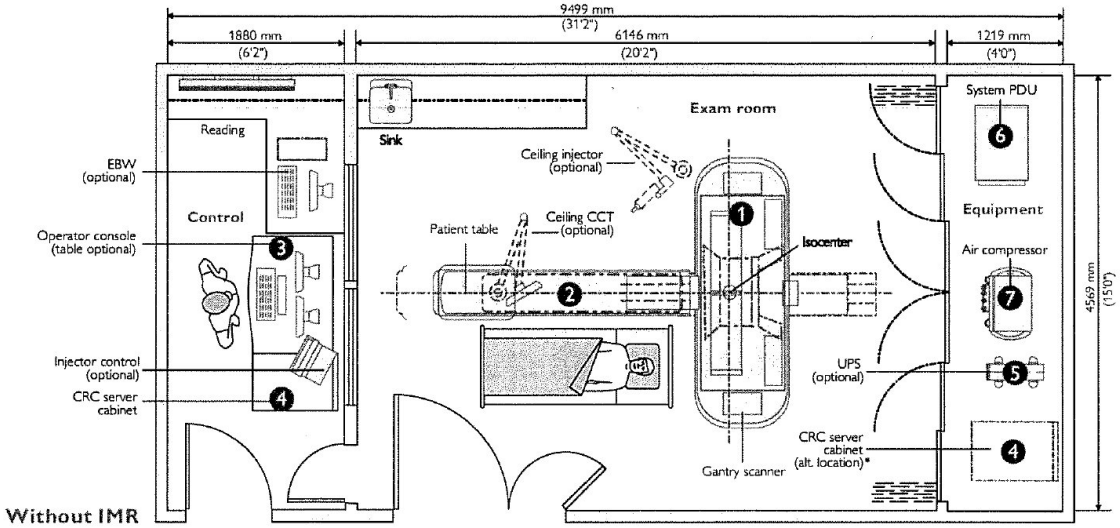
*The following racks replace CRC:

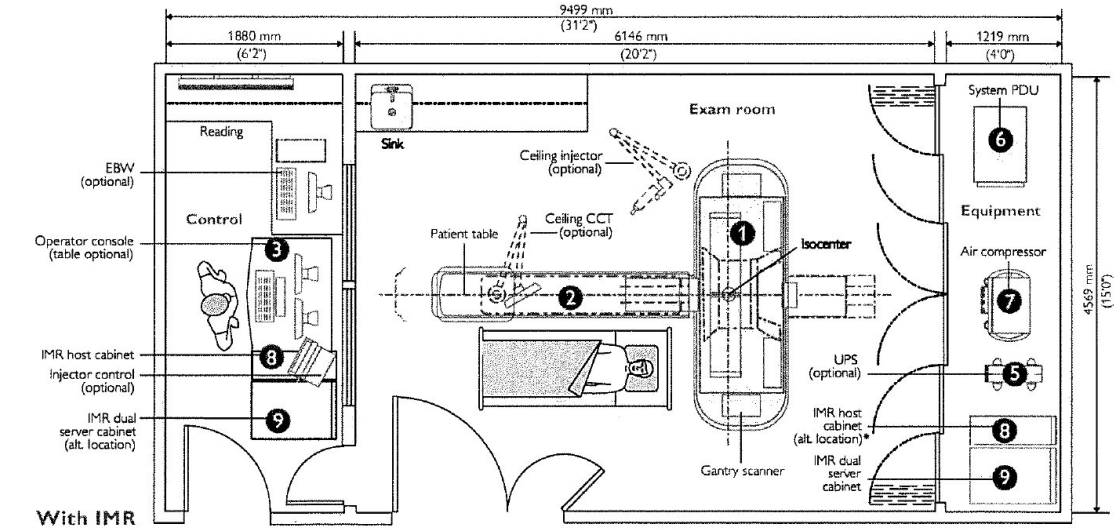
Host	1,450 BTU/hr
Dual server	8,872 BTU/hr



12.6 System requirements, standard and bariatric table

This preferred room layout can be upgraded to long table and will accommodate a 2100 mm scannable range.





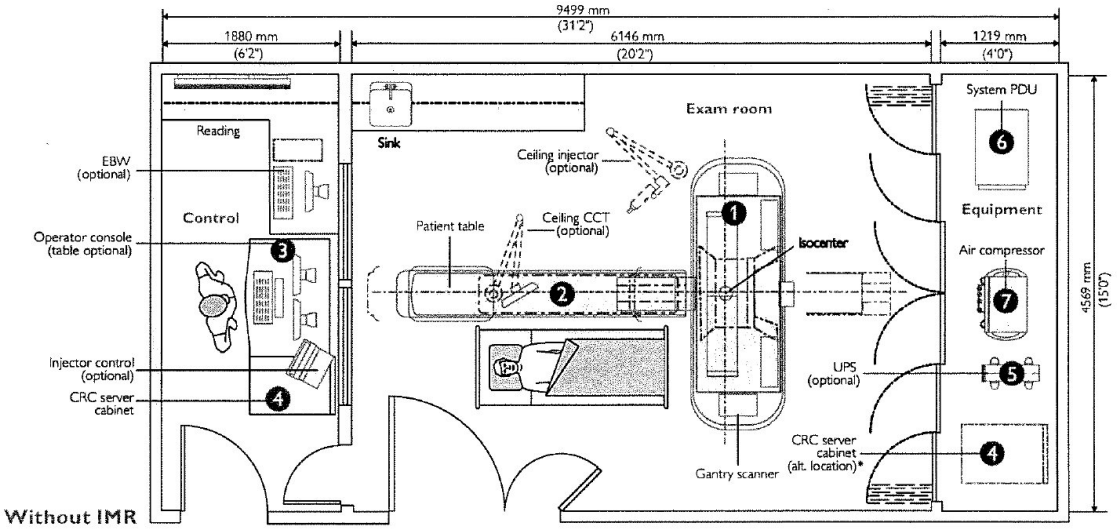
* Alternate location requires extended cable kit.

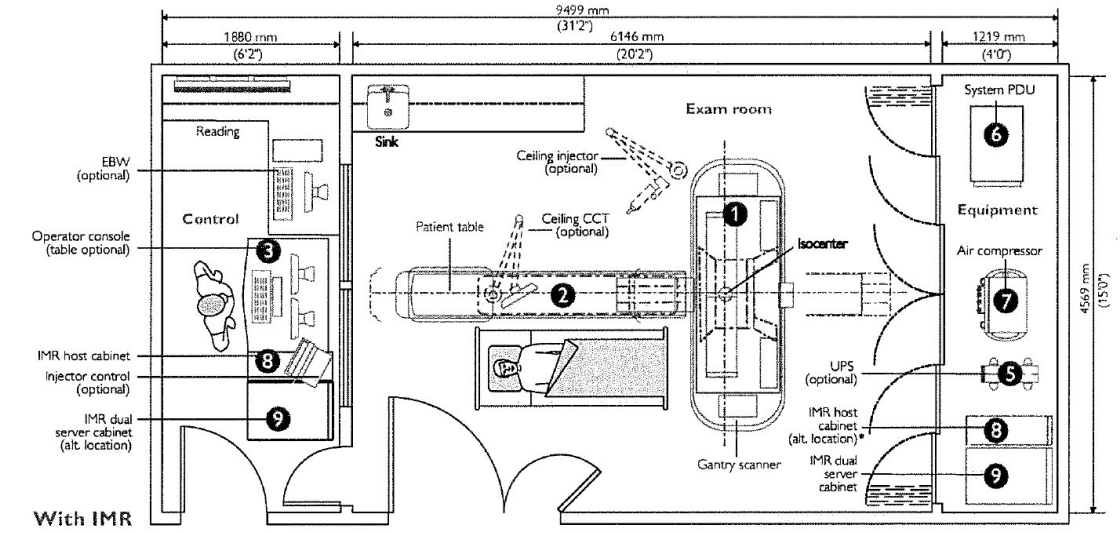
12.7 Dimensions and weights, standard and bariatric tables, per unit

	Length	Width	Height	Weight
❶ Gantry scanner	2,741.9 mm (108")	959.5 cm (37.8")	1,983.7 cm (78.1")	2,566 kg (5,656 lb)
❷ Table, standard or bariatric	4,851 mm (191")	685 cm (27")	1,067 cm (42")	445 kg (981 lb)
❸ Operator console (table optional)	1,200 mm (47.2")	905 cm (35.5")	1,164 cm (44.8")	88 kg (185 lb)
❹ CRC server cabinet	609 mm (24")	908 cm (35.7")	762 cm (30")	123 kg (271 lb)
❺ UPS for host and recon (optional)	296 mm (11.7")	602 cm (23.7")	430 cm (17")	70.4 kg (155 lb)
❻ System PDU	560 mm (22")	845 cm (33.3")	1,233 cm (48.6")	531 kg (1,170 lb)
❼ Air compressor	733 mm (29")	536 cm (21.2")	889 cm (35")	93 kg (204 lb)
❽ IMR host cabinet	300 mm (11.8")	900 cm (35.4")	762 cm (30")	79 kg (174 lb)
❾ IMR dual server cabinet	609 mm (24")	908 cm (35.7")	762 cm (30")	127 kg (279 lb)

12.8 System requirements, long table

This preferred room layout will accommodate a 2100 mm scannable range.





* Alternate location requires extended cable kit.

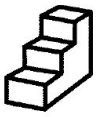
12.9 Dimensions and weights, long table, per unit

	Length	Width	Height	Weight
1 Gantry scanner	2,741.9 mm (108")	959.5 cm (37.8")	1,983.7 cm (78.1")	2,566 kg (5,656 lb)
2 Table, long	5,653 mm (222.5")	577 cm (22.7")	1,070 cm (42.2")	456 kg (1,005 lb)
3 Operator console (table optional)	1,200 mm (47.2")	905 cm (35.5")	1,164 cm (44.8")	88 kg (185 lb)
4 CRC server cabinet	609 mm (24")	908 cm (35.7")	762 cm (30")	123 kg (271 lb)
5 UPS for host and recon (optional)	296 mm (11.7")	602 cm (23.7")	430 cm (17")	70.4 kg (155 lb)
6 System PDU	560 mm (22")	845 cm (33.3")	1,233 cm (48.6")	531 kg (1,170 lb)
7 Air compressor	733 mm (29")	536 cm (21.2")	889 cm (35")	93 kg (204 lb)
8 IMR host cabinet	300 mm (11.8")	900 cm (35.4")	762 cm (30")	79 kg (174 lb)
9 IMR dual server cabinet	609 mm (24")	908 cm (35.7")	762 cm (30")	127 kg (279 lb)

Philips SmartPath provides you easy access to solutions and innovations for the full life of your computed tomography system, so you can boost your clinical and operational potential and achieve your organizational goals.

Optimize

Optimize your system's performance both now and in the future with regular and ongoing updates, including functionality improvements and remote technical support.



Enhance

Enhance your equipment with regular technology upgrades, and take advantage of the newest features and capabilities.

Transform

Transform your investment at the end of your system's life by transitioning seamlessly to a next-generation solution or refurbished option.

The images and descriptions contained herein provide technical specifications and optional features which may not be included with the standard system configuration. Contact your local Philips Representative for complete specific system details.

Some or all of the products, features, and accessories shown or described herein may not be available in your market. Please contact your local Philips Representative for availability.

Please visit www.philips.com/iCT

Philips Healthcare is part of Royal Philips

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Exhibit 6

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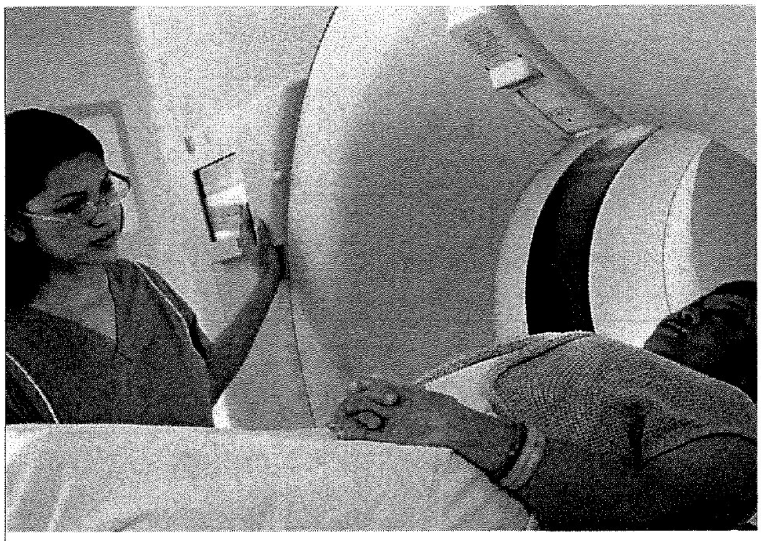

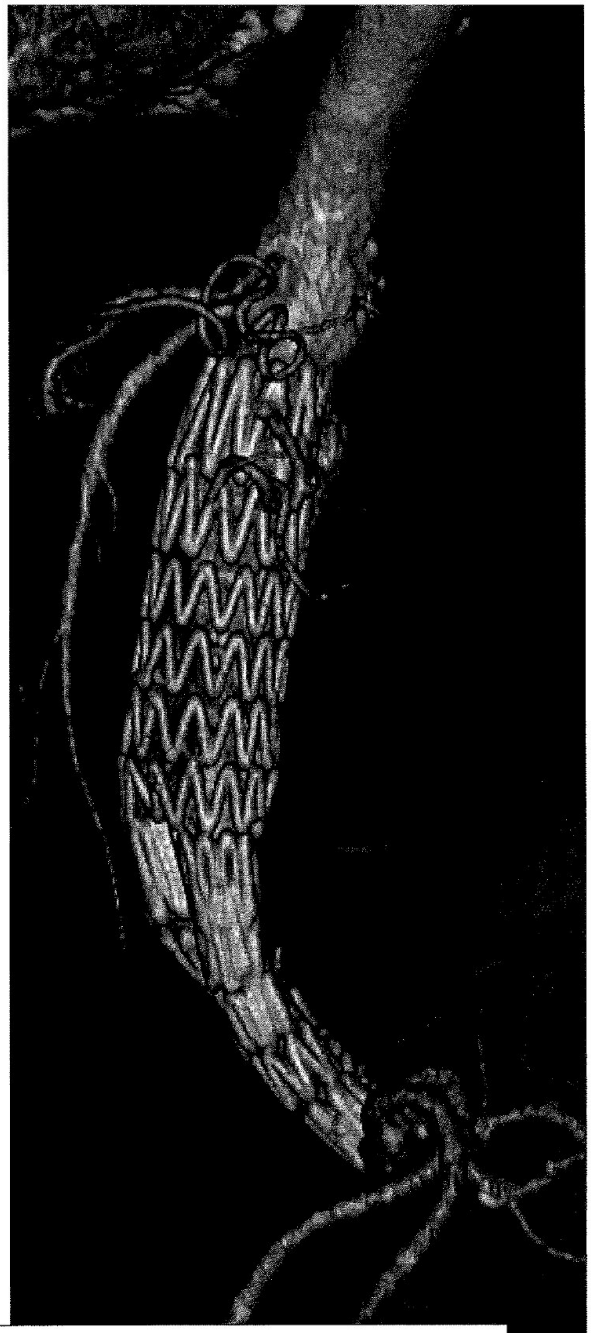

Total vascular imaging that gives you the results you need at a lower patient dose.

Philips and Imaging 2.0 are proud to introduce iCT TVI. Not only does this scanner deliver superior image quality, its lower dose and lower injected contrast significantly reduce the risk to your patients. And, it's setting a benchmark for total vascular imaging through a unique combination of low-kVp scanning and iDose[4] that improves low contrast sensitivity. Visit **www.philips.com/icttvi** to learn how iCT TVI can bring you and your patients closer to your goals.

PHILIPS
sense and simplicity

Frost & Sullivan Press Release **Published: 23 Mar 2009**

Frost & Sullivan Awards Philips Healthcare for Brilliance iCT 256 Slice and iCT SP 128 Slice CT Systems

Date Published: 23 Mar 2009

MOUNTAIN VIEW, Calif. — March 23, 2009 — Based on its recent analysis of the medical imaging market, *Frost & Sullivan* presents Philips Healthcare with the 2009 North American Product Innovation of the Year Award for its Brilliance iCT 256 slice and iCT SP 128 slice computed tomography (CT) systems. The Brilliance iCT imaging systems are not only leading edge technology; they are also part of a complete portfolio of solutions and services from Philips that facilitate the success of every CT imaging operation.

To develop the Brilliance iCT CT system Philips has brought technology innovation to every component of the CT imaging chain. The iCT optimizes imaging speed, X-Ray tube power, detector coverage, and dose utility mechanisms to deliver unsurpassed diagnostic accuracy at lower radiation doses. The Philips Essence technology, comprised of new X-ray tubes, 8-centimeter nano-panel detectors and RapidView reconstruction, combined with other innovative technologies such as the air-bearing gantry allowing faster rotation, contribute to the Brilliance iCT's reputation as one of the most advanced CT imaging systems on the market. As a result of these technology advances, the system provides leading image quality and temporal resolution, and can reduce scan times by half, requiring significantly less contrast than previous models while also offering dual energy and leading dose management capabilities.

"In designing the Brilliance iCT scanner, Philips has successfully overcome technical trade-offs to develop a system that is both highly capable and cost-effective," explains *Frost & Sullivan* Senior Industry Analyst Nadim Daher. "The iCT was designed from the ground up to deliver the dependability and performance required in CT operations including the most mission-critical clinical environments."

The iCT also leads the way with system reliability and ease of use, two key characteristics of the Philips brand. With the iCT, Philips has effectively overcome the physical challenges of cardiac imaging such as the movement of the heart and the variability of heart rate, size and body habitus, allowing the breakthrough capability of imaging the heart within two heartbeats and with up to 80 percent dose reduction. In addition to outstanding cardiovascular imaging capabilities, the iCT constitutes an asset for the entire imaging enterprise, spanning the full spectrum of standard and advanced CT imaging services of cardiology, radiology, oncology, brain imaging, virtual colonoscopy, interventional imaging, and bariatric imaging.

"The innovation Philips brings to the CT market extends well beyond the imaging equipment itself. It extends to solutions aimed at helping customers overcome the constantly changing clinical and business challenges they face in all areas of their CT operation," adds Daher. "Philips understands that optimizing the CT imaging practice requires not only fast and efficient technology, but also technology enrichment at every step of the workflow."

Putting workflow solutions at the service of CT, the Brilliance Everywhere solution utilizes efficient thin client technologies to provide anywhere, anytime access to even the most advanced CT applications. Philips informatics solutions for CT expand the ability to collaborate with referring physicians, while enabling more efficient data distribution and storage management strategies and faster turnaround times. Philips also leverages its leadership role in imaging informatics and PACS to provide unique remote capabilities such as system monitoring and preemptive problem resolution, and support advanced remote service delivery models, with the end effect of optimizing system availability and clinical outcomes.

Philips is constantly helping its customers cope with tightening economic conditions, including the challenges related to reimbursement. Illustrative of this commitment is the fact that Philips is the uncontested industry leader for the upgradeability of its systems, and that beyond the leading edge technology it embodies, the Brilliance iCT platform is also the most scalable in the CT industry. With the Brilliance iCT SP, Philips provides an entry point into the full feature iCT platform at a lower cost, offering imaging providers a seamless and cost effective upgrade path to follow as they expand imaging service lines and as technology advances. In order to

Olszewski Declaration - Exhibit 7

help customers extract as much utility as possible from every asset in their operation, each iCT system includes Philips innovative Utilization Reports. These reports measure critical performance metrics automatically and in real time, allowing customers to quickly identify and easily act upon every opportunity to improve the CT operation. Philips solutions support continuous improvements in efficiency and workflow. A services-based approach, Philips' systems involve every stakeholder along the care cycle, which effectively complements the company's leading edge in horizontal workflow integration.

With the Brilliance iCT platform, Philips has built a powerful value proposition for the CT practice that strengthens the foundation of today's imaging business and supports the success of today's imaging enterprise. *Frost & Sullivan* recognizes the unique work of Philips Healthcare in helping customers take the next leap in CT, and is proud to bestow upon the company the 2009 Product Innovation of the Year Award in medical imaging.

Each year, *Frost & Sullivan* presents this award to the company that has demonstrated excellence in new products and technologies within its industry. The award lauds innovation shown through the launch of a broad line of emerging products and technologies.

Frost & Sullivan's Best Practices Awards recognize companies in a variety of regional and global markets for demonstrating outstanding achievement and superior performance in areas such as leadership, technological innovation, customer service, and strategic product development. Industry analysts compare market participants and measure performance through in-depth interviews, analysis, and extensive secondary research in order to identify best practices in the industry.

About Royal Philips Electronics

Royal Philips Electronics of the Netherlands (NYSE: PHG, AEX: PHI) is a diversified Health and Well-being company, focused on improving people's lives through timely innovations. As a world leader in healthcare, lifestyle and lighting, Philips integrates technologies and design into people-centric solutions, based on fundamental customer insights and the brand promise of "sense and simplicity". Headquartered in the Netherlands, Philips employs approximately 121,000 employees in more than 60 countries worldwide. With sales of $38 billion in 2008, the company is a market leader in cardiac care, acute care and home healthcare, energy efficient lighting solutions and new lighting applications, as well as lifestyle products for personal well-being and pleasure with strong leadership positions in flat TV, male shaving and grooming, portable entertainment and oral healthcare. News from Philips is located at www.philips.com/media

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best in class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. *Frost & Sullivan* leverages over 45 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.

Contact:
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210.247.3806
jake.wengroff@frost.com

BACK TO TOP RETURN

KLAS Data Performance Report

Generated by on January 17, 2012

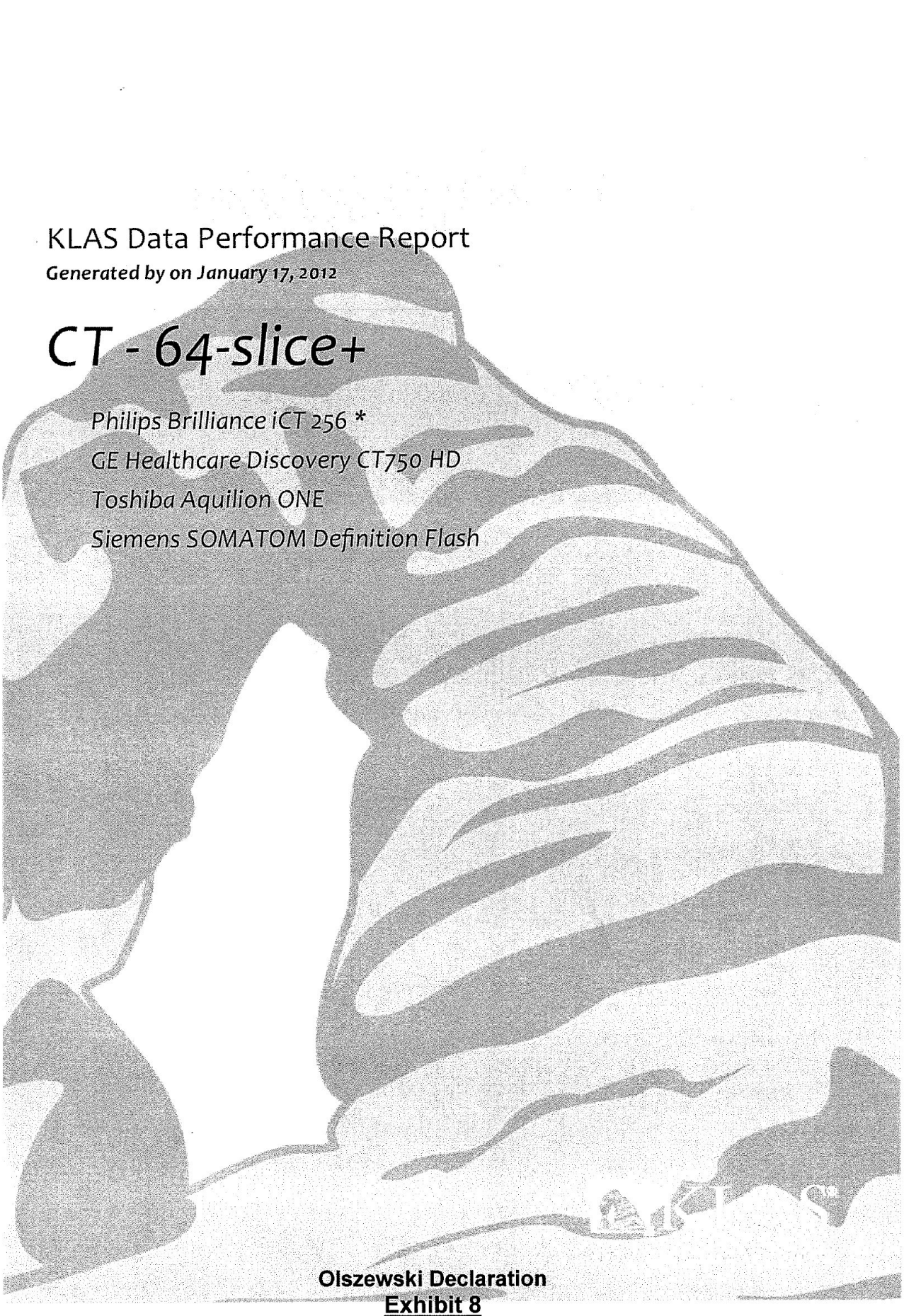
CT - 64-slice+

*Philips Brilliance iCT 256 **

GE Healthcare Discovery CT750 HD

Toshiba Aquilion ONE

Siemens SOMATOM Definition Flash



Olszewski Declaration
Exhibit 8

KLAS Data Performance Report

This data performance report is a summary report only and has been created for promotional use. It includes some of the KLAS performance indicators, which were selected by the report generator. The comments are also a selection, chosen by the report generator from all customer comments.

This promotional report is a compilation of data gathered from interviews with healthcare providers. Data gathered from these sources includes strong opinions reflecting the emotion of exceptional success and, at times, failure. It does not represent KLAS' opinion. The information is intended solely as a catalyst for a more meaningful and effective investigation on an organization's part and is not intended nor should it be used to replace an organization's due diligence. KLAS relies heavily on the First Amendment right of free speech to offer this service to providers and the rest of the healthcare community. This information is provided under copyright by KLAS Enterprises, LLC and is intended to be shared as a promotional report by the generator's organization with a third party. Unauthorized users will be liable to compensate KLAS for the full retail price.

For a full report, go to www.KLASresearch.com. Healthcare providers receive access to KLAS data by registering for a complimentary account on the KLAS website.

KLAS Overview

Who We Are:

KLAS, founded in 1996, is a research and consulting firm that specializes in monitoring and reporting the performance of healthcare's information technology (HIT) vendors. KLAS staff and advisory board average 25 years of healthcare information technology experience.

How the data is collected:

KLAS utilizes two methods to collect candid performance data. The first is a series of direct product/vendor evaluations completed by healthcare provider organizations covering 25 performance areas. Second, KLAS performs in-depth, confidential interviews with healthcare providers completing the questionnaire to gather valuable insight into specific strengths, weaknesses and future expectations for the product. From these two sources, readers are able to gain valuable insights into how a vendor or product is truly performing.

KLAS Konfidence KLAS Konfidence Level Description

Lowest possibility in variability of score

Medium possibility in variability of score

Highest possibility in variability of score
(min. required to publish a ranking)

* Limited data, typically early trending data

Data Details

PHILIPS	GE Healthcare	TOSHIBA	SIEMENS
Brilliance iCT 256*	Discovery CT750 HD	Aquilion ONE	SOMATOM Definition Flash
Konfidence Level	Konfidence Level	Konfidence Level	Konfidence Level
*	●○○	●●○	●○○

Performance Indicators

Well Above Average | Above Average | Average | Below Average | Well Below Average

Sales & Contracting	PHILIPS Brilliance iCT 256*	GE Healthcare Discovery CT750 HD	TOSHIBA Aquilion ONE	SIEMENS SOMATOM Definition Flash	CT - 64-slice+	Med Equipment Avg.
Product works as promoted	8.2	7.2	8.1	8.2	8.0	7.8
Money's worth	8.7	6.8	8.2	8.0	8.0	7.8

Implementation & Training	PHILIPS Brilliance iCT 256*	GE Healthcare Discovery CT750 HD	TOSHIBA Aquilion ONE	SIEMENS SOMATOM Definition Flash	CT - 64-slice+	Med Equipment Avg.
Quality of training	8.3	7.4	7.9	8.0	8.0	7.7

Functionality & Upgrades	PHILIPS Brilliance iCT 256*	GE Healthcare Discovery CT750 HD	TOSHIBA Aquilion ONE	SIEMENS SOMATOM Definition Flash	CT - 64-slice+	Med Equipment Avg.
Product has needed functionality	100 %	86 %	88 %	100 %	93 %	85 %

Service & Support	PHILIPS Brilliance iCT 256*	GE Healthcare Discovery CT750 HD	TOSHIBA Aquilion ONE	SIEMENS SOMATOM Definition Flash	CT - 64-slice+	Med Equipment Avg.
Quality of field support	8.5	8.4	8.7	8.0	8.2	8.0

General	PHILIPS Brilliance iCT 256*	GE Healthcare Discovery CT750 HD	TOSHIBA Aquilion ONE	SIEMENS SOMATOM Definition Flash	CT - 64-slice+	Med Equipment Avg.
Overall communication	8.2	7.4	8.0	8.1	7.8	7.6
Recommend to peer/friend	8.4	7.4	7.6	8.5	7.9	7.7

*** Preliminary scores do not meet KLAS's minimum konfidence level.**

User Commentary (Last 12 Months)

Functionality and Upgrades

Dec 2011	Director	The Brilliance iCT 256 is still meeting our needs. We have had this product for over a year, and our ED has been happy with its performance thus far. As we begin to look toward setting up other facilities, we will definitely go with Philips again since we are so happy with the results we have gotten at this site using their equipment.
Oct 2011	Director	Philips is much better than Toshiba. It is the dose control that gives Philips the edge.
Sep 2011	Analyst/Coordinator	We started off doing cardiac with Philips, and we have always gotten really good results. The protocols that Philips helped us design were really good. We have had very few problems with the Brilliance iCT 256. I would have to give Philips high marks on that. The 256 is also great for pediatrics.
Aug 2011	Director	The iCT 256 is an amazing scanner for us. It is incredibly fast, and in the areas of cardiac and pulmonary, it either reduces or totally eliminates the need for patients to hold their breath. We can get wonderful images using the lowest dose possible. Our physicians have expressed many positive comments in the area of angio runoff. The bore size will accommodate virtually any patient. We have multiple Philips products, and the user interfaces of all of them are very similar, allowing our technologists to move from one product to another with ease. Our physicians are exceptionally happy with the results they get.
Aug 2011	Director	The thing that stands out most is that the Philips Brilliance iCT 256 gives great cardiac images.
Apr 2011	Director	Philips is always coming out with new things. They do a good job of developing their products.
Apr 2011	Director	We have had the Brilliance iCT for a couple of years, and it has been bulletproof for cardiology. It is phenomenal. The user interface for the iCT is the same as the Brilliance 16, and it has been nice to have the same look and feel to the systems.

Implementation and Training

May 2011	Manager	This scanner is incredibly easy to use, and the user interface is intuitive. We went through training very quickly, and Philips was really excellent with the training. They made sure we were well equipped to use this scanner.

Relationship

Oct 2011	Manager	Philips has been really good with us in terms of keeping their promises. They always seem to come through, even when experiences with other vendors would have us predict otherwise.
Sep 2011	Analyst/Coordinator	We have had a really good working relationship with Philips. There are obviously several advantages to going with one vendor. Their units are very reliable. Our physicians have been very pleased with the image quality, and our technologists find the interface to be very easy to use. It is very quick to learn. When we have had that kind of success in quality and satisfaction with a vendor, it sort of makes sense to keep going with them.

ROI / Cost (care and feeding)

Oct 2011	Director	We have really loved our Philips iCT 256. The dose-reduction software has allowed us to minimize dose while still getting really good images.
Aug 2011	Manager	The Philips Brilliance iCT 256 is very fast. This helps us get more patients through, which is nice. More importantly, the scan goes so fast that it is a lot less likely that patients will move. This means that the images are clearer, and we have to redo scans a lot less frequently. The fact that we don't have to redo scans not only is convenient for the patients, but also helps reduce the amount of dose patients receive.

Service and Support

Oct 2011	Director	I have no complaints with the Brilliance iCT 256. We do a lot of work with Philips. The 256 is a simple machine that sits by itself in an area where we mostly do cardiac. It works great. There is really nothing more I could want with this machine. Every time we need service, Philips is right there. They do a good job.
Oct 2011	Manager	I really like the service engineer that we have. Whenever we have an issue, he arrives at the office 40 minutes after our call.
Aug 2011	Director	The service and support from Philips are excellent. Philips is always available to us quickly when we require their help.
May 2011	Manager	Philips' service is excellent. The field service is better than the phone service, but I think it is just easier to deal with things in person, so that is not necessarily Philips' fault.

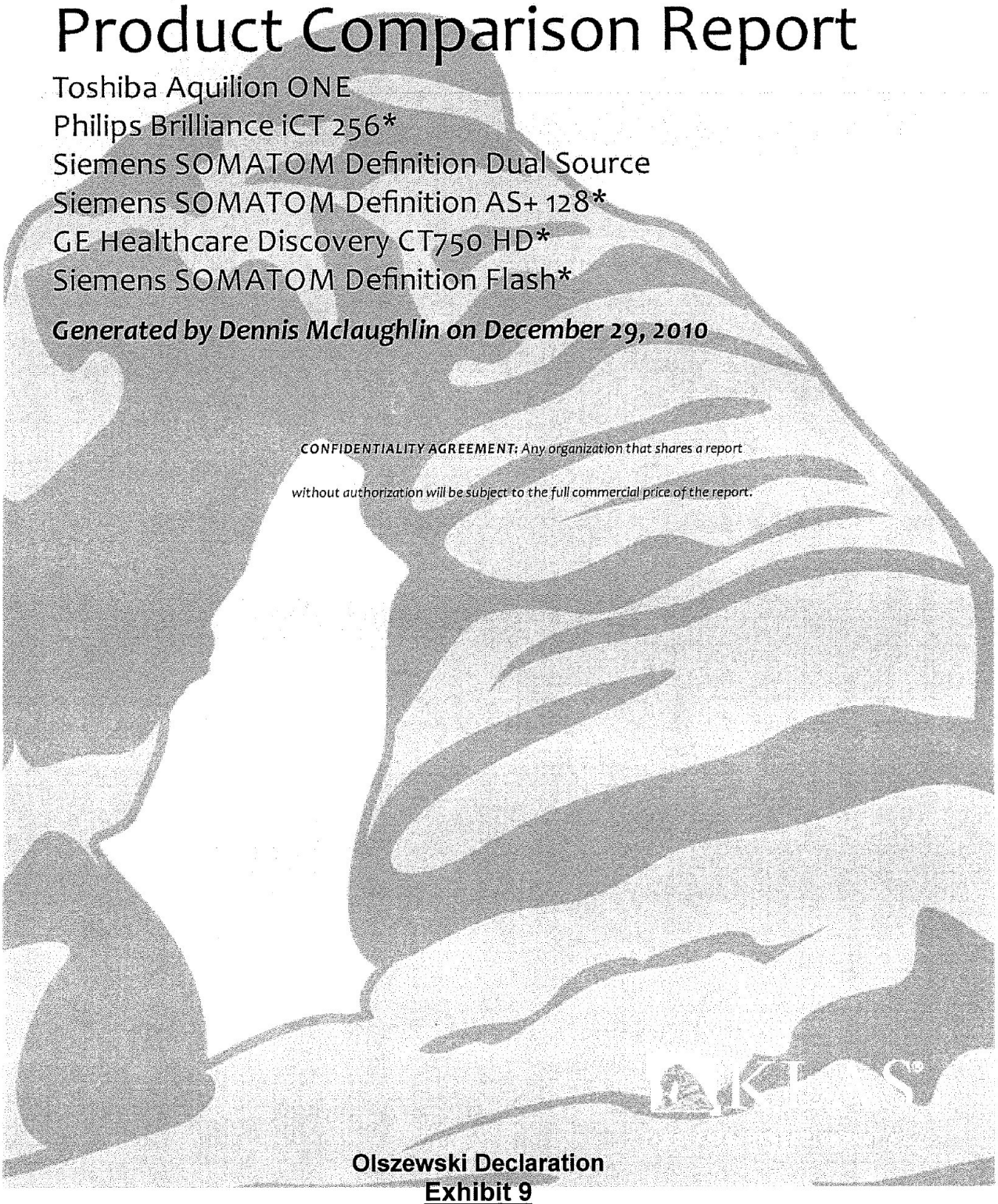
Technology

Aug 2011	Director	Overall, the Philips Brilliance iCT 256 is a great machine. It is very reliable, and we don't have many issues with it. Overall, it is a good piece of equipment.
May 2011	Manager	The Philips iCT 256 is very fast. Patients can't believe how fast it is. It is a breath of fresh air in our department.
May 2011	Manager	The speed of the Brilliance iCT is amazing. Patients can't believe how quickly the exam is done. The images are also amazing. I am looking forward to using the unit more for general radiology. We will be able to get some great images.

Product Comparison Report

Toshiba Aquilion ONE
Philips Brilliance iCT 256*
Siemens SOMATOM Definition Dual Source
Siemens SOMATOM Definition AS+ 128*
GE Healthcare Discovery CT750 HD*
Siemens SOMATOM Definition Flash*

Generated by Dennis Mclaughlin on December 29, 2010



Olszewski Declaration
Exhibit 9

Overview

Overview

	Overall Score	Konfidence	Annual Trend
TOSHIBA Aquilion ONE	92.54		
PHILIPS Brilliance iCT 256*	87.44		
SIEMENS SOMATOM Definition Dual Source	87.35		
SIEMENS SOMATOM Definition AS+ 128*	86.11		
GE Healthcare Discovery CT750 HD*	81.11		
SIEMENS SOMATOM Definition Flash*	88.32		
CT - 64-slice+	88.85		
Medical Equipment Average	84.17		

Full Report Card

Sales & Contracting	TOSHIBA Aquilion ONE	PHILIPS Brilliance iCT 256*	SIEMENS SOMATOM Definition Dual Source	SIEMENS SOMATOM Definition AS+ 128*	GE Discovery CT750 HD*	SIEMENS SOMATOM Definition Flash*	CT - 64-slice+	Med Equipment Avg.
Contracting experience	7.9	7.8	7.6	7.2	7.0	7.5	7.8	7.5
Product works as promoted	8.0	8.0	7.8	8.3	7.7	8.8	8.1	7.9
Money's worth	8.3	7.9	7.9	8.2	7.5	8.7	8.1	7.8
Avoids nickel-and-diming	100 %	93 %	93 %	86 %	80 %	100 %	90 %	84 %
Category Average (Score out of 100)	92.2	89.2	87.7	87.2	82.0	95.8	89.5	85.6

Implementation & Training	TOSHIBA Aquilion ONE	PHILIPS Brilliance iCT 256*	SIEMENS SOMATOM Definition Dual Source	SIEMENS SOMATOM Definition AS+ 128*	GE Discovery CT750 HD*	SIEMENS SOMATOM Definition Flash*	CT - 64-slice+	Med Equipment Avg.
Quality of implementation	8.5	7.8	7.8	7.8	8.1	8.2	8.1	7.8
Implementation on time	8.6	8.1	8.2	8.3	8.4	8.2	8.3	8.1
Quality of training	8.6	7.9	8.0	7.7	7.2	8.1	8.0	7.8
Category Average (Score out of 100)	95.1	87.7	89.1	88.3	88.0	90.6	90.5	87.6

Functionality & Upgrades	TOSHIBA Aquilion ONE	PHILIPS Brilliance iCT 256*	SIEMENS SOMATOM Definition Dual Source	SIEMENS SOMATOM Definition AS+ 128*	GE Discovery CT750 HD*	SIEMENS SOMATOM Definition Flash*	CT - 64-slice+	Med Equipment Avg.
Overall product quality	8.4	7.9	8.0	7.8	7.6	8.4	8.2	7.8
Delivery of new technology	8.6	8.1	8.1	8.3	7.5	8.2	8.1	7.6
Product reliability/uptime	8.1	7.5	7.7	7.7	7.9	8.0	8.1	7.9
Ease of use	8.3	8.0	8.0	7.9	7.2	7.8	8.1	7.9
Supports integration goals	8.4	8.3	8.1	8.3	7.9	8.6	8.3	7.8
Product has needed functionality	82 %	94 %	86 %	100 %	63 %	91 %	90 %	83 %
Category Average (Score out of 100)	91.3	89.2	88.0	90.7	81.0	90.7	90.5	86.0

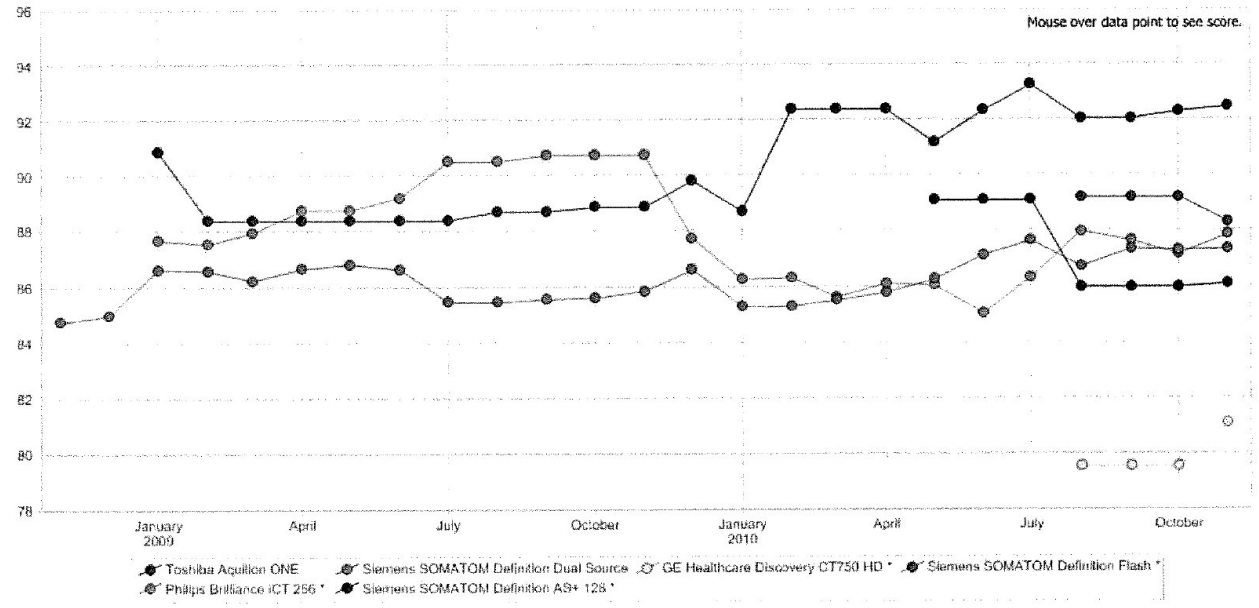
Full Report Card - cont.

Service & Support	TOSHIBA Aquilion ONE	PHILIPS Brilliance iCT 256*	SIEMENS SOMATOM Definition Dual Source	SIEMENS SOMATOM Definition AS+ 128*	GE Discovery CT750 HD*	SIEMENS SOMATOM Definition Flash*	CT - 64-slice+	Med Equipment Avg.
Quality of phone/web support	8.7	8.1	8.2	7.9	7.5	8.2	8.1	7.7
Quality of field support	9.0	8.1	8.4	8.2	8.0	8.1	8.2	7.9
Proactive service	8.6	7.4	7.7	7.4	7.3	7.7	8.0	7.4
Account management	8.2	8.1	7.6	7.3	7.7	7.3	7.8	7.5
Lives up to expectations	8.4	7.9	7.9	7.1	7.3	7.9	8.0	7.7
Keeps promises	95%	94%	86%	78%	75%	80%	94%	91%
Category Average (Score out of 100)	95.7	88.9	88.1	83.4	82.4	86.3	90.0	85.9

General	TOSHIBA Aquilion ONE	PHILIPS Brilliance iCT 256*	SIEMENS SOMATOM Definition Dual Source	SIEMENS SOMATOM Definition AS+ 128*	GE Discovery CT750 HD*	SIEMENS SOMATOM Definition Flash*	CT - 64-slice+	Med Equipment Avg.
Overall communication	8.5	7.9	7.7	7.1	7.6	8.4	8.0	7.6
Recommend to peer/friend	8.8	8.3	8.2	7.9	7.9	8.2	8.2	7.8
Overall satisfaction	8.6	8.1	8.2	7.7	7.8	7.9	8.2	7.8
Forecasted overall satisfaction	8.5	8.1	8.2	8.2	8.0	8.7	8.3	7.9
Would you buy again	100%	88%	100%	100%	86%	92%	95%	89%
Ranked client's best solution	53%	50%	50%	50%	17%	45%	49%	33%
Category Average (Score out of 100)	89.3	82.9	85.0	82.6	75.7	84.5	84.7	78.1

Trending Details: Overall Score

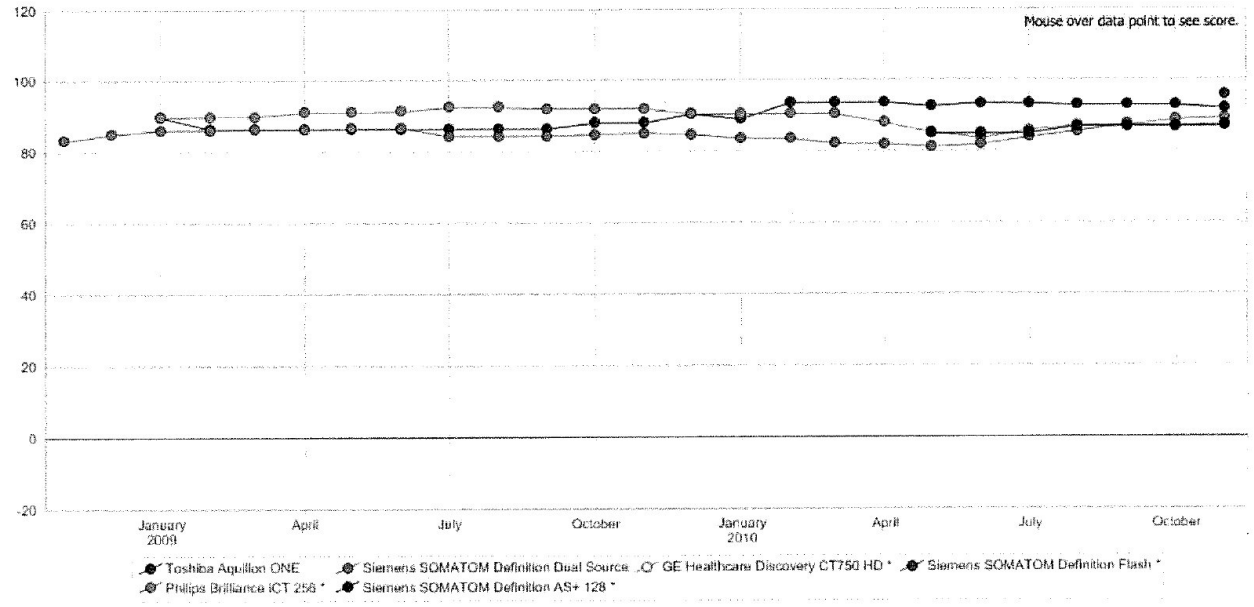
Overall Score out of 100



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	90.92	88.42	88.42	88.42	88.73	88.89	88.74	92.41	91.22	93.29	92.07	92.51	
PHILIPS Brilliance iCT 256*	N/A	87.70	87.98	88.78	90.54	90.77	90.77	86.27	85.63	86.06	86.34	87.65	87.88	
SIEMENS SOMATOM Definition Dual Source	84.76	86.66	86.26	86.84	85.47	85.57	85.85	85.31	85.53	86.27	87.65	87.37	87.35	
SIEMENS SOMATOM Definition AS+ 128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	89.12	89.12	85.99	86.11	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79.53	81.11	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	89.23	88.32	

Category Trending Details: Sales & Contracting

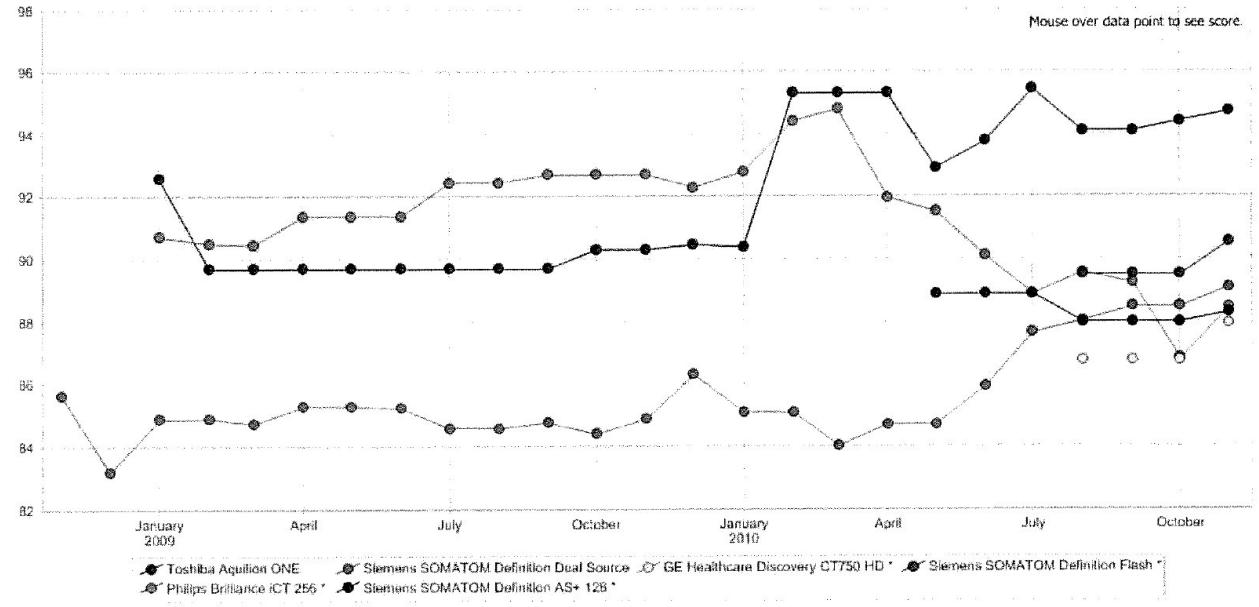
Sales & Contracting



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	90.0	86.7	86.7	86.7	86.7	88.3	89.3	93.9	92.8	93.5	93.1	92.2	
PHILIPS Brilliance iCT 256*	N/A	90.0	90.2	91.4	92.7	92.3	92.3	90.6	90.6	85.5	86.0	87.5	89.6	
SIEMENS SOMATOM Definition Dual Source	83.4	86.4	86.7	86.9	84.6	84.7	85.4	83.9	82.4	81.5	84.1	87.5	87.7	
SIEMENS SOMATOM Definition AS+128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	85.2	85.2	87.2	87.2	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	95.8	

Category Trending Details: Implementation & Training

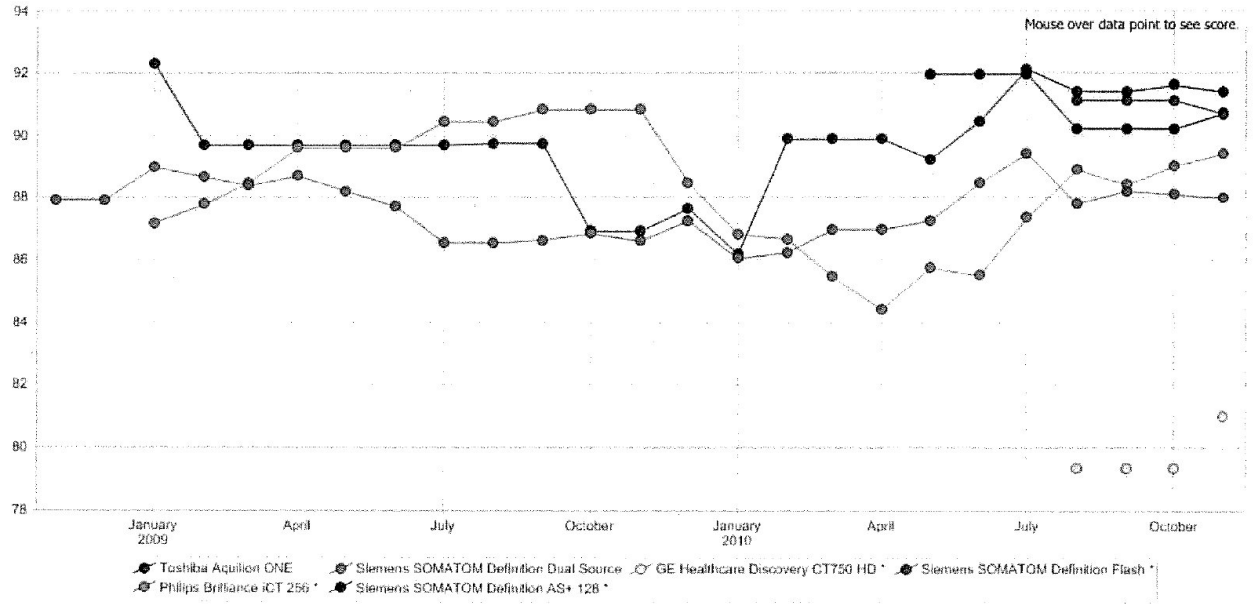
Implementation & Training



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	92.6	89.7	89.7	89.7	89.7	90.3	90.4	95.3	92.9	95.4	94.1	94.7	
PHILIPS Brilliance iCT 256*	N/A	90.7	90.5	91.4	92.5	92.7	92.7	92.8	94.8	91.5	88.9	89.2	88.4	
SIEMENS SOMATOM Definition Dual Source	85.6	84.9	84.8	85.3	84.6	84.8	84.9	85.1	84.0	84.7	87.6	88.5	89.1	
SIEMENS SOMATOM Definition AS+ 128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	88.9	88.9	88.0	88.3	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	86.8	88.0	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	89.5	90.6	

Category Trending Details: Functionality & Upgrades

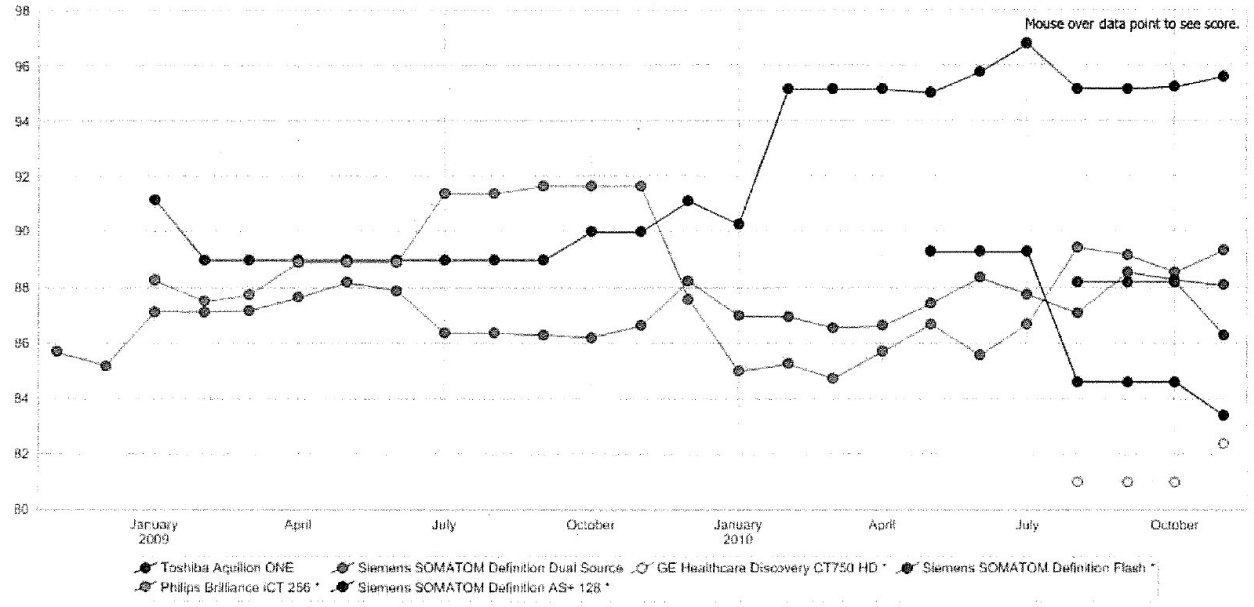
Functionality & Upgrades



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	92.3	89.7	89.7	89.7	89.8	86.9	86.2	89.9	89.2	92.1	91.4	91.4	
PHILIPS Brilliance iCT 256*	N/A	87.2	88.5	89.6	90.5	90.8	90.8	86.8	85.5	85.8	87.4	88.4	89.4	
SIEMENS SOMATOM Definition Dual Source	88.0	89.0	88.4	88.2	86.6	86.6	86.6	86.1	87.0	87.3	89.4	88.2	88.0	
SIEMENS SOMATOM Definition AS+ 128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	92.0	92.0	90.2	90.7	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	79.4	81.0	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	91.2	90.7	

Category Trending Details: Service & Support

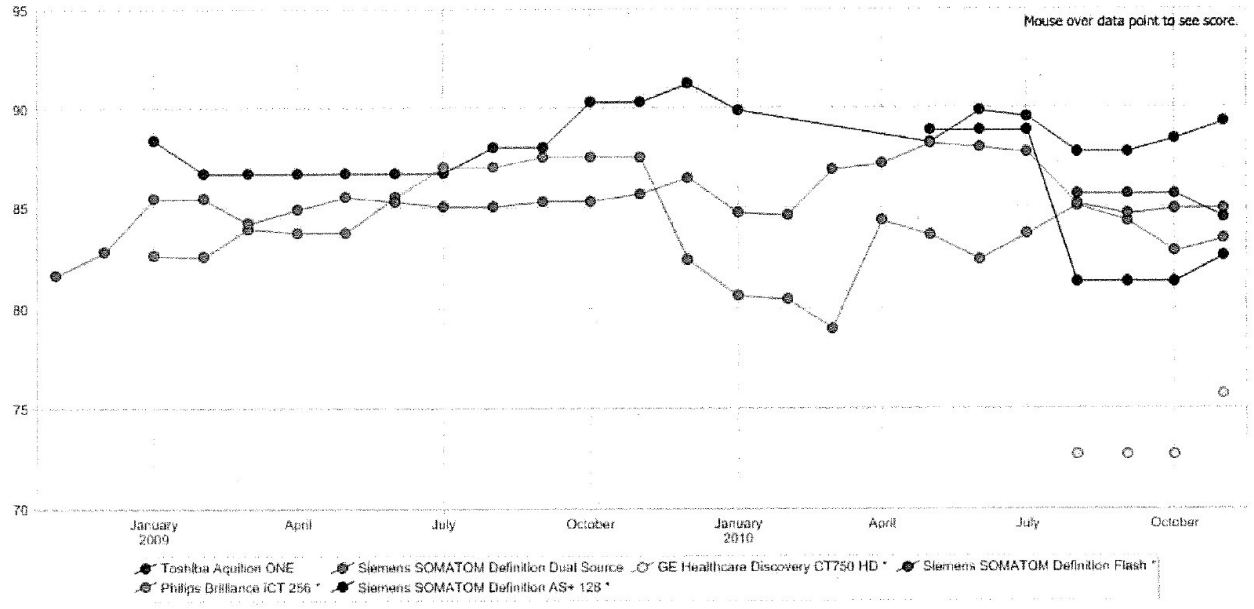
Service & Support



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	91.2	89.0	89.0	89.0	89.0	90.0	90.3	95.2	95.0	96.8	95.2	95.6	
PHILIPS Brilliance iCT 256*	N/A	88.3	87.8	88.9	91.4	91.7	91.7	85.0	84.7	86.7	86.7	89.2	89.4	
SIEMENS SOMATOM Definition Dual Source	85.7	87.2	87.2	88.2	86.4	86.3	86.6	87.0	86.6	87.4	87.8	88.6	88.1	
SIEMENS SOMATOM Definition AS+ 128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	89.3	89.3	84.6	83.4	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	81.0	82.4	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	88.2	86.3	

Category Trending Details: General

General



	2008	2009						2010						
	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	
TOSHIBA Aquilion ONE	N/A	88.4	86.8	86.8	86.8	88.1	90.3	89.9	N/A	88.3	89.6	87.8	89.3	
PHILIPS Brilliance iCT 256*	N/A	82.7	84.0	83.8	87.1	87.6	87.6	80.6	79.0	83.7	83.7	84.4	83.5	
SIEMENS SOMATOM Definition Dual Source	81.7	85.5	84.3	85.6	85.1	85.4	85.7	84.8	86.9	88.2	87.8	84.7	85.0	
SIEMENS SOMATOM Definition AS+ 128*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	88.9	88.9	81.4	82.6	
Discovery CT750 HD*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72.7	75.7	
SIEMENS SOMATOM Definition Flash*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	85.7	84.5	

Data Details

Score Distribution

Score Scale: 1 2 3 4 5 6 7 8 9

TOSHIBA
Aquilion ONE

PHILIPS
Brilliance iCT 256*

SIEMENS
SOMATOM Definition Dual Source

SIEMENS
SOMATOM Definition AS+ 128*

GE Healthcare
Discovery CT750 HD*

SIEMENS
SOMATOM Definition Flash*

* Mouseover to see percentages

Facility Type

Legend: Facilities in IDN Standalone Facilities

TOSHIBA
Aquilion ONE

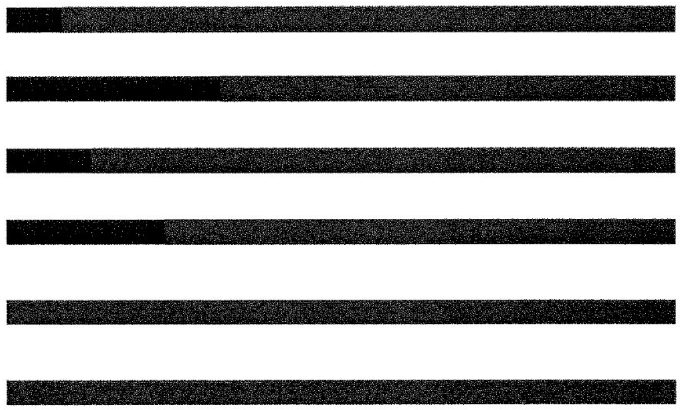
PHILIPS
Brilliance iCT 256*

SIEMENS
SOMATOM Definition Dual Source

SIEMENS
SOMATOM Definition AS+ 128*

GE Healthcare
Discovery CT750 HD*

SIEMENS
SOMATOM Definition Flash*



* Mouseover to see percentages

User Comments: Overview

All Comments	Positive	Negative
TOSHIBA Aquilion ONE	87%	13%
SIEMENS SOMATOM Definition Dual Source	87%	13%
PHILIPS Brilliance iCT 256*	81%	19%
SIEMENS SOMATOM Definition AS+ 128*	78%	22%
SIEMENS SOMATOM Definition Flash*	76%	24%
Discovery CT750 HD*	67%	33%
Medical Equipment Average	68%	32%

Implementation and Training

Aug 2010	Manager	The training that Siemens gave us was too in depth on a few topics, and it didn't cover other topics that we wanted to learn about.
Jul 2010	Manager	One thing that Siemens could do is provide more training for our doctors to educate them about what a flash scan is.

Other Observations & Comments

Aug 2010	Manager	We actually had Siemens' older scanner, their Dual Source, right when it was first released, and we had a lot of problems with it. However, we aren't seeing those problems with our other pieces of Siemens' equipment.

ROI / Cost (care and feeding)

Nov 2010	Director	The Definition Flash is supposed to scan faster than normal CT equipment since it has dual sources. Granted, the time is only cut from five seconds to three, so in the grand scheme of things, it is not a huge difference. But for the movement of a body part, like the heart, a second is a long time. For cardiac patients, we don't have to beta block.

Service and Support

Nov 2010	Director	Siemens monitors a lot of the equipment proactively. They do planned maintenance up front.
Aug 2010	Manager	Service and support from Siemens are excellent. Siemens is readily available to us when we need them.
Aug 2010	Physician	Siemens almost babysits us as it relates to support. They are always available to us and phone us regularly to make sure everything is going well.
Aug 2010	Manager	Siemens provides great service.
Aug 2010	Manager	Siemens' service is very proactive. A service person called me a few weeks ago and told me that I was going to have a problem with one of my bulbs. Siemens came and replaced it, and I never even knew that there was a problem at all. Our service people deserve awards. They come in when they are supposed to be on vacation.
Aug 2010	Manager	The service department is very on top of things. They called us a few weeks ago to tell us that one of our tubes had a problem and that they wanted to replace it. All of this was done before we even knew there was a problem at all.
Aug 2010	Manager	We have a new service representative from Siemens, and we have been very happy with her. The engineer is really great, too.

Technology

Nov 2010	Director	Siemens is always at the forefront of technology.
Aug 2010	Manager	I just absolutely love Siemens' technology. It is cutting edge and still so easy to use. The flash mode is so amazing on this system. The dose is very low, and it works very well for cardiac imaging. This machine is even better than I expected it to be.
Aug 2010	VP/Other Executive	One area that this machine can improve upon is the two tubes that it has. One of the tubes has a restricted 23 cm viewing area. We wish that Siemens could expand it.
Aug 2010	VP/Other Executive	The main thing we wanted from the Flash was speed. We got it. When patients are unwilling to cooperate with longer exam times, providers want a machine that will do the exam really fast. The Flash is able to do scans for us two to four times faster than our previous machines.
Aug 2010	VP/Other Executive	We really couldn't care about the overall functionality of the Flash. When it comes to cardiac scans, we aren't interested in the number of channels that it has. We just want to freeze the cardiac images. The Flash is able to get an image in 75 milliseconds. This allows us to see the required coronary and plaque characteristics of the heart.

Win/Loss - Why they were not selected (by non-clients)

Jul 2010	Analyst/Coordinator	We are looking at getting a new CT scanner and have delayed that because we have all of the functionality we need. The Flash would have offered us lower disk scanning, but we would not get reimbursed for that. We would like the features of the newer systems but cannot justify getting them when we are comfortable with what we already have.

Win/Loss - Why they were selected (by current clients)

Sep 2010	Director	We already had a Definition here, so the Flash just kind of fit as a complement. We are opening a new building soon, and in that building will be a new ED. That will double the size of our existing ED. The Flash will be positioned right there in the ED.

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Corporate Responsibility

Our mission is to improve healthcare technology delivery by honestly, accurately, and impartially measuring vendor performance for our *provider partners*.

Making Greater Strides through the Collective Voice of Customers
Kent Gale, founder of KLAS, discusses why measuring vendor performance is critical to today's healthcare challenges.

What We Do

KLAS helps healthcare providers make informed technology decisions by reporting accurate, honest, and impartial vendor performance data. Discover the KLAS Difference.

Why Providers Trust KLAS
Healthcare CIO's share their perspectives about the reasons they trust KLAS as a source for vendor performance research.

How We Do It

KLAS independently monitors vendor performance through the active participation of thousands of healthcare organizations. KLAS uses a stringent methodology to ensure all data and ratings are accurate, honest, and impartial.

Providing a Transparent Window into What Users Think
Jared Peterson, KLAS EVP of Research Operations, illustrates the process for gathering and reporting vendor performance research.

Research results are offered to healthcare providers through the following mediums:

Performance Database — Real-time performance ratings for all of the markets, vendors, and products KLAS monitors (free access to healthcare providers)

Specialty Reports — A detailed look at the performance or perception of specific segments, as well as key issues within the vendor market

Advisory Services/Custom Research — Providers and vendors can engage KLAS to conduct custom research projects or deliver on-site consulting engagements

Quick Facts

- KLAS conducts over 1,900 healthcare provider interviews per month, working with over 4,500 hospitals and over 3,000 doctor's offices and clinics
- KLAS is independently owned and operated
- KLAS has ratings on over 250 healthcare technology vendors and over 900 products and services
- KLAS publishes approximately 40 performance and perception reports per year
- KLAS is headquartered in Orem, Utah, with independent researchers working throughout North America
- The name KLAS is an acronym comprising a letter from each of the founders' names.

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Olszewski Declaration
Exhibit 10

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Quarterly User Satisfaction Report™
2nd Quarter 2011

Vendor	**PHILIPS HEALTHCARE**
Technology	**CT SCANNER - CT SIMULATION**
Date	**6/23/2011**

User Satisfaction Ratings Review 2
User Satisfaction Ratings For All Vendors 2
User Comments 2
Two Year Trending 9
Vendor Ranking for 2nd Quarter 2011 10

Olszewski Declaration
Exhibit 11

User Satisfaction Ratings Review

Category	2nd Quarter 2011	1st Quarter 2011	4th Quarter 2010
System Performance	9.2 ♦	9.2 ▼	9.3
System Reliability	9.2 ▲	9.1 ♦	9.1
Installation / Implementation	9.2 ▲	9.1 ▼	9.2
Applications Training	9.2 ▼	9.4 ▼	9.5
Service Response Time	9.4 ▲	9.3 ♦	9.3
Service Repair Quality	9.4 ▲	9.3 ♦	9.3
Composite Rating	9.3 ♦	9.3 ♦	9.3

♦ Indicates No Change in Rating ▲ Indicates Rating Went Up ▼ Indicates Rating Went Down

User Satisfaction Ratings For All Vendors

	System Performance	System Reliability	Installation / Implementation	Applications Training	Service Response Time	Service Repair Quality	Composite
GE	9.1 ▼	9.1 ▼	9.2 ▼	9.2 ▼	9.2 ▼	9.3 ▼	9.2 ▼
PHILIPS	9.2	9.2	9.2 ▼	9.2 ▼	9.4	9.4	9.3
SIEMENS	9.3	9.4	9.2 ▼	9.3	9.4	9.3 ▼	9.3
TOSHIBA	9.4 ▲	9.5 ▲	9.5 ▲	9.5 ▲	9.5 ▲	9.6 ▲	9.5 ▲

▲ - represents the highest rating in a category. ▼ - represents the lowest rating in a category.

User Comments

The User Comments in this report may include individual responses that were gathered from specific interviews. However, the majority of the comments below are summations indicating the general themes raised by your customers.

SYSTEM PERFORMANCE

- Many users offer positive feedback on operating costs, which are lower because the systems do not require a chiller.
- Users report the radiation dose package is best on today's market.
- Several customers cite price and user interface as reasons for purchasing this system instead of competing products.

- According to user feedback Big Bore is purchased based on lower radiation dose, table weight limit, image quality and resolution, and ability to export data sets to RTP systems.
- Users report excellent results with Web portal as it does everything simultaneously.
- Bone and PE images are reported to be excellent.
- CT Fluoro application is rated highly.
- Users note that upgrading CT, PACS and EBW to latest software versions can be complicated as one system may be "behind" in technology.
- Most users agree image quality is excellent; the CT scanners are solid and built to last.
- Some customers are reportedly long-time Philips (Picker) CT users because of the technology and support.
- Users purchase the Big Bore based on the technology and FOV and truly being able to reconstruct images at 60 cm FOV and extrapolate at 70 cm FOV.
- EBW is reported to be very sophisticated for CT post-processing applications – 3D recons, MPRs, and MIPS.
- According to user feedback, CT and web portal operating software should be upgraded simultaneously and not at different times during the year for better compatibility.
- Would like to have the ability of repeating AP view without exiting the system and starting all over.
- Users like the capability of download protocols from the website.
- System is reportedly excellent for quantitative studies of blood flow, especially compared to competitors' solutions.
- Extended Brilliance workstation 3D applications are reportedly easier to use than those of competitors.
- Positive feedback is given because beta blockers do not have to be used and hearts can be scanned with heart rates of greater than 80-85 beats per minute.
- Users report some difficulty in building new protocols.
- One facility criticized the table because it flares out and causes stretchers to get caught.
- Customers express that the BolusTrak contrasting monitoring software is an excellent feature that works well.

- Users comment they really like the CT colonography images and fly-through maneuverability.

SYSTEM RELIABILITY

- Some physicians note images are grainy when utilizing the ACR standard protocol for head/brain studies.
- Users report very stable products with smooth workflow that runs well with their internal processes.
- Issues of high humidity with compressor issues and downtime with gantry / tube rotation have been resolved according to user feedback.
- Downtime is reported only to be scheduled PMs.
- One user reported head / brain protocol set for ACR standards produces grainy images and needs to be adjusted.
- Users report robust product offering with EB and web portal.
- Some users report 100% uptime with their systems.
- Users report downtime for tube replacement on the iCT is approximately two days.
- Most sites report no major downtime or hard downs with Brilliance product line.
- Customers note Philips systems have no dose penalties, only dose advantages.
- Some users noted computer freezes and have to reboot system to function.
- The system is reportedly reliable in terms of supporting and imaging bariatric patients.
- According to one facility, it was never warned the system would be highly sensitive to room temperature and require a consistent temperature to prevent downtime.
- Users comment positively on the automatic radiation dose management reporting system.
- Some consumers do not consider downtime with the iCT to be a major issue because FSEs quickly resolved limited problems that were anticipated with the new technology.
- The unit has been described as very dependable with high uptime.
- Positive feedback is consistently given the system's high level of flexibility; users like the ability to use the system in different modes (e.g., 64, 128, and 256).

- Customers report that the tube's air bearing design is outstanding.

INSTALLATION / IMPLEMENTATION

- Customer opinion indicates installation teams are reliable and meet project deadlines.
- Users report pre-planning was excellent.
- De-installation of existing equipment to go-live with new system is reported to be 7-8 days; some users reported three day installations.
- Some note that installation costs increased with the latest technology because the radiation dose on newer systems is much higher.
- Project managers are reported to be responsive to customer's needs and extremely knowledgeable.
- Problems post-installation were reportedly resolved quickly.
- Philips' re-planning managers are rated highly.
- Installation process was considered "impressive" according to user opinion.
- Most users report installation as flawless including accelerated installations.
- Users with space limitations commented positively on Philips' design and planning team.
- One facility suggests the sales team should advise customers to purchase UPS/power conditioners to help avoid power problems after installation.
- Feedback consistently reflects high levels of satisfaction for excellent installations and effective communication from project managers.
- Positives include the company's willingness to work around customer schedules to accommodate installation and regularly scheduled PMs.

APPLICATIONS TRAINING

- Consumers are generally pleased with on-site and off-site applications training, according to reports.
- Users express that the user interface is the easiest to learn of all competitors.
- Users would like protocols pre-set prior to installation.

- According to feedback, Philips' applications provide users with excellent training related to timing and injection sequences.
- Users report high learning curve moving from 4 to 64 slice CT.
- Systems are reported to be highly intuitive, very technologist friendly product.
- Users of other Philips imaging equipment note training was easier because they were familiar with Philips' GUIs.
- Most users reports applications training as being very thorough and technologist friendly.
- Users note there is a slight learning curve when switching to Philips from another vendor's product.
- Users report wanting additional training on the EBW for advanced post-processing for both technologist and radiologist.
- Application specialists are very thorough according to user feedback.
- Most users reported a good comfort level after the first week of initial onsite training.
- Philips' Essentials training is said to be very easy as user interface is very intuitive and user friendly.
- Users note it is very easy to train others on Brilliance platform.
- According to most, applications training experiences range from very good to excellent.
- Users often experience greater difficulty learning the physics of contrast than the physics of the CT scanner.
- User comments were very positive concerning help with ACR requirements from Philips' technical support.
- Numerous facilities report a learning curve in moving to new technology, the physics of the machine, or transitioning from a different vendor.
- Positive feedback is given on setting up CT protocols, including cardiac CTA protocols.
- Users express a desire for training to be geared more towards the specific applications of each facility instead of standard practices.

SERVICE RESPONSE TIME

- Customers often report encountering no delays when receiving parts.
- Service and support and technical phone support is always available.
- Users report exchanging an X-ray tube is approximately four hours.
- Applications technical phone support is reported to be immediate.
- According to user feedback, most service issues are handled via phone technical support.
- Users report downtime as scheduled PMs and upgrades have presented no problems.
- Users say FSEs easily adapt to customers' schedules when called in for repair.
- Feedback indicates FSEs arrive onsite well within the four-hour response time limit; most users report onsite response is within one hour.
- Customers report high uptime of 99%.
- Customers with BME first pass contracts report excellent communication and working relationships with Philips' FSEs and their service department.
- Philips' customers note they purchase Philips again because of solid service and support.
- Field service engineers are reportedly knowledgeable and very reliable; they seem to know what to do when problems arise and methodically troubleshoot the issues.

SERVICE REPAIR QUALITY

- Negative feedback is given for operating costs considered too high for the technology.
- Users continue to provide positive feedback on the skill set of FSEs.
- Users comment that their FSE walks them through issues over the phone versus on onsite fix.
- Users continue to report Philips provides exceptional service and delivers on what they promised.
- Users report that compressor issues were quickly resolved.
- According to oncology users, FSEs for CT and CT Sim are highly skilled.
- Users note that Philips has become more proactive with service and support by correcting even the minor issues.

- Customers familiar with Philips note they purchase additional product based on excellent historical service and support.
- Some users noted that historically equipment uptime is high resulting in minimal interaction with service.
- Users note that their FSEs work weekends and after hours in order to resolve issues within 24 hours.
- When the same FSE services a site's equipment, customers note repairs are quicker because the FSE knows the system and site.
- Technical Support is reported to answer calls in real-time.
- A few noted that their service and support was the best from any vendor in their specific area.
- Facilities appreciate the main service engineer coming onsite, even on minor issues.
- Some users note that most repairs are completed in the same day.

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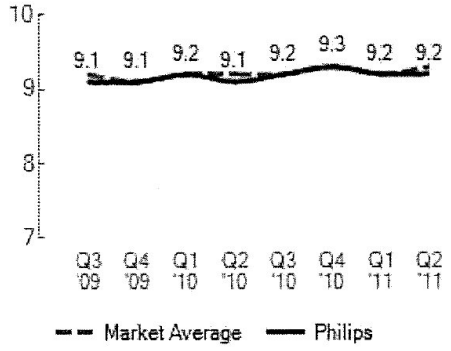
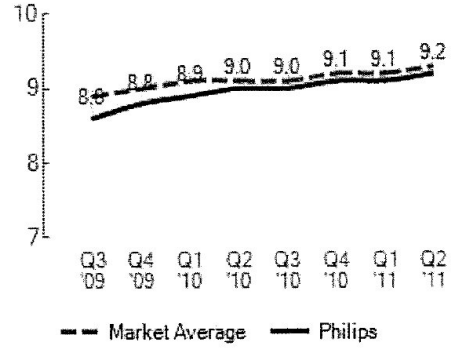
Two Year Trending

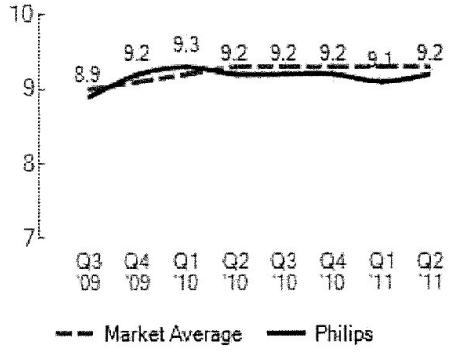
System Performance



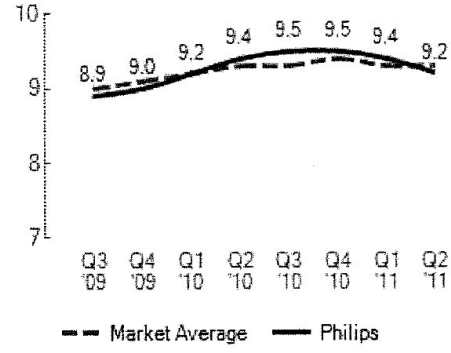
System Reliability



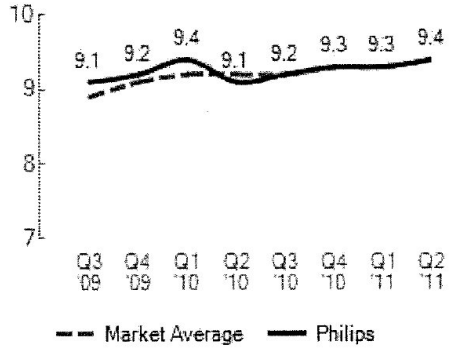
Installation / Implementation



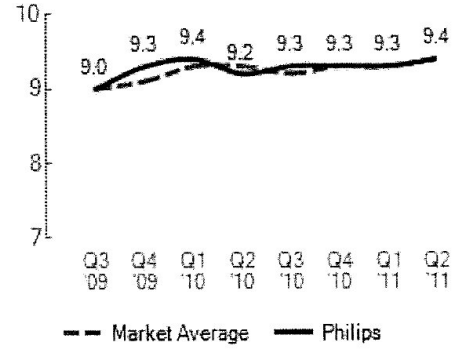
Applications Training



Service Response Time



Service Repair Quality



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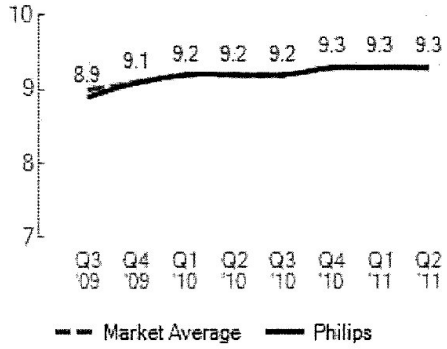
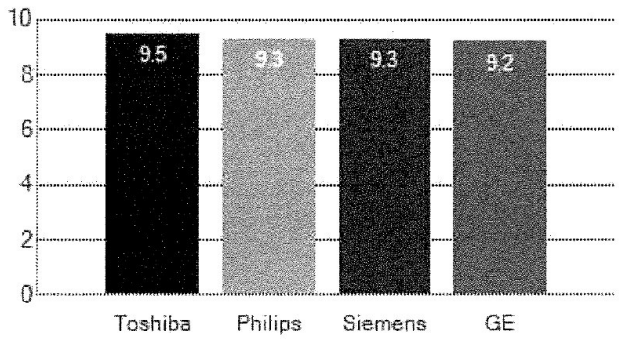
Composite Rating



Vendor Ranking for 2nd Quarter 2011



MD Buyline places strong focus on the opinion of those who use the product every day. The vendor rankings are based on the User Satisfaction Composite Ratings.

Questions?

Contact: Loretta Loncoske, Clinical Analyst
Loretta.Loncoske@mdbuyline.com
(800) 375-5463 ext. 6714

For international customers, please contact MD Buyline using the e-mail address indicated above.

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Quarterly User Satisfaction Report™ 1st Quarter 2012

Vendor	**PHILIPS HEALTHCARE**
Technology	**CT SCANNER - CT SIMULATION**
Date	**3/23/2012**

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Vendor Ranking for 1st Quarter 2012 10

Olszewski Declaration
Exhibit 12

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User Satisfaction Ratings Review

Category	1st Quarter 2012	4th Quarter 2011	3rd Quarter 2011
System Performance	9.3 ▲	9.2 ▲	9.1
System Reliability	9.2 ▲	9.1 ▼	9.2
Installation / Implementation	9.2 ♦	9.2 ▼	9.3
Applications Training	9.2 ♦	9.2 ▲	9.1
Service Response Time	9.2 ▼	9.4 ♦	9.4
Service Repair Quality	9.2 ▼	9.4 ♦	9.4
Composite Rating	9.2 ♦	9.2 ▼	9.3

♦ Indicates No Change in Rating ▲ Indicates Rating Went Up ▼ Indicates Rating Went Down

User Satisfaction Ratings For All Vendors

	System Performance	System Reliability	Installation/ Implementation	Applications Training	Service Response Time	Service Repair Quality	Composite
GE	9.3	9.3	9.4	9.3	9.6 ▲	9.5 ▲	9.4
PHILIPS	9.3	9.2 ▼	9.2 ▼	9.2 ▼	9.2 ▼	9.2 ▼	9.2 ▼
SIEMENS	9.1 ▼	9.3	9.6 ▲	9.2 ▼	9.4	9.4	9.3
TOSHIBA	9.4 ▲	9.6 ▲	9.5	9.6 ▲	9.5	9.5 ▲	9.5 ▲

▲ - represents the highest rating in a category. ▼ - represents the lowest rating in a category.

User Comments

The User Comments in this report may include individual responses that were gathered from specific interviews. However, the majority of the comments below are summations indicating the general themes raised by your customers.

SYSTEM PERFORMANCE

- Users would like the iDose package to be a standard feature with lower pricing, instead of an option.
- According to user feedback, Big Bore is purchased based on lower radiation dose, table weight limit, image quality and resolution, and ability to export data sets to RTP systems.

- Interview participants report excellent results with Web portal as it does everything simultaneously and is the best feature for physicians.
- CT Fluoro, bone, and PE images are rated highly.
- Users rate the remote diagnostics capability as excellent, noting that downtime can be planned.
- iDose package is rated "excellent" by users.
- Users would like the iDose package to be automatically sent to their EHR versus manually pushing it to the EHR post-exam.
- According to user feedback, technical staff and physicians are very satisfied with Philips' systems.
- According to interview statements, field upgradability is highly desired for 128 and 256-slice systems.
- Philips' systems are described by respondents as "a machine with superior quality," "very reliable," and "workhorses."
- Users would like Sales to become more educated on reimbursement such as CCTA.
- Facility contacts note that upgrading CT, PACS, and EBW to latest software versions can be complicated, as one system may be "behind" in technology.
- Some customers are reportedly long-time Philips (Picker) CT users because of the technology and support.
- Users report frustration with the fact that "latest" technology must be too quickly replaced as it becomes obsolete within one year of purchase, such as web portal.
- Users report upgrades for installed base are very costly.
- Philips Brilliance CT users find the Ingenuity platform easy to learn.
- System is reportedly excellent for quantitative studies of blood flow, especially compared to competitors' solutions.
- Users report downtime is rare with remote diagnostics.
- Feedback from some users indicates difficulty in building new protocols.
- One facility criticized the table because it flares out and causes stretchers to get caught.

- Customer comments indicate that the BolusTrak contrasting monitoring software is an excellent feature that works well.
- Users comment they really like the CT colonography images and fly-through maneuverability.

SYSTEM RELIABILITY

- Users report very stable products with smooth workflow that runs well with their internal processes.
- Users describe robust product offering with EBW and web portal.
- Users report downtime for tube replacement on the iCT is approximately two days.
- User interviews rated step and shoot capabilities as excellent.
- Users like the ability to adjust iDose on the fly.
- Feedback indicates Big Bore is excellent tool with CT fluoro for interventional and bariatric applications.
- According to end-users, system performance is excellent from low to high volume studies.
- The Big Bore is ideal for most interventional applications, according to interview statements.
- Customers note Philips systems have no dose penalties, only dose advantages.
- The system is reportedly reliable in terms of supporting and imaging bariatric patients.
- Users comment positively on the automatic radiation dose management reporting system.
- Systems are reported to be highly reliable with minimal downtime.
- iDose package does slow down the image reconstructions as it applies the filters for dose reduction but it is not slow enough to affect throughput, according to users.
- Some consumers do not consider downtime with the iCT to be a major issue because FSEs quickly resolve limited problems anticipated with the new technology.
- Positive feedback is consistently given the system's high level of flexibility; users like the ability to use the system in different modes (e.g., 64, 128, and 256).

INSTALLATION / IMPLEMENTATION

- Some customers report that installation costs increase with the latest technology because the radiation dose on newer systems is much higher.
- A few users report pop-up error messages with no resolution on Brilliance platform.
- Project managers are reported to be responsive to customer's needs and are extremely knowledgeable.
- According to user feedback, service installation and service engineer were key decisions for purchase.
- Installation process is considered "impressive," according to user opinion.
- Most users report installation as "flawless," including accelerated installations.
- Routine installation problems were quickly resolved, according to users.
- One facility suggests the sales team should advise customers to purchase UPS/power conditioners to help avoid power problems after installation.
- Users report rigging companies utilized were reliable with no problems encountered.
- Feedback consistently reflects high levels of satisfaction for excellent installations and effective communication from project managers.
- Positives include the company's willingness to work around customer schedules to accommodate installation and regularly scheduled PMs.

APPLICATIONS TRAINING

- According to feedback, Philips' applications provide users with excellent training related to timing and injection sequences.
- Users report applications such as bone removal are easier on Ingenuity product versus Brilliance line.
- A few users reported their initial trainer was not skilled or knowledgeable on their system.
- Philips' users report high learning curve moving from 4 to 64-slice CT.
- Radiation dose training is very thorough, according to interview statements.
- Users would like additional training on the EBW for advanced post-processing for both technologist and radiologist.

- Applications trainers are rated highly by users.
- Users of premium end CT scanners, ≥128 slices, request additional post-processing training as learning curve is too steep.
- Users continue to request additional applications training for advanced applications, such as radiation dose, CCTA, CTA in general, etc.
- Users report training on the Ingenuity platform is almost identical as Brilliance platform.
- Philips' Essentials training is said to be very easy as user interface is very intuitive and user friendly.
- EBW training was "very good" to "excellent," according to user opinion.
- Users often experience greater difficulty learning the physics of contrast than the physics of the CT scanner.
- Online technical assistance is rated highly, according to user feedback.
- Numerous facilities report a learning curve in moving to new technology, the physics of the machine, or transitioning from a different vendor.
- Positive feedback is given on setting up CT protocols, including cardiac CTA protocols.
- Users express a desire for training to be geared more towards the specific applications of each facility instead of standard, routine applications.

SERVICE RESPONSE TIME

- Exchanging an X-ray tube takes approximately four hours, according to user feedback.
- According to user statements, most service issues are handled via phone technical support.
- Customers rate online service and technical tools as "very good" to "excellent."
- Those interviewed report downtime as scheduled PMs and upgrades, with those presenting no problems.
- Service and support, including technical assistance, is very timely according to user feedback.
- Users report no IT (HIS/RIS/PACS) integration issues with Ingenuity or Brilliance CT portfolios.
- Some user report never having system issues.

- Users rate Philips onsite and phone support as "very good" to "excellent."
- Client's report that FSEs easily adapt to their schedules when called in for repair.
- Majority of users report no delays with technical support issues.
- Users note that Philips support to online questions is immediate or real-time.
- The Philips service team is highly rated, according to user feedback.
- Customers with BME first pass contracts report excellent communication and working relationships with Philips' FSEs and their service department.
- Field service engineers are reportedly knowledgeable and very reliable; they seem to know what to do when problems arise and methodically troubleshoot the issues.

SERVICE REPAIR QUALITY

- Users continue to provide positive feedback on the skill set of FSEs.
- Users continue to report that Philips provides exceptional service and delivers on what they promised.
- User opinion is that Philips offers the best level of service when compared to competitors.
- Users report favorable results with service repair quality.
- A few users report occasional parts delay.
- Users rate their FSE highly, and note high level of skill sets as main reason for purchase.
- The majority of users report that service issues are repaired the first time.
- Users note that their FSEs work weekends and after hours in order to resolve issues within 24 hours.
- When the same FSE services a site's equipment, customers note repairs are completed more quickly because the FSE knows the system and site.
- Technical Support is reported to answer calls in real-time.
- Users comment positively on FSEs ability to diagnose and resolve issues immediately.
- A few users note that their service and support was the best from any vendor in their specific area.

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- Brilliance 64 users report continuous error messages and pop-up screens with no resolution.
- According to user opinion, FSEs are highly responsive and knowledgeable.
- Some users note that most repairs are completed the same day.

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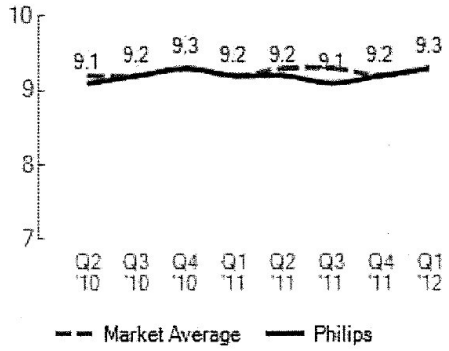
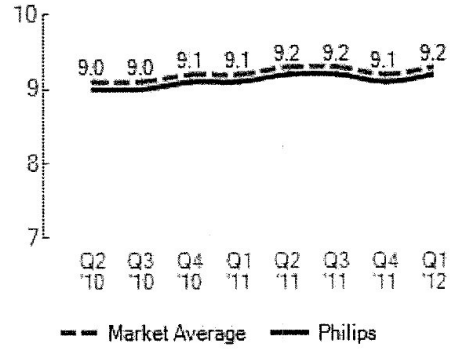
Two Year Trending

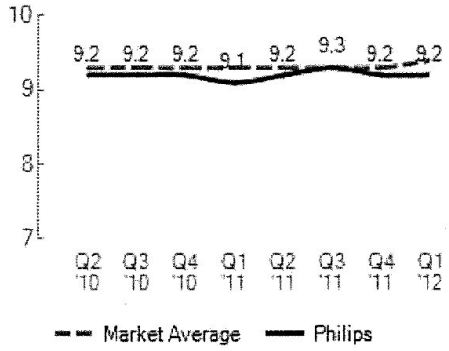
System Performance



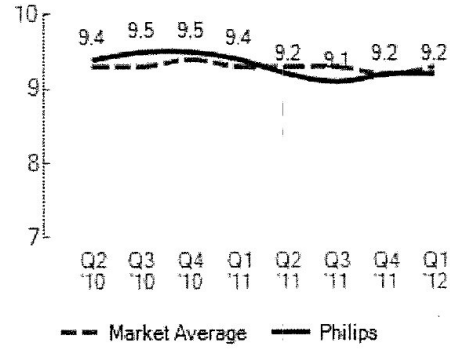
System Reliability



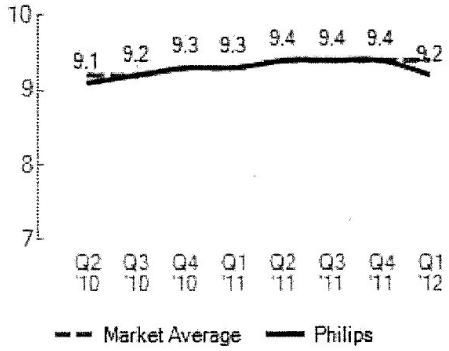
Installation / Implementation



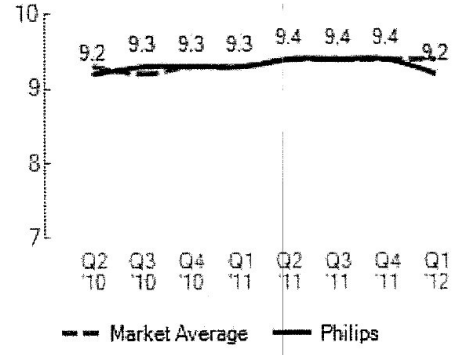
Applications Training



Service Response Time

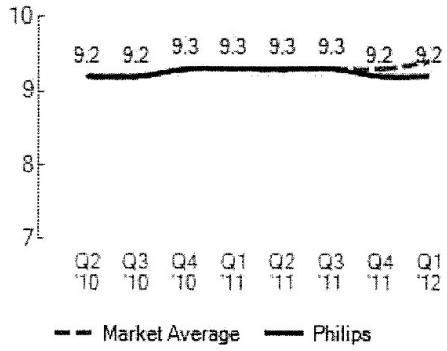


Service Repair Quality

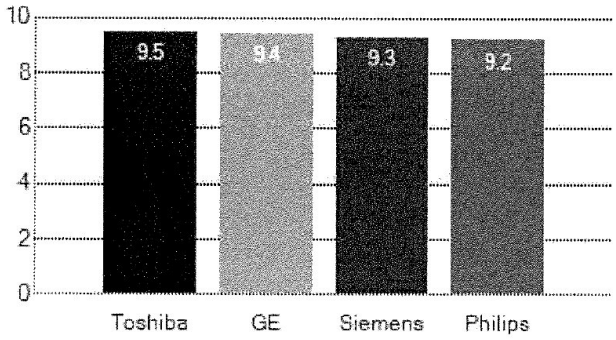


md buyline

Composite Rating



Vendor Ranking for 1st Quarter 2012



MD Buyline places strong focus on the opinion of those who use the product every day. The vendor rankings are based on the User Satisfaction Composite Ratings.

Questions?

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Security for the End User: The Role of Biometrics in Healthcare

The future of biometrics in healthcare will depend on what level of security healthcare institutions believe is necessary and the type of data they think might be exposed as the healthcare information highway speeds up.

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Olszewski Declaration
Exhibit 13

hospitals and health systems nationwide, the provider community rec
for holistic financial, clinical, and operational information across all m

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PREMIUM CT SYSTEMS

AS THE CAPABILITIES OF COMPUTED TOMOGRAPHY ADVANCE, THE NUMBER OF SLICES IS NO LONGER THE SIGNIFICANT DIFFERENTIATOR AMONG THE BEST-EQUIPPED SCANNERS. WE'LL HELP YOU SORT THROUGH THE FEATURES AVAILABLE ON FIVE OF THE MOST SOPHISTICATED (AND EXPENSIVE) SYSTEMS.

Like any evolving technology, computed tomography (CT) has its cutting edge. All major CT manufacturers have introduced new technologies that aim to improve the clinical capabilities of CT while reducing radiation dose. The scanners that boast these advanced new features are what we call "premium" CT systems.

Each manufacturer has taken a different approach to its premium systems, and hospitals surveying the marketplace are no longer faced simply with a "battle of slices"—a competition to see which company can offer the greatest number of slices on its scanners. Rather, they're confronted with a choice among many high-end capabilities and features, some of which are designed for specialized uses. This can make the selection process complex and challenging.

Keep in mind, though, that many hospitals shouldn't even be considering premium systems. While some facilities may have a need for top-of-the-line scanners, we believe most should think hard before taking the plunge.

Why? Because premium systems aren't necessary for the vast majority of applications. And in most cases, the impact of their advanced features on clinical outcomes hasn't been established. Which means that any return on investment will depend on being able to bring in more patients (for example, through increased referrals) by promoting the scanners' state-of-the-art capabilities, rather than being able to claim better patient care. Particularly in today's difficult economic climate, we believe most hospitals should be thinking about lower-specification systems or upgradable platforms, rather than these very expensive "luxury" models.

If you do want to consider a premium system, it's important to recognize that there is no one "best" choice. Each product stands out for a different reason, and prices vary considerably. (All the systems are expensive, but some are more expensive than others.) You should review our findings and each system's capabilities carefully to be sure you're picking the system that best matches your particular needs.

Get the Picture on Five High-End Scanners

This Evaluation covers five systems:

- GE Discovery CT750 HD
- Philips Brilliance iCT
- Siemens Somatom Definition
- Siemens Somatom Definition AS+
- Toshiba Aquilion One

The Siemens Somatom Definition was tested for our May 2008 Evaluation on dual-source CT, which includes our detailed findings for that product. For the other four scanners, results can be found starting on page 250 of this issue. Below, we summarize our judgments for all five systems.

Two additional premium systems, the GE LightSpeed VCT XTe and the dual-source Siemens Somatom Definition Flash, recently came on the market, too late to be included in this Evaluation.

ECRI Institute Findings

Dose-reduction features, such as advanced collimators and new detectors, have been introduced by all manufacturers. Some systems allow the required x-ray exposure to be reduced for every patient, while other systems offer dose saving in specific applications. For example, for cardiac scanning, which traditionally has been a comparatively high-dose procedure, some of the premium scanners can achieve dose saving of up to 90%. In addition, image quality is generally better on most of the systems compared to traditional CT systems for both cardiac and routine studies.

The advanced capabilities on these systems are of growing interest. One example is wide-coverage perfusion imaging, which may play a key role in improving stroke diagnosis, and systems offering this capability may be good

UMDNS term. Scanning Systems, Computed Tomography, Spiral [18-443]

EVALUATION

THE BOTTOM LINE

- The premium CT systems in this Evaluation offer the most advanced scanning technologies available. They generally provide better image quality and better dose saving than other scanners. On the other hand, premium systems are expensive, and not all facilities have a need for their high-end capabilities.
- Facilities considering one of these systems can't just look at the number of slices available—they need to examine all the available capabilities and choose the system that best meets their specific needs.
- We rate the following scanners Preferred:
  - For routine imaging: GE Discovery CT750 HD
  - For cardiac imaging: Philips Brilliance iCT, Siemens Somatom Definition
  - For pediatric imaging: GE Discovery CT750 HD, Toshiba Aquilion One
  - For advanced imaging: Siemens Somatom Definition and Definition AS+, Toshiba Aquilion One (The GE Discovery CT750 HD and the Philips Brilliance iCT may also become strong contenders for advanced imaging: GE is adding new features that were recently approved by FDA and will be available soon, and Philips has FDA clearance for a dual-energy application [known as Spectral CT] that is currently available as a software upgrade but that we were unable to test. We will provide updated information when it becomes available.)

choices for that application. (Note that because the efficacy of wide-coverage imaging has not yet been demonstrated in clinical trials, our recommendations related to this capability are necessarily provisional.) Other perfusion applications (e.g., abdominal) are only just beginning to be explored. Another advanced feature is dual-energy CT, which can help categorize pathology; it is now being used by early adopters, and more manufacturers are just beginning to introduce this functionality.

Given the range of capabilities to consider, we have rated each system in four different areas: routine imaging, cardiac imaging, pediatric imaging, and advanced imaging. We discuss some of these ratings below; a complete list can be found in the Evaluation at a Glance table on page 246.

GE DISCOVERY CT750 HD

The GE Healthcare Discovery CT750 HD introduces some significant changes to CT technology that allow dose reduction for all types of studies. We found that image quality is improved compared to earlier GE CT systems and is the best of all the scanners in this Evaluation when ASIR is used. (ASIR, or Adaptive Statistical Iterative Reconstruction, is GE's new image reconstruction technique.) ASIR reduces image noise, particularly for low-dose images.

ASIR capabilities enable physicians to select up to 50% lower dose settings for all routine studies without reducing image quality. But because the visual texture of the ASIR images is noticeably different from that of other images, the physician's willingness to use ASIR may be a factor in how valuable this feature is for a given facility. However, the amount of ASIR that contributes to the image (i.e., texture change and dose saving) can be adjusted to meet a physician's preference. Also, ASIR lengthens the image reconstruction time, which may affect patient throughput in a busy setting; GE is working to improve the reconstruction rate. GE expects to have comparable reconstruction times by fall 2009.

Further enhancement is provided by the HD mode, which improves the spatial resolution available. Overall, the image quality and dose management are excellent, and this unit is Preferred for routine applications.

It is also Preferred for pediatric applications. In addition to the low dose and high image quality so important for pediatric scans, GE offers further dose-reduction recommendations with its CT 4Kids guidance. It is Acceptable for cardiac studies, providing good image quality and a very-low-dose axial scan. Though it offers a clear improvement over traditional 64-slice scanners for heart rates below 75 bpm and variable heart rates, we found that some of the other premium units perform better for cardiac studies at higher heart rates.

The system's ability to perform axial scanning up to 8 cm (using a feature called Volume Helical Shuttle) with a 1.7-second sampling rate may make it a good choice for stroke brain perfusion studies. Two advanced clinical applications, dual-energy imaging (referred to as Gemstone Spectral Imaging by GE) and wide coverage for dynamic imaging (31.5 cm) and perfusion imaging (up to 14 cm), have 510(k) regulatory clearance from the U.S. Food and Drug Administration (FDA) and are expected to be available sometime in the next few months. Both of these should improve the clinical capabilities of this system; however, we have not had the opportunity to examine these capabilities. Access to these applications will require upgrades to existing systems.

PHILIPS BRILLIANCE iCT

The iCT is one of the more moderately priced premium systems. It is Preferred for cardiac imaging. The image quality for routine imaging is good, and reduced dose is possible with the advanced beam filtration and collimators. It has the fastest tube rotation of any system on the market, and while some other systems have limited capability at higher heart rates, the image quality on this scanner was satisfactory for all tested heart rates (up to 85 bpm) with acceptable dose and short exposure times. The ability to perform over this range of heart rates may reduce the need for pharmacologic intervention to control the patient's heart rate.

The wide coverage of the detector (8 cm) and the associated short sampling rates seem likely to be advantageous in stroke and body perfusion imaging. Furthermore, coverage up to 16 cm is available for axial-based perfusion scanning (a capability called Jog Scan), though the sampling rate will be longer than for 8 cm coverage. This may be an excellent choice for brain perfusion imaging and a good choice for body perfusion imaging.

Philips has FDA clearance for a dual-energy application (known as Spectral CT). The application is available as a software upgrade, and Philips is commercializing it as a pioneering clinical application on the iCT platform. However, we have not had the opportunity to examine the capabilities of this application.

SIEMENS SOMATOM DEFINITION

The Somatom Definition is a dual-source CT system and is one of the more moderately priced premium systems. It is Preferred for cardiac imaging. Its very fast temporal resolution for cardiac scanning is an advantage over single-source systems, including the other premium models. Whereas some other systems have limited capability at higher heart rates, the image quality is acceptable for all tested heart rates (we tested up to 85 bpm), with acceptable dose and reasonable exposure times. The ability to perform over this range of heart rates may reduce the need for pharmacologic intervention to control the patient's heart rate.

The reciprocating helical acquisition enables up to 20 cm coverage, which is sufficient for stroke and body perfusion imaging. Though the sampling rate is relatively long (2.5 seconds) for the longest coverage, this should not be a problem for body perfusion studies. For brain studies, 11 cm coverage can be achieved in a satisfactory 1.5 seconds. This may make the system an excellent choice for brain perfusion studies.

The dual-imaging capability can be useful in a number of ways and in a wide range of studies—for instance, by helping to identify specific tissue characteristics so that the physician has more confidence in what is being viewed and by reducing the need for additional studies. Calcified plaque can be identified and removed from an angiogram, for example, or a kidney stone can be characterized.

For routine imaging, the Definition does not provide the same dose-reduction and image-quality advantages as the other premium systems; its image quality and dose are similar to those of top-of-the-line single-source 64-slice scanners.

Although it doesn't measure up to other premium units in certain areas (image quality, dose), overall the Definition is well worth considering given its moderate pricing for a system that can perform cardiac studies and given its dual-energy advantages.

SIEMENS SOMATOM DEFINITION AS+

The Somatom Definition AS+ is the lowest-cost system of the five, has the largest patient bore (78 cm), and includes dose-reduction features such as a sliding collimator. It is Preferred for advanced imaging. The very wide acquisition coverage (27.1 cm) enabled by the system's helical reciprocating scan technique would appear to be advantageous for body perfusion studies. The sampling rate is relatively long (2.5 seconds) for the longest coverage, but this should not be a problem for body perfusion studies. For brain studies, 14 cm coverage can be achieved in a very satisfactory 1.5 seconds. This may be an excellent choice for brain perfusion imaging and a good choice for body perfusion imaging.

TOSHIBA AQUILION ONE

The Aquilion One has the highest list price of the five systems. Because of its cost, at present it should mainly be considered by research facilities, pediatric facilities, and emergency departments looking to take advantage of its very fast, wide-coverage axial scanning capability—primarily for perfusion and pediatric exams. These attributes also make it more capable than any other system for emergency chest pain and emergency stroke assessment, and it should also be considered for high-workload emergency room use. But for most routine applications, it operates as a 64-slice system and offers few advantages.

The ability to obtain wide-coverage perfusion studies with a very short sampling rate (down to 0.35 second for 16 cm coverage) is excellent for brain perfusion imaging and for body perfusion imaging. Also, the ability to obtain the whole volume at the same time (a capability Toshiba calls "temporal uniformity") is unique to Toshiba and may translate to improvements in clinical applications that require dynamic images. However, only clinical trials can confirm this.

In pediatric imaging, in which patient movement is a major problem, the short scan time is a significant advantage, as is the reduced dose. The system is therefore Preferred for pediatric facilities.

In cardiac imaging, the system's ability to perform scans without any table movement produces the most consistent and highest-quality images among the evaluated systems for all heart rates up to 85 bpm, with the shortest exposure times (1 to 3 seconds). However, at heart rates above 65 bpm, the dose increases significantly; for most patients, imaging at higher heart rates should be avoided, and pharmacologic intervention should be used instead to control the heart rate.

Although the cost of this unit makes a purchase hard to justify for routine cardiac use, its high image quality and variable helical pitch (which allows adequate images to be acquired in the region below the heart with less dose during the same acquisition) could make this unit worth considering for chest pain assessment in the emergency department.

EVALUATION

EVALUATION AT A GLANCE: PREMIUM CT SYSTEMS

Some features listed here may not yet be widely available. However, our judgments are based only on those features that are available commercially and that have been tested by or demonstrated to ECRI Institute.

	GE Discovery CT750 HD	Philips Brilliance iCT	Siemens Somatom Definition	Siemens Somatom Definition AS+	Toshiba Aquilion One
Summary	64-slice system; best non-cardiac image quality of all evaluated systems if ASIR is used; for detailed findings, see page 250	256-slice system (8 cm coverage); moderately priced and has fastest tube rotation of all systems on the market; for detailed findings, see page 253	64-slice dual-source system; chiefly advantageous for cardiac and dual-energy applications; moderately priced, but image quality and dose reduction not on par with other premium systems; for detailed findings, see the May 2008 *Health Devices*	128-slice system; least expensive; largest patient bore; Adaptive technologies increase applications; for detailed findings, see page 256	Dynamic-volume system with 320 detector rows and 16 cm coverage; high price makes it suitable mainly for research and pediatric hospitals and for high-workload ERs; for detailed findings, see page 259
Average quoted price*	$2 million	$1.6 million	$1.6 million	$1.2 million	$2.5 million
Average list price	$3.2 million	$2.8 million	$2.2 million	$1.6 million	$3.7 million
Routine imaging	PREFERRED Excellent image quality and very low dose if ASIR is used; ASIR enables up to 50% dose savings, though actual savings depends on physician preference	ACCEPTABLE Image quality and dose-saving features exceed those of traditional CT scanners; fast study time allows for reduced contrast use for all routine exams compared to the other evaluated systems	ACCEPTABLE Image quality and dose-saving features similar to those of top-of-the-line single-source 64-slice scanners	ACCEPTABLE Image quality and dose-saving features exceed those of traditional CT scanners	ACCEPTABLE Image quality and dose-saving features exceed those of traditional CT scanners
Cardiac imaging**	ACCEPTABLE Excellent image quality for lower heart rates; low doses for all heart rates	PREFERRED Good image quality for all heart rates using both axial and helical acquisitions	PREFERRED Good image quality for all heart rates using both axial and helical acquisitions	ACCEPTABLE Image quality acceptable for heart rates <65 bpm and variable heart rates. However, image quality is reduced at heart rates >65 bpm	ACCEPTABLE Excellent image quality for all heart rates tested; however, dose is significantly higher at heart rates >65 bpm
Pediatric imaging	PREFERRED Excellent image quality and very low dose; CT 4Kids mode further minimizes dose based on the indications for the exam	ACCEPTABLE Adequate for pediatric scans; quiet scans will help reduce patient anxiety	ACCEPTABLE Ability to scan higher heart rates (due to shortest temporal resolution) is an advantage for pediatric cardiac imaging	ACCEPTABLE Adequate for pediatric scans	PREFERRED Very short (<1 sec) scan time minimizes impact of patient movement; axial scanning can be used for most studies, which should reduce dose
Advanced imaging	ACCEPTABLE Good brain perfusion imaging—up to 8 cm coverage in 1.7 sec; dual-energy imaging, as well as extended-coverage dynamic imaging up to 31.5 cm and perfusion imaging up to 14 cm, are approved by FDA and due for commercial release in 2009	ACCEPTABLE Excellent brain perfusion imaging—up to 8 cm coverage in 0.27 sec minimum (1 sec typical); using Jog Scan, up to 16 cm coverage in 1.9 sec; good body perfusion imaging; Philips has recently obtained 510(k) clearance for Spectral CT (dual-energy), and it is available as a software upgrade on the iCT	PREFERRED Excellent brain perfusion imaging—up to 11 cm in 1.5 sec; good body perfusion imaging; wide range of easy-to-use dual-energy applications are available and in use	PREFERRED Excellent brain and body perfusion imaging—up to 14 cm in 1.5 sec; helical-based body perfusion imaging enables coverage up to 27 cm with a sampling rate of 2.5 sec; no dual-energy capability	PREFERRED Excellent brain and body perfusion imaging—up to 16 cm in 0.35 sec minimum (1 sec typical) with one rotation, allowing essentially simultaneous volume capture for uniform contrast image tracking; no dual-energy capability

Excellent—The unit possesses a feature or performs at a level that would likely be considered favorable during the selection process. **Good**—The unit performs satisfactorily. In general, any advantages of the unit balance or outweigh any disadvantages. **Fair**—The unit either does not perform satisfactorily or has a noteworthy deficiency or limitation. However, the failure, deficiency, or limitation is *not likely* to (1) cause an adverse clinical outcome, (2) significantly affect the overall performance of the unit, or (3) place an excessive burden on those who purchase, use, or service the unit. **Poor**—The unit does not perform satisfactorily, and its deficiencies or limitations are *likely* to (1) adversely affect the clinical outcome, (2) significantly affect the overall performance of the unit, or (3) place an excessive burden on those who purchase, use, or service the unit.

* Quoted prices include options and are based on data from ECRI Institute's SELECTplus program and on discussions with manufacturers.

** On most of the systems, the image quality and dose for cardiac scans are better than on earlier 64-slice systems. In particular, the low-dose axial scanning techniques are improved. We believe that axial scanning should be the first-choice technique for most cardiac scans, as long as functional information is not required and the heart rate is controlled and stable. At low heart rates, all five systems offer good image quality and excellent dose saving. Pharmacologic agents can be used to reduce heart rates if needed, to help minimize the impact of issues that occur at high heart rates. However, the ability to avoid having to use these agents is advantageous and occasionally indispensable.

If You're Buying, Think About . . .

ROUTINE IMAGING NEEDS

Even with the availability of new advanced capabilities, for most facilities the majority of CT scanning will continue to consist of standard radiology and trauma studies. Therefore, the ability of a CT system to perform routine exams is an important consideration for a new purchase, and any advantages shown by a particular scanner should be taken into account.

For routine use, a premium CT system should meet the following criteria:

- It must at least match, and preferably exceed, the image-quality metrics measured on previous-generation CT systems.
- It must provide dose-reduction strategies that do not compromise image quality and are generally applicable to all patients. It is preferable that dose reductions be automatically applied and not affect patient throughput.

CARDIAC IMAGING NEEDS

The ability to successfully image the coronary arteries has been one of the most notable developments in CT technology over the last decade. And being able to reliably image a constantly and rapidly moving heart with reasonable levels of x-ray dose is often a major reason for purchasing the latest CT technology. Facilities looking for a CT system that will be predominantly used for cardiac imaging should choose one that meets these criteria:

- It must be able to reliably scan patients with lower heart rates (<65 bpm) with adequate image quality and a short scan time.
- The system must have low-dose scanning options. It is preferable that users be able to selectively maximize the dose saving based on the patient's heart rate and on the indications for the exam.
- It is preferable that the system be able to reliably scan both higher and more variable heart rates with a low dose.

PEDIATRIC IMAGING NEEDS

In general, pediatric hospitals have slightly different concerns when selecting equipment compared to general hospitals. Pediatric patients are more sensitive to x-ray radiation, so lowering the dose is very important. Also, the anatomy in younger patients is often smaller, so image quality—particularly spatial resolution—must be good. A third issue is that pediatric patients are often uncooperative, so the scan time must be very short to minimize the need for sedation. Therefore, the following criteria should be considered by pediatric hospitals:

- The system must have dose settings that are specifically optimized for pediatric patients. It is preferable that the dose settings be selectable based not only on the patient's size, but also on the clinical indication for the exam (since, for example, a follow-up scan requires less information and therefore less dose than an initial diagnostic exam).
- Techniques to reduce x-ray dose must not compromise image quality; in particular, high-spatial-resolution acquisitions must be possible.
- It is preferable that very short scan times be possible so that sedation can be avoided.

ADVANCED IMAGING NEEDS

Some facilities may want to independently explore new applications for CT, such as wide-coverage stroke diagnosis and dual-energy imaging, and will therefore need a suitably equipped system. It's important, however, to establish the functionality and utility of such applications before investing in them.

It usually takes many years and multiple clinical trials proving the efficacy of new techniques before they are widely accepted. It's likely that a new scanning technology will change significantly between the time that early adopters first develop it and the time that it is ready for more general use. Also, even if it proves clinically useful, it may turn out to be no better than other available techniques.

Dual-energy CT is a good example of a technology still finding its place. It is not yet widely used, partly due to the limited number of scanners that offer it. Its utility will also depend on the ease of performing scans and viewing the data. Siemens is the only company to have significant commercial experience in dual-energy CT; however, during the course of this Evaluation, both GE and Philips have added dual-energy capabilities to their systems. So, the use of dual-energy is likely to increase significantly. We believe that dual-energy will become a significant tool for radiologists, and facilities wanting to remain at the forefront of CT should consider the future dual-energy capabilities that may be available to them. But not all facilities fall into this category. So investigate carefully before you buy.

COST ISSUES

Because of the differences in functionality and performance among the five systems, a side-by-side cost comparison based on simple specifications would not be meaningful. Instead, for each system, we have determined a "consensus" average quoted price; these prices are shown in the Evaluation at a Glance table on page 246. They are based on data from ECRI Institute's SELECTplus program—which collects actual quoted equipment prices received by our hospital clients—as well as on our discussions with manufacturers. The average quoted prices for these systems range from $1.2 million to $2.5 million.

Because the research and development costs for the new features on these premium systems are considerable, their purchase prices are higher than those of earlier models. The additional functionality and dose savings provided by premium systems cost between $0.2 million and $1.5 million.

Justifying a Premium Purchase

Calculating the economic value provided by a CT scanner—or any other general-

purpose diagnostic imaging system—is extremely complex, depending as it does on cost savings derived from multiple, often intangible, factors such as more rapid diagnosis, reduced need for other tests, increased referrals, and earlier discharge. Individual facilities need to evaluate these factors based on their patient mix when justifying the purchase of a premium system. Given an average reimbursement of $300 per patient, an additional 3 to 13 patients will need to be scanned each week over a typical amortization period of five years for the facility to recoup the costs (ignoring additional personnel and service costs). Facilities must determine whether these numbers are achievable.

Another way to look at the question is to gauge the value, not of the system as a whole, but of the specific capabilities added by the advanced technologies. Take, for example, the dose saving provided by a premium system. If you spend $250,000 to upgrade a scanner with a technology that reduces dose by half, and that improvement prompts physicians to refer more patients to your hospital, an increase in referrals of three to four patients per week would cover the cost of the upgrade over five years.

Cost can be looked at from a broader perspective as well: The advanced dose-saving features on premium systems may be expensive, but they are less expensive than treating cancer. Based on estimates published by the National Academy of Sciences, on average, one case of cancer will result for every 1,000 CT scans delivered. Assuming a CT scanner performs 6,000 scans per year for five years, the number of cancer cases caused by the CT system can be expected to be 30.* If the radiation dose can be halved, then the number of cancers can be expected to be halved to 15 (assuming the same case mix and number of patients). If adding a dose-reduction feature to a scanner costs, say, $250,000, the cost of avoiding each cancer is $16,666. This is significantly less than the costs associated with treating most cancers. Granted, these savings will not accrue directly to the individual facility. But the overall benefits to the healthcare system shouldn't be overlooked.

* Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation. *Health risks from exposure to low levels of ionizing radiation: BEIR VII—phase 2.* Washington (DC): National Academies Press; 2005.

The Upgrade Approach

All the manufacturers included in this Evaluation offer options to upgrade earlier platforms to include some of the new technology, or can provide lower-cost configurations that can be upgraded later to the full functionality of the systems evaluated in this report. In the present economic climate, purchasing an upgrade or a lower-cost system often provides a more affordable way to access at least some of the new technology. Also, the fact that some of the new applications are not yet proven means that a conservative approach will be wise for some facilities. So this course of action is worth considering if a facility needs a new scanner and is prepared to forgo the full capabilities and wait for new applications (such as wide-coverage body perfusion imaging) to become more widely accepted.

HEALTH DEVICES RATINGS SYSTEM

Health Devices Evaluations rate products based on their clinical and technical acceptability and desirability. Ratings are based on standard commercial products. Suppliers often modify their products in response to our findings, sometimes before we publish our Evaluations. If the modified product is not available in time for us to verify the significance of the change, we may include a statement of the supplier's intentions. In future issues of *Health Devices*, we may update the information provided for the evaluated products and may revise our ratings.

We recommend that you use our ratings as a guide for selecting the best products for your healthcare facility. Actual purchasing decisions should be based on a thorough understanding of the article, as well as on your specific clinical applications, users' opinions, standardization policies, direct experience with the supplier, and price.

RATINGS CATEGORY: ACCEPTABLE FOR USE

PREFERRED The product meets all major performance and safety criteria. It has no serious shortcomings and offers significant advantages over other alternatives.

ACCEPTABLE The product meets all major performance and safety criteria and has no serious shortcomings.

NOT RECOMMENDED The product does what it is intended to do, but not at the desired level of performance, or it has significant disadvantages compared with other alternatives. For example, it may be more difficult to use or clean, or it may be less suitable for a specific application. A product that we rate Not Recommended is safe to use and does not have to be withdrawn from service. However, we recommend against purchasing the product unless overriding considerations warrant it.

RATINGS CATEGORY: UNACCEPTABLE

UNACCEPTABLE The product fails to meet significant criteria for performance or poses significant safety risks. A healthcare facility that does not own such a product should not purchase it. If you have a product that we have rated Unacceptable, review the disadvantages of continuing to use it, and plan to replace it. If you decide to purchase or continue to use the product, carefully document the basis for your actions.

CONDITIONAL RATINGS

Occasionally, our rating for a product depends on whether a healthcare facility is willing and able to take corrective measures to overcome a basic performance or safety shortcoming. Corrective measures range from special training (e.g., stressing the importance of certain operating instructions) to ordering an upgrade or modifying a product. If the facility meets the conditions stated, the product is rated in the category specified—that is, Preferred, Acceptable, or Not Recommended. However, if the facility does not or cannot meet the conditions, the product is Unacceptable.

However, it may not be the best option for facilities looking specifically to perform cardiac imaging. That's because the cardiac scanning capabilities of lower-specification configurations are often somewhat compromised, so they may not be able to provide the desired level of scanning until upgrades can be obtained. You may be better served by a 64-slice system with limited upgrade options rather than a fully upgradable (but initially lower-specification) system. Your choice should be based on the functionality that is most important for your patients.

The upgrade paths for the four single-source scanners in this study are as follows:

GE Discovery CT750 HD. Dual-energy and extended-coverage dynamic perfusion imaging (Volume Helical Shuttle) have received 510(k) clearance from FDA and are being made available as optional upgrades within the next few months. In addition, users of the LightSpeed VCT can upgrade to the LightSpeed VCT XTe, which includes ASIR, for about $250,000 (though it will not include all of the benefits of the CT750 HD). ASIR would be a significant advantage for the LightSpeed.

Philips Brilliance iCT. Philips designed the detector so that a smaller (less expensive) detector can be field upgraded from 64 rows to 128 rows. A lower-cost configuration (Brilliance iCT SP) will be available in the second half of 2009 (FDA 510(k) clearance has been received) and can be easily upgraded with wider coverage and other options (e.g., rotation time, generator power, and post processing server options) to achieve the same performance as the Brilliance iCT.

Siemens Somatom Definition AS+. The 20-slice Somatom Definition AS can be upgraded to the 128-slice AS+ without a gantry swap. In addition to the increased detector coverage, the system includes x-ray generator and rotation time upgrades, and the patient table specifications can be upgraded to accommodate obese patients.

Toshiba Aquilion One. Toshiba has introduced the Aquilion Premium system, which is identical to the Aquilion One except the detector is half as wide (8 cm). It is upgradable to the Aquilion One and is available for approximately $1.7 million.

About Our Testing

For this Evaluation, we have been a bit more demanding in our judgments than in our earlier studies of CT scanners. Since these systems are significantly more expensive than those we previously evaluated, our expectation is that significant advantages will be evident in image quality, dose, and new CT applications. Therefore, performance that might be deemed excellent on one of the previously evaluated systems wouldn't necessarily be considered excellent here.

There are a few other differences as well. Since the systems we are evaluating are new to the market, there are some aspects (e.g., reliability) that cannot be assessed. There are also some aspects of the systems, such as workstations, that are identical to those of previously evaluated scanners from the same manufacturer, so there was no point in retesting them. As a result, we have excluded our categories of Workflow Integration and Service and Support.

The Special Features test category covers any unique features with each design and some important aspects that we would have previously examined as part of Workflow Integration.

Since cardiac imaging is an important feature of CT systems, our testing once again included a dynamic test phantom that uses catheters containing contrast medium to emulate the motion of the coronary arteries at various heart rates so that coronary CT angiography image quality can be compared. This phantom can be connected to the electrocardiogram (ECG) input of the CT systems, allowing it to be imaged in the same way that a patient would be. For more details about this phantom, as well as the scoring system we used for these images, see our December 2008 issue.

GE HEALTHCARE DISCOVERY CT750 HD

GE Healthcare [439946], Waukesha, WI (USA);
+1 (800) 643-6439, +1 (262) 544-3011;
www.gehealthcare.com

Routine imaging. PREFERRED
Cardiac imaging. ACCEPTABLE
Pediatric imaging. PREFERRED
Advanced imaging. ACCEPTABLE

PRODUCT DESCRIPTION

Availability. Introduced in 2008; marketed worldwide.

The system we tested. We performed our testing on a Discovery CT750 HD with software release 08MW39.4.

Note. GE did not provide a photograph of the unit for publication.

How It Compares to Previous Models

GE states that, compared to the LightSpeed VCT, its previous 64-slice system, major technology changes have been made to the Discovery CT750 HD. According to GE, these changes, which are not apparent in a specification comparison, enable a significant improvement in both image noise and sharpness. Changes that *are* apparent include the x-ray tube and the extended perfusion study coverage length. Notably, the maximum power available to the smaller of the two focal spots has been increased, which should result in sharper images for larger patients, as well as faster scans.

New and Unique Features

The Discovery CT750 HD combines the standard back-projection technique used by all CT scanners with a new image reconstruction technique known as Adaptive Statistical Iterative Reconstruction, or ASIR. ASIR is designed to reduce image noise, thereby significantly improving image quality and reducing the required dose. The benefits are more noticeable when the dose is very low. One drawback is that the specified image reconstruction rate decreases from 16 to 6 images per second when ASIR is used, meaning that patient throughput will be affected in high-workflow situations; GE expects to significantly improve the ASIR reconstruction rate. In the meantime, potential customers must keep this information in mind when selecting equipment. The user can select the respective contribution to the final image from ASIR and standard back-projection reconstructions. The slower reconstruction rate is independent of the proportion of ASIR used in the final image.

Improved image sharpness is possible using the HD mode, which employs a moving focal spot. A similar technique is used by other manufacturers to increase the number of available slices; the difference with the HD mode is that the deflection is present only in the x/y plane rather than in all planes. As a result, images should appear sharper without affecting the noise or number of slices.

TEST RESULTS

Image Quality—Excellent

Fundamental image quality—Excellent. The CT750 HD has improved the image noise level for all standard reconstruction kernels compared to the LightSpeed VCT—for example, the noise for the Standard kernel was reduced from 0.6% to 0.5%, and we had similar findings for other kernels. In particular, the noise levels for the sharpest kernels (i.e., bone imaging) were significantly lower than those produced by other CT systems.

The HD mode on the CT750 HD increases the sharpness of images. When HD is not used, the sharpness (as measured with the modulation transfer function [MTF]) was similar to that previously measured for the LightSpeed VCT. With HD mode, the MTF increased by a range of 17% to 50%. The improvement was greater for the sharpest reconstruction kernels, which is a significant advantage for bone images (compared to the LightSpeed and the other premium units).

Dynamic image quality—Good. When using default prospective ECG gating for medium and variable heart rates, the CT750 HD's performance was equal to or better than that of the LightSpeed VCT. However, at lower heart rates (65 bpm), the images appeared degraded (slight blurring on all the catheters in our test phantom), though still acceptable.

For heart rates below 65 bpm, the low-dose SnapShot Pulse mode provides better image quality but no functional information. A padding option, which reduces the problem of slight variations in heart rate but increases the dose, is also available.

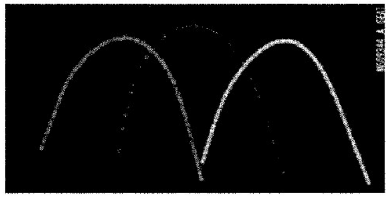
Dose Management—Excellent

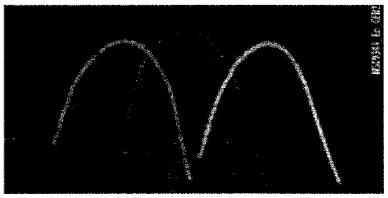
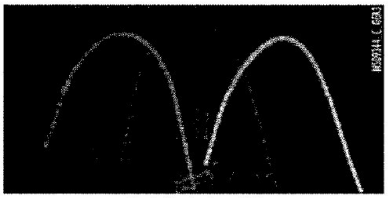
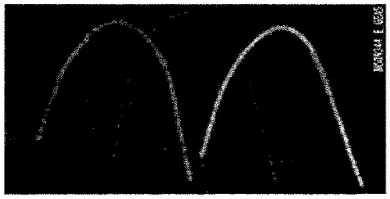
Dose—Excellent. ASIR will enable dose to be further reduced for all studies (beyond the reduction provided by common tools such as dose modulation). When using the standard kernel without ASIR, the noise was 0.80% at 18.86 mGy. When the dose was halved to 9.33 mGy and 50% ASIR was used (i.e., the image was a combination of 50% ASIR with 50% back-projection), the noise was 0.78%. In other words, our results confirmed that dose can be halved without affecting image quality when ASIR is used.

The detectability of low-contrast images also improved when ASIR was engaged: The amount of detail visible was the same with 60% ASIR at 13 mGy compared to no ASIR at 26 mGy.

VISUAL COMPARISON OF ECG-GATED AND AXIAL CARDIAC ACQUISITIONS FOR THE GE DISCOVERY CT750 HD

Stationary (0 bpm)—for reference



ECG-gated	Score 65 bpm 12 14	Axial (SnapShot Pulse)
 4 + 4 + 4 = 12		 4 + 5 + 5 = 14
	75 bpm **14 NA**	
 5 + 5 + 4 = 14		**Not applicable**
	85 bpm **12 NA**	
 4 + 4 + 4 = 12		**Not applicable**
	Irregular heart rate **15 NA**	
 5 + 5 + 5 = 15		**Not applicable**

GE HEALTHCARE DISCOVERY CT750 HD

(continued)

Note, however, that ASIR affects the visual appearance of the images. Images reconstructed with ASIR have a very different texture compared to conventional back-projection images. As the percentage of ASIR is increased, the appearance of the images markedly changes. The acceptability of these changes will depend on physician preference. Therefore, the dose saving possible will depend on whether the physicians responsible for interpretation are willing to use the ASIR images.

For gated helical cardiac scanning, the user can choose between very-low-dose scans with exposure primarily limited to a small acquisition window or obtain functional information from additional cardiac phases by increasing the mA used outside the chosen acquisition window and the width of the window.

The SnapShot Pulse technique (axial), which can be used only for heart rates 65 bpm or lower, enables a very low radiation dose and a shorter scan time. Our results show a dose of 1.7 mSv with a 6-second scan (compared to 5.2 mSv with a 7-second scan for ECG-gated acquisitions). A common problem with axial cardiac techniques is that they are negatively affected by any variation in heart rate. GE has added the ability to widen the acquisition window, which is known as padding. However, since the padding function increases the dose slightly (to 2.4 mSv), it should only be used when necessary (i.e., when heart rate is irregular).

GE has improved the protocols for pediatric patients on the CT750 HD. In addition to automatically setting the dose based on the patient's age and size (as is done by all manufacturers), GE recommends settings based on the exam indications. So, for example, a patient receiving a follow-up scan will be given a lower dose (since less information is needed compared to an initial diagnostic exam). This is accomplished using protocols recommended by CT 4Kids.

Special Features—Good

Utility—Good. Axial wide-coverage acquisition for head perfusion imaging is available on the CT750 HD (as with the LightSpeed VCT), with a coverage of up to 8 cm and a sampling rate of 1.7 seconds. This is significantly better than the capabilities on most conventional CT systems.

PHILIPS HEALTHCARE BRILLIANCE iCT

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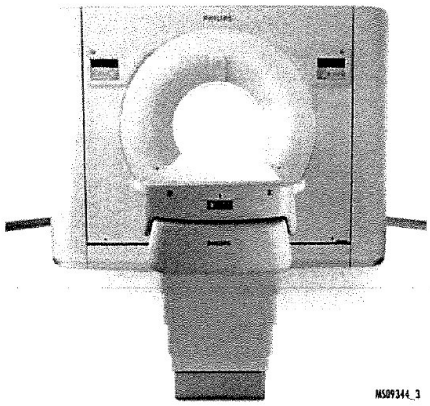
+1 (800) 722-7900, +1 (425) 487-7000;
www.medical.philips.com.



Routine imaging. ACCEPTABLE
Cardiac imaging. PREFERRED
Pediatric imaging. ACCEPTABLE
Advanced imaging. ACCEPTABLE

PRODUCT DESCRIPTION

Availability. Introduced in 2008; marketed worldwide

The system we tested. We performed our testing on a Brilliance iCT with software release 2.5.0.

How It Compares to Previous Models

The Brilliance iCT has a number of changes compared to the earlier Brilliance 64 CT system, using features that Philips collectively describes as Essence technology. The coverage of the detector has been increased to 8 cm with 128 detector rows, which, when combined with a moving focal spot, doubles the number of slices to 256, improves the in-plane resolution, and reduces scan time. The reduced scan time should lead to reduced contrast volumes in some exams. The Brilliance iCT also has a second 60 kW generator, so 120 kW is now available, enabling the shortest rotation times of any system on the market (0.27 second). The x-ray tube on the Brilliance iCT has been modified to provide longer tube life (though this could not be tested), and a number of beam-shaping filters (which Philips calls IntelliBeam) help to optimize the x-ray dose; these filters are new to Philips CT systems but can be found on competitors' systems. In addition, the conventional gantry bearings have been replaced with an air bearing.

New and Unique Features

Eclipse DoseRight Collimation is automatically engaged for all helical scans to eliminate the effects of overbeaming and therefore reduce the unnecessary radiation dose.

In addition, Philips has developed a very fine antiscatter grid and shaped the detector so that all the elements are focused toward the x-ray tube. One problem with a wider detector is that the proportion of scatter increases, which degrades image quality. Antiscatter grids are routinely used in radiography to reduce scatter. However, the dose typically must be increased to compensate for absorption by the grid. Philips claims that no dose increase is necessary with its new grid. If the grid is effective, then the low-contrast detectability should be the same or better, compared to that measured for narrower-coverage CT detectors.

TEST RESULTS

Image Quality—Excellent

Fundamental image quality—Good. The quality of the images produced by the Brilliance iCT is noticeably improved compared to the Brilliance 64 and is similar to that of the other premium systems. For example, the noise for the standard filter—known as the B filter—was measured to be 0.7% on the Brilliance 64 and 0.62% on the Brilliance iCT. Similar results were seen for other reconstruction kernels. Additionally, the sharpness of all reconstruction filters, as measured by the MTF, is improved compared to the Brilliance 64; it is similar to that of the other premium systems. Therefore, overall image quality (taking into account the noise and image sharpness) is improved.

Dynamic image quality—Excellent. We found that images acquired with the default ECG gating (DoseRight, which modulates the mA between 20% and 100% based on the ECG) were consistently of acceptable quality and comparable to the reference (Siemens Somatom Definition) for all heart rates.

It is possible to acquire low-dose axial cardiac images for all heart rates that we tested. Using the step-and-shoot axial technique, there was no noticeable loss in visual quality at low heart rates.

Dose Management—Excellent

Dose—Excellent. The Brilliance iCT's Eclipse DoseRight Collimator automatically reduces the effect of overbeaming for all helical acquisitions without any user interaction and with no loss of image quality. Overbeaming collimation is particularly beneficial on this unit because the detector is the widest available of all systems for helical acquisitions (8 cm compared to 4 cm or less on other systems). In a 16 cm scan, we found a 20% dose saving for a pitch of 0.6.

The 120 kW generator and three levels of additional filtration (IntelliBeam) allow use of higher tube currents without a concomitant increase in radiation dose, since filtration removes most lower-energy x-rays that do not contribute to the final image but do add to the patient dose. The additional filtration is automatically selected based on the exam, patient age, and patient size. It is very difficult to quantify the actual dose saving, since dose will depend on the beam parameters used; but based on our measurements, we estimate that a 10% saving can be expected for most adult patients, with even higher savings likely to occur for larger adult patients.

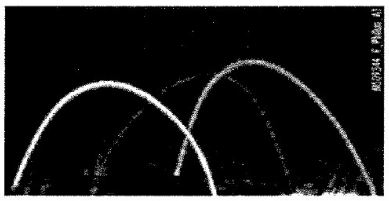
In cardiac imaging, the dose-reducing ECG gating is easy to use in prospective ECG-gated exams. The default ECG

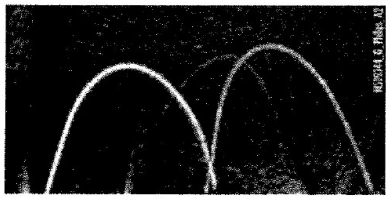
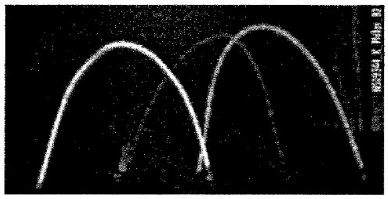
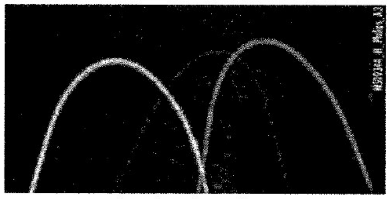
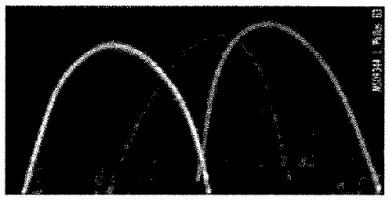
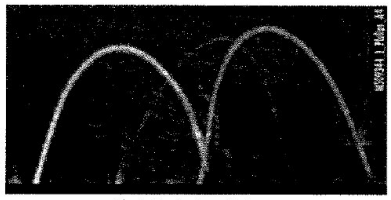
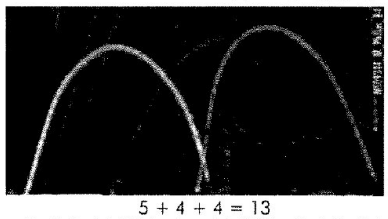
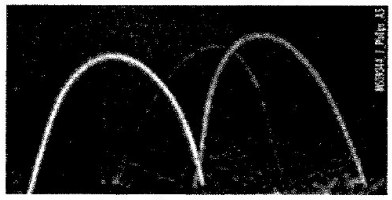
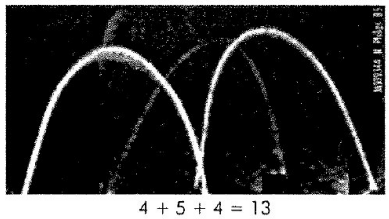
PHILIPS HEALTHCARE BRILLIANCE iCT

(continued)

VISUAL COMPARISON OF ECG-GATED AND AXIAL CARDIAC ACQUISITIONS FOR THE PHILIPS BRILLIANCE iCT

Stationary (0 bpm)—for reference



ECG-gated	Score	Axial (step-and-shoot)
	65 bpm	
	14 14	
		
5 + 5 + 4 = 14		5 + 5 + 4 = 14
	75 bpm	
	13 15	
		
5 + 5 + 3 = 13		5 + 5 + 5 = 15
	85 bpm	
	14 13	
		
5 + 5 + 4 = 14		5 + 4 + 4 = 13
	Irregular heart rate	
	13 13	
		
5 + 5 + 3 = 13		4 + 5 + 4 = 13

gating for a patient with a heart rate of 65 bpm will be about 4.2 mSv, increasing to 5.0 mSv for a heart rate of 85 bpm. Using the same scanner without any ECG gating, the dose was 7.6 mSv.

The step-and-shoot axial technique enables a lower radiation dose and a shorter scan time than the helical acquisition. This technique can be used for all heart rates that we tested (65 to 85 bpm) and results in a dose of 2.4 mSv with a 4.3-second scan (compared to 4.2 mSv and 5.3 seconds for ECG gating). We found that step-and-shoot images had a similar image quality to ECG-gated helical images.

Special Features—Good

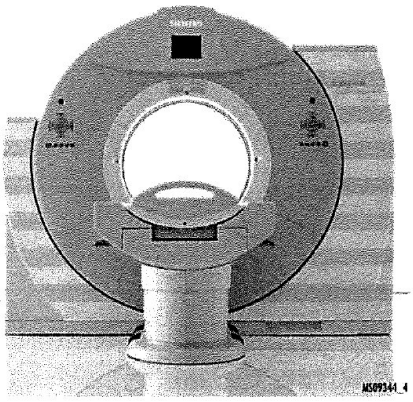
Utility—Good. An axial extended-coverage acquisition known as Jog Scan is available for head and body perfusion imaging on the Brilliance iCT, with coverage up to 16 cm with a sampling rate of 1.9 seconds (or longer).

Philips is in the process of introducing dual-energy imaging (Spectral CT) as a pioneering clinical application option on the iCT. The application has FDA 510(k) clearance and will require a dedicated workstation and software, though no hardware upgrades will be required. However, we have not had the opportunity to inspect the application.

The air bearing on the gantry results in a noticeable reduction in operating noise levels compared to other CT systems. (Normally, CT gantries are very noisy when spinning at their maximum speed.) This may reduce patient anxiety during studies and reduce changes in heart rate, though this would be difficult to test.

Note that the wide coverage of the detector (8 cm) did not lead to decreased uniformity between axial slices obtained from along the width of the detector. We found that average voxel values varied by 2.36 HU, which is similar to the variation found with narrower detectors.

Our results show that the addition of the antiscatter grid does not adversely affect image quality by increasing the noise.



SIEMENS MEDICAL SOLUTIONS SOMATOM DEFINITION AS+

Siemens Medical Solutions USA Inc. [399199],
Malvern, PA (USA); +1 (888) 826-9702,
+1 (610) 219-6300; www.siemensmedical.com

Routine imaging. ACCEPTABLE
Cardiac imaging. ACCEPTABLE
Pediatric imaging. ACCEPTABLE
Advanced imaging. PREFERRED

PRODUCT DESCRIPTION

Availability. Introduced in 2008; marketed worldwide

The system we tested. We performed our testing on a Somatom Definition AS+ with software release Syngo CT 2008G.

How It Compares to Previous Models

The Somatom Definition AS+ is a single-source 128-slice CT system. It is a wider-coverage configuration of the Somatom Definition AS (evaluated in the December 2008 *Health Devices*). The wider coverage enables improved perfusion imaging and cardiac imaging, and allows for shorter scans.

In addition to the single-source CT systems, Siemens also markets two dual-source systems, the Somatom Definition (evaluated in the May 2008 *Health Devices*) and the recently introduced Somatom Definition Flash.

New and Unique Features

With the Somatom Definition AS and AS+, Siemens introduced what it calls Adaptive technology, which we described in our December 2008 Evaluation of the Somatom Definition AS. The wider detector of the AS+ enables some of these technologies to be further improved upon.

TEST RESULTS

Image Quality—Good

Fundamental image quality—Good

Dynamic image quality—Good. We found that the Definition AS+ displayed excellent image quality for low heart rates (65 bpm). For higher heart rates, however, the quality of the images was poor compared to that of images from the dual-source Definition. Despite this, the quality for variable heart rates was similar to that obtained for the dual-source system. It should also be noted that the AS+ produced better image results than the AS, particularly for lower heart rates. Our results indicate that acceptable cardiac image quality requires heart rates of 65 bpm or below. Higher heart rates would require the use of medication to control heart rate, as is the case for most 64-slice CT systems.

When using the axial acquisition technique (known as Adaptive Cardio Sequence), the image quality for lower heart rates (65 and 75 bpm) is comparable to that of the helical-mode images and slightly inferior to that of the dual-source images. For higher and variable heart rates, the image quality is noticeably reduced when using the axial mode. Therefore, the low-dose techniques do not compromise image quality if the heart rate is low and stable.

Dose Management—Excellent

Dose—Excellent. The Adaptive Dose Shield (which uses a sliding collimator to eliminate overbeaming) is more effective on the Somatom Definition AS+ than on the Definition AS. This is due to the increased width of the detector. The sliding collimator will always be more effective when the scan range is short; however, the AS+ also has appreciable dose saving with wider-coverage studies. In fact, we found the dose saving to be doubled compared to the savings of the Definition AS—for example, in a 10 cm scan, the saving can be up to 39% for the Definition AS+, compared to 20% for the Definition AS. A significant dose saving can be achieved for most helical scans (except extended-coverage perfusion scans), without any user interaction and with no loss of image quality.

The prospective ECG synchronization (Adaptive ECG-Pulsing) automatically reduces the dose while maintaining the ability to reconstruct the images throughout the cardiac cycle. Images outside the prospectively selected phase will be of reduced quality; however, the dose for a patient with a heart rate of 65 bpm will be about 2.5 mSv using this method. On our phantom, using the same scanner without any ECG gating, the dose was 5.4 mSv.

If the heart rate is steady, the dose can be further reduced by adjusting the Adaptive ECG synchronization (MinDose mode) during prospectively gated cardiac exams. Using this method, the dose for

DOSE SAVING (%) ACHIEVED WITH THE ADAPTIVE DOSE SHIELD FOR THE SIEMENS SOMATOM DEFINITION AS+

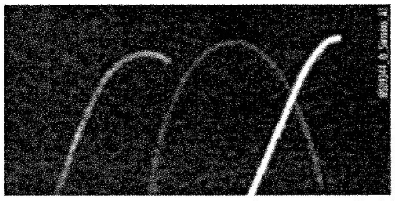
Dose saving compared to scans that do not use Adaptive Dose Shield.

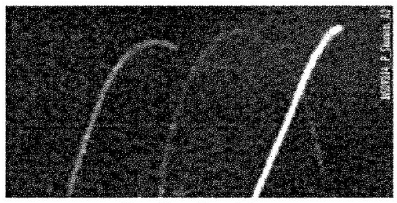
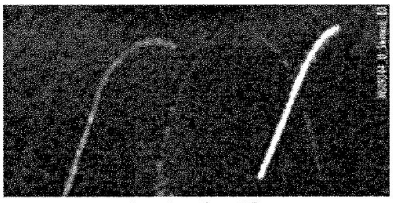
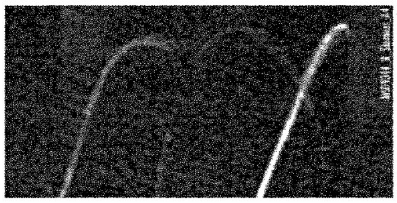
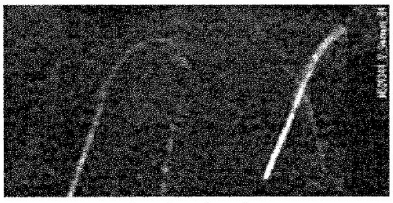
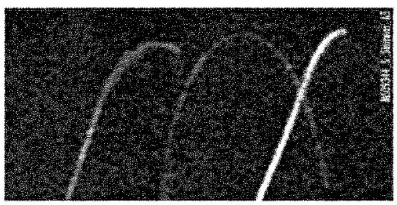
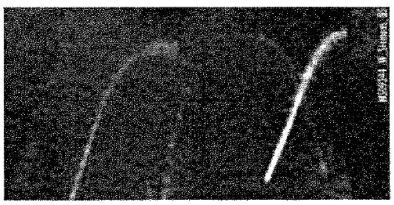
Pitch	6 cm scan	10 cm scan	40 cm scan
1.0	39%	25%	8%
1.5	54%	39%	13%

(continued)

VISUAL COMPARISON OF ECG-GATED AND AXIAL CARDIAC ACQUISITIONS FOR THE SIEMENS SOMATOM DEFINITION AS+

Stationary (0 bpm)—for reference



ECG-gated	Score	Axial
	65 bpm	
	15 14	
		
5 + 5 + 5 = 15		5 + 5 + 4 = 14
	75 bpm	
	12 13	
		
5 + 4 + 3 = 12		5 + 5 + 3 = 13
	85 bpm	
	10 8	
		
4 + 3 + 3 = 10		3 + 3 + 2 = 8
	Irregular heart rate	
	13 10	
		
4 + 4 + 5 = 13		3 + 4 + 3 = 10

EXTENDED-COVERAGE OPTIONS (ADAPTIVE 4D SPIRAL)

Coverage (cm)	Sampling rate (sec)	Pitch
6.9	1.0	0.5
7.9	1.25	0.5
9.6	1.5	0.5
14.2	1.5	1.0
17.5	1.75	1.0
20.7	2.0	1.0
24.0	2.25	1.0
27.1	2.5	1.0

a patient with a 65 bpm heart rate will be about 1.7 mSv. The drawback of this method is that additional functional information is not available.

A similar dose saving was found for axial cardiac acquisitions. Adaptive Cardio Sequence is an axial technique that enables a lower radiation dose and a shorter scan time compared to ECG-gated helical scans. The same dose and scan time are used regardless of the heart rate (1.4 mSv and 6 seconds). We found that the image quality is not affected for lower heart rates. For comparison, a standard ECG-gated acquisition takes 6.8 seconds at a 65 bpm heart rate and a dose of 2.5 mSv.

Special Features—Excellent

Utility—Excellent. Adaptive 4D Spiral is a helical reciprocating scanning technique that enables neurological and body perfusion exams to be acquired over a coverage volume that is larger than the detector. In CT perfusion exams, multiple acquisitions over the same region are used to track the contrast medium as it flows through an organ. The time between each acquisition is important and must be less than 3 seconds to be useful. The "Extended-Coverage Options" table on this page summarizes the options available on the Somatom Definition AS+. Based on these coverage values, the Somatom Definition AS+ has significantly better perfusion coverage than most 64-slice CT systems.

In our December 2008 issue, we described the advantages of the Adaptive 3D Intervention Suite, which we tested on the Definition AS. These advantages included the wide bore, control panel, image transfer, joystick, artifact reduction, and x-ray dose-reduction features. The Somatom Definition AS+ has an additional advantage in that the detector covers 4 cm, compared to 2 cm on the Somatom Definition AS. Therefore, the physician can more easily track biopsy needles when approaching a target at an oblique angle. Since interventional CT is usually reserved for the most technically demanding cases (ultrasound- and fluoroscopy-based systems are used for less demanding cases), this is a consideration for facilities undertaking the most difficult biopsies.

TOSHIBA MEDICAL SYSTEMS AQUILION ONE

Toshiba America Medical Systems Inc.
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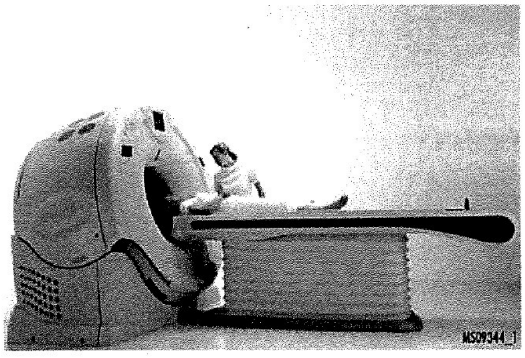
+1 (714) 730-5000; www.medical.toshiba.com

Routine imaging. ACCEPTABLE
Cardiac imaging. ACCEPTABLE
Pediatric imaging. PREFERRED
Advanced imaging. PREFERRED



PRODUCT DESCRIPTION

Availability. Introduced in 2008; marketed worldwide

The system we tested. We performed our testing on an Aquilion One with software release V4.20ER002.

How It Compares to Previous Models

Toshiba refers to the Aquilion One as a "dynamic volume"* CT system with 320 detector rows. It has many similarities to the Aquilion 64—for example, the x-ray tube, rotation time, and slice thickness are identical. Apart from the wider detector, the only other significant improvements are to the patient table and the size of the system.

A drawback of the Aquilion One is the loss of the tilt capability for helical scans; Toshiba is working to rectify this. In addition, the minimum installation area must be very large, with space to accommodate not only the slightly larger gantry, but also the required ancillary equipment.

New and Unique Features

The 16 cm wide detector is unique to Toshiba and has been the subject of considerable expectation. The primary reason for the wider detector is that it allows multiple serial images to be acquired of large-volume subjects (e.g., whole organs) with a short sampling rate (minimum is 0.35 second). Therefore, physiologic (e.g., perfusion) and dynamic morphological images can be acquired. Also, some conventional CT studies can now be acquired with a single rotation, so breathhold and patient movement problems are reduced, and it may be possible to use less contrast medium.

Another potential advantage relates to the fact that during a contrast study (such as any vascular study or perfusion study), the concentration of the contrast medium will change slightly between rotations as the contrast medium moves through the vasculature. If the whole anatomy can be captured at the same time—producing, in effect, a snapshot of the concentration of the contrast medium in a whole organ—any differences in the concentration of the contrast medium will be due only to the fluid dynamics of the vasculature, not the time differences in acquisition. Researchers are looking into the possibility of using this information to identify pathologies before morphological changes are visible (Doppler ultrasound already achieves this for some vascular sites). Toshiba has introduced the term "temporal uniformity" to describe this advantage of the 16 cm coverage. None of the other wide-coverage perfusion techniques available can claim temporal uniformity over a wide coverage area.

It should be noted that the full coverage of the wide detector can be used only for axial acquisitions. For studies requiring more than 16 cm of coverage, the helical mode would likely be used, in which case the Aquilion One would have a maximum coverage of 3.2 cm, which is identical to the Aquilion 64.

The wide detector presents problems with commonly used techniques for measuring dose. With the advent of multislice CT, it was recognized that the standard 10 cm long dosimetry probes were no longer as accurate, but the inaccuracies were not considered significant enough to force changes. However, with the 16 cm coverage, the measurement inaccuracies are significant. This is a very real problem, and the International Electrotechnical Commission (IEC) has developed some interim modifications to the definition of the CT dose index (CTDI) that should reduce the inaccuracies until a better solution can be agreed upon.**

* For a more complete explanation of this term, see page 145 of our May 2008 issue.

** For further details see: Geleijns J, Salvado Artells M, de Bruin PW, et al. Computed tomography dose assessment for a 160 mm wide, 320 detector row, cone beam CT scanner. *Phys Med Biol* 2009 May 21;54(10):3141-59.

LOW-CONTRAST DETECTABILITY MEASURED WITH INDUSTRY-STANDARD CATPHAN PHANTOM

Low-contrast phantom is placed at the center and then moved 6 cm in the z-axis. The results are the minimum-diameter low-contrast phantom disk that can be detected for each contrast level (smaller diameter means better image quality). See discussion on page 261 for further information. Slice thickness—8 mm, dose—35 mGy, kernel—FC13

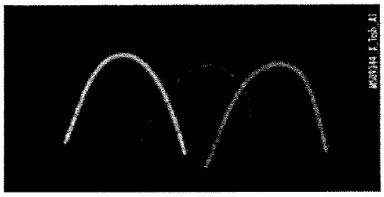
Contrast	Center	Offset 6 cm
1%	2 mm	2 mm
0.5%	3 mm	3 mm
0.3%	3 mm	2 mm

TOSHIBA MEDICAL SYSTEMS AQUILION ONE

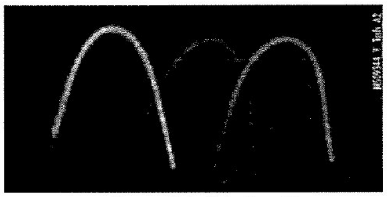
(continued)

VISUAL COMPARISON OF AXIAL CARDIAC ACQUISITIONS FOR THE TOSHIBA AQUILION ONE

Stationary (0 bpm)—for reference



65 bpm



Score: 5 + 5 + 5 = 15

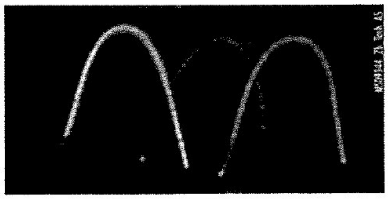
75 bpm

Score: 5 + 5 + 5 = 15

85 bpm

Score: 5 + 5 + 5 = 15

Irregular heart rate



Score: 4 + 4 + 5 = 13

TEST RESULTS

Image Quality—Excellent

Fundamental image quality—Good. Helical image quality is the same as that previously measured for the Aquilion 64, which we rated excellent. The image quality of kernels used in soft-tissue and bone imaging is comparable to that from other premium CT systems.

Dynamic image quality—Excellent. We found that the Aquilion One produced excellent image quality for stable heart rates.

All cardiac scans are performed using axial acquisition, regardless of heart rate. As a result, the scan time for low heart rates is 1 second, while the maximum scan time is 3 seconds for higher heart rates. These times are shorter than is possible with any other existing CT system, so patient movement is less likely to degrade image quality and breathholds can be shorter. Also, since no gantry movement is required (unlike with axial acquisitions on all other CT systems), it is possible to acquire functional information with an axial scan, though there will be no dose saving.

Dose Management—Good

Dose—Good. The wide coverage area for axial exams allows the unit to reduce the dose and the imaging times, particularly since the overbeaming inherent in helical scanning and a proportion of penumbra is eliminated. In addition, most exams can be completed with an exposure time of 0.35 second, compared to 5 to 10 seconds on other CT systems, so patient movement is unlikely to be an issue. Therefore, it is less likely that studies will need repeating, which reduces dose. Also, the need for sedation, which is always a safety concern, will be reduced. The wide coverage for axial exams is an advantage for pediatric scanning due to the inherent dose saving and very fast imaging times that are possible.

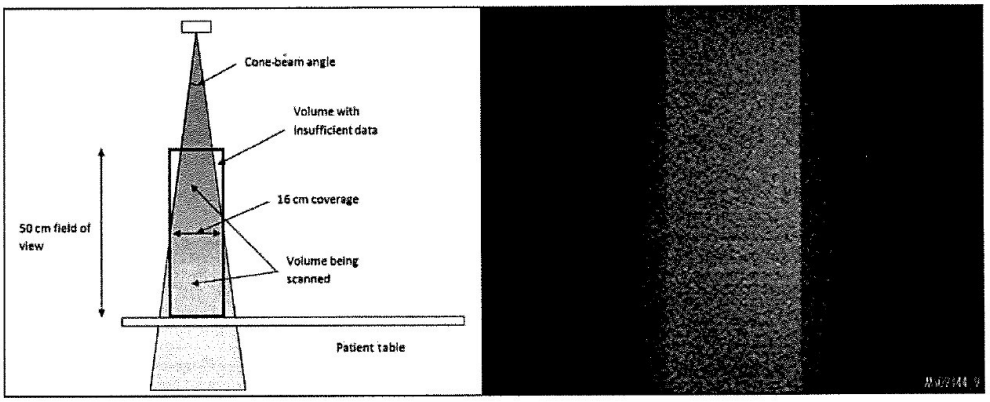
Toshiba has a noise-reduction reconstruction algorithm known as QDS (Quantum Denoising Software), which can be used with sharp (bone) reconstruction kernels. We found that QDS reduces the noise by 20% and improves the visibility of low-contrast resolution for the smallest details: The resolution for 0.5% and 0.3% contrast can be reduced from 3 mm diameter (as shown in the "Low-Contrast Detectability" table on page 259) to 2 mm when QDS is used. Therefore, users can reduce the dose by 20% in some studies to achieve the same image quality.

During helical scans, overbeaming is controlled by using the active collimator (a sliding collimator).

Toshiba Aquilion CT systems, including the Aquilion One, have the unique ability to vary the pitch during a helical acquisition, a capability known as Variable Helical Pitch, or vHP. The main application for vHP is in the assessment of chest pain. The cardiac part of the study requires a low pitch (i.e., high dose), but the pitch can be significantly reduced in the rest of the abdomen. Without vHP, avoiding an unacceptably high radiation dose (20 to 30 mSv) would require two exams and thus the use of more contrast medium. So vHP helps control the dose without prolonging the study time.

One disadvantage is that, although the dose for cardiac imaging at low heart rates is comparable to that of the other premium CT systems, segmented acquisition must be used for patients with higher heart rates to maintain good image quality. The penalty for the good image quality is significantly higher dose. For a 75 bpm heart rate, the dose is doubled to 5.0 mSv, and it is tripled to 7.5 mSv for a heart rate of 85 bpm. The system is completely automatic, so the user cannot adjust the settings to reduce the dose. Therefore, reducing heart rate with a pharmacologic agent would be recommended.

Note: Measuring the dose for the extended coverage is technically difficult. Our measurements (made according to the revised IEC CTDI definition) were in agreement with the values displayed by the system.



Left: Cross-sectional view of an instant of CT image acquisition on the Aquilion One, showing loss of scanned volume. **Right:** Volume rendering of a 40 cm diameter water phantom scanned with the Aquilion One's 16 cm axial coverage. Ideally, the volume should be a cylinder.

Special Features—Excellent

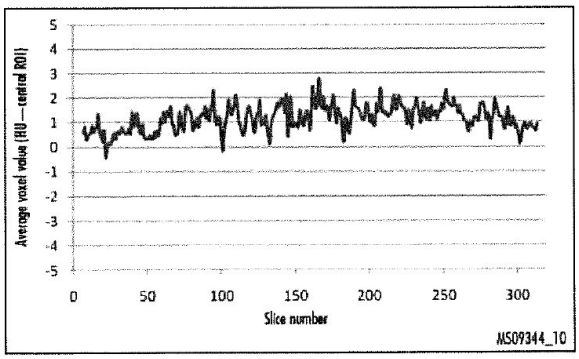
Utility—Excellent. No compromises for physiologic imaging and dynamic morphological imaging are necessary. The Aquilion One provides the widest coverage of all available systems, with the sampling rate limited only by the rotation time. Up to 16 cm coverage is possible (a distance that, for example, can cover the whole brain) with a sampling rate of 0.35 second, though 1 second would be more typical.

Toshiba supplies a set of very large phantoms, with handling equipment, to ensure the quality of the wide detector.

Despite the size and depth of the gantry, tilted axial acquisitions are possible. Tilted acquisitions are commonly used in head imaging to reduce the dose to the orbits, so images obtained with the Aquilion One can be compared with images obtained using other CT systems. However, due to the longer coverage of the scanner, the orbits will inevitably receive a higher radiation dose. Toshiba expects to enable helical imaging with the tilted gantry in a future upgrade.

Though generally advantageous, the wide coverage does present a problem: Part of the reconstructed volume is cut off. In fact, the full 50 cm field of view only covers 9.3 cm rather than the full 16 cm. (See the figures on the top of this page.) This is consistent given the geometrical considerations of the 16 cm z-axis coverage. The loss of coverage is reduced when a smaller field of view is used. (For example, with a 24 cm field of view, as is used in head imaging, the coverage would be 12.8 cm, which is sufficient.) Toshiba has begun to address this problem in a recent update to the system—for example, the patient table can now move ±4.2 cm laterally, so specific anatomy can be better centered.

Note: The measured slice thickness was not affected by the position along the scanned volume. Image quality is not affected by the wide coverage. We measured the homogeneity of voxel values across the full detector coverage; we also measured low-contrast detectability both in the standard location (at the isocenter of the scanner) and 6 cm along the z-axis (along the patient table, 8 cm would be the edge of the scanned volume). The voxel values were consistent for the whole coverage (see the figure at bottom left). The low-contrast results showed that the minimum detectable low contrast was not affected by the position of the test phantom (see "Low-Contrast Detectability Measured with Industry-Standard Catphan Phantom" on page 259).



Plot of average voxel values obtained with the Aquilion One for a central region of interest along the full detector coverage.

EVALUATION

QUANTITATIVE RESULTS COMPARISON

IMAGE QUALITY

On pages 262 through 264, we present five tables that summarize our image-quality measurements:

- Noise (page 262)
- Uniformity (page 263)
- Sharpness (page 263)
- Nominal versus Measured Slice Thickness (page 263)
- Low-Contrast Detectability (page 264)

CARDIAC IMAGING

The ability to acquire an image of a moving object has been a goal for all CT systems ever since the first multislice system was introduced. With wider coverage, faster rotation, and more advanced gating, the quality of cardiac images has improved, as has been shown both clinically and using phantom images.

Our testing provides an indication of the image quality for both prospectively ECG-gated helical scans and low-dose axial scans. The results can also be used to compare dose and imaging time for cardiac scans. Early cardiac CT scanning required 20-second scan times; our results show that the time has been reduced to less than 6 seconds. The shorter the time, the less likely patient movement will affect image quality and the shorter breathholds will be; thus, the volume of contrast administered may be reduced. For reference, we are including the results we obtained with the same phantom used on the Siemens Somatom Definition, a dual-source CT system that we previously rated Preferred over single-source CT for cardiac imaging (*Health Devices*, May 2008).

On pages 264 and 265, we present three tables that summarize our cardiac imaging results:

- Dynamic Phantom—Image Scores (page 264)
- Dynamic Phantom—Dose (page 265)
- Dynamic Phantom—Exposure Time (page 265)

The results in these three tables show that each evaluated system provides lower x-ray dose compared to the earlier-generation 64-slice systems. Also, the increased coverage of the Philips and Toshiba systems appears to provide improved image quality for axial scanning, though the dose saving is not as high. All systems can provide excellent image quality. In particular, imaging of variable heart rates is improved. Also, axial imaging is improved with the Philips Brilliance iCT due to its dual-energy capabilities, and the Toshiba Aquilion One provides excellent image quality for all heart rates tested. Both the Philips Brilliance iCT and the Siemens dual-source system maintain low doses for all axial acquisitions.

NOISE (%) (Normalized to 20 mGy, 10 mm Slices)

Noise limits the visibility of details and can be objectively measured, and so it is widely used as an indicator of image quality—the lower the noise, the better the image quality. Noise is strongly affected by the sharpness of the image. However, we found that the correlation between spatial frequency content (as measured with the modulation transfer function [MTF]) and noise is usually nonlinear for these systems.

To compare systems, we chose to compare noise values from closely matching kernels with similar use. We found that noise is at least as good for all systems when compared to the systems featured in our December 2007 Evaluation—in fact, all of the systems listed below would be rated excellent compared to the earlier 64-slice systems. However, some differences in noise values among the evaluated premium CT systems were observed, primarily for the sharper kernels. Overall, when taking into account the spatial frequency content of the images, the GE Discovery CT750 HD provides the lowest noise, even without ASIR. When ASIR is used, the noise further decreases. (Values in parentheses represent the 50% MTF value [measured in line pairs/cm] of the kernel used.)

Kernel type	GE Discovery CT750 HD (no ASIR)	Philips Brilliance iCT	Siemens Somatom Definition AS+	Toshiba Aquilion One
Soft tissue	0.5 (4.9 lp/cm)	0.6 (5.1 lp/cm)	0.6 (4.0 lp/cm)	0.64 (5.1 lp/cm)
Bone	2.27 (6.7 lp/cm)	2.10 (6.5 lp/cm)	3.70 (8.1 lp/cm)	3.10 (7.2 lp/cm)

UNIFORMITY

In CT images, voxel values are directly related to the subject's attenuation. Therefore, the voxel values in a uniform phantom image should be uniform regardless of the phantom's position. Low values indicate good uniformity. Uniformity depends on good calibration for all the detectors. All results are within acceptable limits, and no significant differences were observed.

	GE Discovery CT750 HD	Philips Brilliance iCT	Siemens Somatom Definition AS+	Toshiba Aquilion One
Intraslice axial uniformity (slice thickness in parentheses)	2.5 (5 mm)	1.97 (5 mm)	1.13 (4.8 mm)	3.1 (5 mm)
Interslice axial uniformity (broad slices)	1.0 (5 mm)	0.45 (5 mm)	1.52 (4.8 mm)	1.369 (5 mm)
Interslice axial uniformity (narrow slices)	1.86 (0.625 mm)	2.46 (0.6 mm)	1.96 (1 mm)	1.86 (0.5 mm) (central 4 cm of detector only) 3.19 (0.5 mm) (whole detector width)
Interslice uniformity for 5 mm spiral slices	1.0	2.73	1.15	2.09

SHARPNESS

The sharpness of any imaging device can be measured using the modulation transfer function (MTF). Put simply, the MTF is a plot of contrast against spatial resolution. In general, MTF decreases with spatial resolution. In other words, fine detail (high spatial resolution) is more difficult to see. CT manufacturers typically report the spatial frequencies at specific points along the MTF curve for comparison (e.g., 50%, 10%, and 2%). The 10% values are probably the most indicative of the image sharpness.

Higher values indicate sharper images. However, the MTF is dependent on the reconstruction kernel. Below we report the spatial frequency (measured in line pairs [lp]/cm) for specific points on the MTF response from three kernels for each system. The GE Discovery CT750 HD offers significantly greater sharpness than the other systems.

	Kernel name	50%	10%	2%
Soft tissue				
GE Discovery CT750 HD	**Standard**	4.0	7.0	8.0
	With HD	4.8	8.1	9.6
Philips Brilliance iCT	**UB**	3.5	6.6	8.8
Siemens Somatom Definition AS+	**B31s**	3.9	6.7	8.1
Toshiba Aquilion One	**FC22**	4.6	9.2	11.8
Lung				
GE Discovery CT750 HD	**Lung**	5.7	9.2	10.4
	With HD	6.6	10.8	12.4
Philips Brilliance iCT	**D**	6.4	11.0	13.2
Siemens Somatom Definition AS+	**B70s**	8.1	10.9	11.9
Toshiba Aquilion One	**FC50**	5.9	10.1	11.8
Bone				
GE Discovery CT750 HD	**Edge**	9.2	14.8	16.6
	With HD	14.0	23.4	Not applicable
Philips Brilliance iCT	**E**	6.3	12.1	15.0
Siemens Somatom Definition AS+	**B75h**	9.2	12.4	13.7
Toshiba Aquilion One	**FC30**	7.2	11.7	13.4

NOMINAL VERSUS MEASURED SLICE THICKNESS (HELICAL)

The thickness of helical slices is measured by assessing a profile of a thin object through multiple slices. The full width half maximum (FWHM) of the profile defines slice thickness and should match the set value. These results show that for the narrowest slices reconstructed, all manufacturers provide slices that are within 0.1 mm of the nominal value. Furthermore, the full width tenth maximum (FWTM) shows the spread of the slice profile; a narrower spread is preferred.

	GE Discovery CT750 HD (no ASIR)	Philips Brilliance iCT	Siemens Somatom Definition AS+	Toshiba Aquilion One
Nominal (mm)	0.625	0.67	0.6	0.5
FWHM	0.68	0.65	0.7	0.6
FWTM	1.2	1.1	1.5	1.0
Nominal (mm)	5.0	2.5	5.0	5.0
FWHM	5.25	2.7	5.3	5.0
FWTM	8.2	4.4	8.0	5.7

EVALUATION

LOW-CONTRAST DETECTABILITY (Minimum Visible Diameter [mm])

The detectability of low-contrast objects of various sizes is often used to visually confirm the other measurements. In CT, the minimum visible diameter is usually reported at three contrast levels. A smaller diameter indicates better image quality. However, dose is also a factor in detectability, and manufacturers differ in how dose is determined, so comparisons can be difficult (here the reported dose has been calculated based on the CT dose index measured for a head phantom and corrected for a 10 mm slice width). These results indicate that the GE Discovery CT750 HD has the best overall low-contrast detectability, particularly for the lowest-contrast details. (Note: The measurements in this table are subject to measurement error, and small differences should not be regarded as significant.)

	GE Discovery CT750 HD	Philips Brilliance iCT	Siemens Somatom Definition AS+	Toshiba Aquilion One
Dose $CTDI_{vol}$ (mGy)	26	27	24	28
Kernel	Standard	A	B31s	FC13
1% contrast	2	2	2	2
0.5%	2	3	2	3
0.3%	2	5	6	3

DYNAMIC PHANTOM—IMAGE SCORES (Maximum Score Is 15)

	Dual-source Siemens Somatom Definition		GE Discovery CT750 HD		Philips Brilliance iCT		Siemens Somatom Definition AS+		Toshiba Aquilion One	
Heart rate (bpm)	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**
65	15	15	12	14	14	14	15	14	Not applicable	15
75	14	14	14	Not applicable	13	15	12	13	Not applicable	15
85	14	13	12	Not applicable	14	13	10	8	Not applicable	15
65 to 85 (irregular)	13	11	15	Not applicable	13	13	13	10	Not applicable	13

DYNAMIC PHANTOM—DOSE
(Effective Dose [mSv])

Dose is calculated from dose length product, with the scan length assumed to be 10 cm for all scans. In helical scanning, both the dual-source Siemens Somatom Definition and the Definition AS+ have two electrocardiogram pulsing methods. The first is an automatic mode that enables different cardiac phases to be reconstructed, which is similar to competitors' gating methods. A second mode, known as MinDose, reduces the dose further, but loses cardiac phase information. The MinDose values are reported in parentheses.

	Dual-source Siemens Somatom Definition		GE Discovery CT750 HD		Philips Brilliance iCT		Siemens Somatom Definition AS+		Toshiba Aquilion One	
No dose reduction	9.7		9.8		7.6		5.4		5.1	
Heart rate (bpm)	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**
65	3.7 (2.4)	1.9	5.2	1.7	4.2	2.4	2.5 (1.7)	1.4	Not applicable	2.5
75	3.4 (2.3)	1.8	6.0	Not applicable	4.8	2.4	2.3 (1.6)	1.4	Not applicable	5.0
85	3.4 (2.3)	1.8	5.5	Not applicable	5.0	2.4	3.1 (3.2)	1.4	Not applicable	7.5
65 to 85 (irregular)	4.4 (3.3)	1.8	6.0	Not applicable	4.7	2.4	2.9 (2.5)	1.4	Not applicable	5.0

DYNAMIC PHANTOM—EXPOSURE TIME
(Measured in Seconds)

	Dual-source Siemens Somatom Definition		GE Discovery CT750 HD		Philips Brilliance iCT		Siemens Somatom Definition AS+		Toshiba Aquilion One	
Heart rate (bpm)	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**	**ECG**	**Axial**
65	8.8	6.6	6.9	6.0	5.3	4.3	6.8	6.1	Not applicable	1.0
75	7.6	6.6	8.5	Not applicable	5.3	4.3	6.1	5.3	Not applicable	2.0
85	6.7	6.6	7.6	Not applicable	5.3	4.3	5.3	5.3	Not applicable	3.0
65 to 85 (irregular)	7.8	6.6	8.5	Not applicable	5.3	4.3	6.5	5.3	Not applicable	2.0

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40th Anniversary
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   Only science, rigorously applied and implemented by experienced, disciplined scientists from the clinical, engineering, and research communities, can unearth the broad-scale, systematic approaches to improving patient care.
2. **The Integrity of Independence**
   Our conflict-of-interest rules have been carefully developed to create an environment that maximizes objectivity, productivity, and integrity of process. We accept no advertising revenues from any source. Our employees are not permitted to own stock shares in medical device or pharmaceutical firms, and we verify this by examining each employee's federal income tax return. We go beyond the industry norm to ensure that you receive unbiased guidance.

Public file
ECRI Institute is a 501(c)(3) exempt organization. Certain annual returns and other documents are available for public inspection at its corporate office during normal business hours. Copies are available upon request. For inspection or copies, please contact Dan Downing, vice president for finance, at (610) 825-6000, ext. 5238, or ddowning@ecri.org; or Ronni P. Solomon, executive vice president and general counsel, at (610) 825-6000, ext. 5158, or rsolomon@ecri.org.

New York Times called us "the country's most-respected laboratory for testing medical products."

Free Chart Mapping Health System Needs to ECRI Institute Information Products

English Version
Chinese Version

Olszewski Declaration
Exhibit 15

ICT

Definition from Wiktionary, the free dictionary

English

Initialism

ICT

1. (*electronics*) *Initialism of* **in-circuit test**.
2. (*electronics*, *communication*) *Initialism of* **information and communications technology**.

Anagrams

- cit
- tic, TIC

Retrieved from "http://en.wiktionary.org/w/index.php?title=ICT&oldid=21267721"
Categories: English initialisms | en:Electronics | en:Communication

---

ICT

From Wikipedia, the free encyclopedia

ICT may refer to:

Contents

- 1 Places
- 2 Government agencies, organizations and politics
- 3 Science and technology
- 4 Other
- 5 See also

Places

- Indochina Time, a time zone
- Islamabad Capital Territory, the area of Islamabad which consists only the Capital Territory of Pakistan
- Wichita Mid-Continent Airport, an airport in Wichita, Kansas (IATA Airport Code ICT)

Government agencies, organizations and politics

- Costa Rican Tourism Board (*Instituto Costarricense de Turismo*), the government agency responsible for promoting sustainable tourism in Costa Rica
- International Campaign for Tibet, a political interest group
- International Institute for Counter-Terrorism, an Israeli think-tank and policy research institute
- Internationalist Communist Tendency, the new name of the left communist group formerly known as the International Bureau for the Revolutionary Party

Science and technology

- Image Constraint Token, a flag that causes the downsampling of high-definition content on Blu-ray and HD DVD or DVD quality in the Advanced Access Content System
- In-circuit test, an electronics testing methodology, a special case of White box testing
- Information and communications technology
  - Information and communication technologies for development
  - Information and communication technologies in education
  - Information and communication technologies for environmental sustainability
- Inhibitory control test, helping in the diagnosis of hepatic encephalopathy
- Institute of Chemical Technology, a premier institute located in the city of Mumbai, India
- Institute of Computing Technology, Chinese Academy of Sciences, the first academic establishment to specialize in comprehensive research on computer science and technology in China

- Institute for Creative Technologies, a research center at the University of Southern California
- Integrated Circuit Technology
- International Computers and Tabulators, the former name of a British computer industry company (now part of Fujitsu Services)
- International CMOS Technology Inc. (iCT), the former name of Anachip USA Inc. electronic component manufacturing company (now part of Diodes Incorporated)
- Inverse cosine transform, a mathematical transformation of data
- Island College of Technology, a higher learning college in Balik Pulau, Penang, Malaysia
- International Center for Air Transportation[*citation needed*] at Massachusetts Institute of Technology

Other

- *Indian Country Today*, a weekly newspaper in the United States
- Insulin coma therapy, a form of psychiatric treatment
- InterCity-Triebwagen, class of InterCityExpress high-speed trains in Austria and Switzerland
- Intercollegiate Championship Tournament, run by National Academic Quiz Tournaments for collegiate quizbowl teams
- International Crimes Tribunal or International Criminal Tribunal
- Intra-company transfer, the movement of an employee
- Inverness Caledonian Thistle F.C., a Scottish association football team who play in the Scottish Premier League

See also

- ICE-T (disambiguation)
- Ministry of Information and Communication Technology (disambiguation)

Retrieved from "http://en.wikipedia.org/w/index.php?title=ICT&oldid=585913783"
Categories: Disambiguation pages

What does ICT stand for?

Your abbreviation search returned 90 meanings

Category Filters > All definitions (90) | Information Technology (28) | Military & Government (13) | Science & Medicine (18) | Organizations, Schools, etc. (37) | Business & Finance (16) | Slang, Chat & Pop culture (0)

sort results: alphabetical | rank ?

Rank	Abbr.	Meaning
******	ICT	Information and Communication Technology (school of)
******	ICT	Information and Communications Technologies
******	ICT	International Campaign for Tibet (Washington, DC)
******	ICT	Institute for Counter-Terrorism (Israel)
******	ICT	Institute for Creative Technologies (University of Southern California)
******	ICT	Informatie- en Communicatietechnologie (Dutch: information and communication technology)
******	ICT	Indian Country Today (newspaper)
*****	ICT	Institute of Computer Technology (Sunnyvale, CA)
*****	ICT	International Conference on Telecommunications
*****	ICT	Intercompany
*****	ICT	Instituto Costarricense de Turismo (Spanish: Costa Rican Institute of Tourism; Costa Rica)
*****	ICT	Fraunhofer Institut für Chemische Technologie
*****	ICT	International Criminal Tribunal (United Nations)
****	ICT	Integrated Circuit Technology
****	ICT	Independent Coordinator of Transmission
****	ICT	Insurance Council of Texas
****	ICT	International Conference on Thermoelectrics
****	ICT	Image Constraint Token (forced resolution down conversion option)
****	ICT	Implementation/Coordination Team
****	ICT	Inverness Caledonian Thistle (UK football club)
****	ICT	In-Circuit Testing
****	ICT	Islamabad Capital Territory (Pakistan)
****	ICT	Integrative Cancer Therapies
****	ICT	Intramolecular Charge Transfer
****	ICT	Internet and Communication Technology
***	ICT	Integrated Concept Team
***	ICT	Institut Catholique de Toulouse (French: Catholic Institute of Toulouse; France)
***	ICT	Item Category
***	ICT	International Critical Tables
***	ICT	Instant Center Tracking
***	ICT	Indochina Time (GMT +0700)
***	ICT	Institute of Concrete Technology (UK)
***	ICT	International Communication Technology
***	ICT	Institute for Computer Technology (Vienna, Austria)
***	ICT	Institute for Contextual Theology (Zambia)

Request for Reconsideration of Final Action
Attachment D

*** ICT	Integer Cosine Transform	
*** ICT	Incoming Trunk	
*** ICT	Catalan Institute of Technology	
*** ICT	Wichita, KS, USA - Mid-Continent Airport (Airport Code)	
*** ICT	International Commission on Tracers	
** ICT	Intercompany Transaction	
** ICT	Intercompany Transfer	
** ICT	International Catalyst Technology, Inc.	
** ICT	International Container Terminal Service (Philippines)	
** ICT	Integrated Capability Team	
** ICT	Information and Communications Section	
** ICT	Initial Configuration Task (Microsoft)	
** ICT	Integrated Combat Turnaround	
** ICT	Isomorphic Control Transformation	
** ICT	Interface Control Technician	
* ICT	Imaging Compton Telescope	
* ICT	Individual & Collective Training	
* ICT	Interoperability Compliance Statement	
* ICT	Ionic Contamination Tester	
* ICT	International Cooperative Team	
* ICT	Innovative Circuit Technology Corp.	
* ICT	Innovative Computer Technology, Incorporated	
* ICT	Installation Coordination Team	
* ICT	Image Composition Tool	
* ICT	Interactive Claims Training (insurance)	
* ICT	Interface Certification Test	
* ICT	Intelligent Call Transfer	
* ICT	Inter-Changeability Testing	
* ICT	Inter-Exchange Carrier Tandem	
* ICT	Interface Coordination Team	
* ICT	Initial Commit Time	
* ICT	Indirect Coomb's Test (blood test)	
* ICT	Integration Current Transformer (diagnostic sensor)	
* ICT	Integrated Circuit Testing	
* ICT	Institute of Cancer Therapeutics (UK)	
* ICT	Instruction Cycle Time	
* ICT	Intermediate Care Team (various organizations)	
* ICT	Internal Consultation Team (healthcare)	
* ICT	International City Theatre (California)	
* ICT	Intelligent Compression Technologies (Quincy, MA)	
* ICT	Intercostal Tube	
* ICT	Information and Computing Technologies	
* ICT	Initial Cadet Training (Australia)	
* ICT	Information and Communication Theory (various locations)	
* ICT	Institute for Christian Teaching (Silver Spring, MD)	
* ICT	Immunochromatographic Technique (diagnostics)	
* ICT	IBM (International Business Machines Corporation) Community Tools (software)	
* ICT	Idaho Centennial Trail (scenic trail)	
* ICT	Igaueno Cable Television (Japan)	
* ICT	Indian Cricket Team	
* ICT	Infamous Commonwealth Theatre (Chicago, IL)	
* ICT	Infection Control Today (magazine)	

* ICT	Infinite Core Technologies (Canada)	
* ICT	Irving Community Theater (Irving, TX)	
* ICT	Introduction to Cisco Technology (course)	

Note: We have 250 other definitions for **ICT** in our Acronym Attic

new search | suggest new definition

Search for ICT in Online Dictionary Encyclopedia

<< Previous	Abbreviation Database Surfer		Next >>
ICSUS	ICSWCD	ICT-MICC	ICT5
ICSV	ICSWE	ICT3	ICTA
ICSVA	ICSWM	ICT4D	ICTAB
ICSW	ICSY	ICT4LT	ICTAC
ICSWA	ICSZ	ICT4RD	ICTAD

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What does ICT stand for?

abbreviation to define
ICT Go

Acronym Finder has
88 **verified** definitions for **ICT**

Our 'Attic' has 250 unverified meanings for **ICT**

sort by **Rank** | Alpha

Possible Meanings	Rank
In Chelsea Today	****
international coal trading	****
Islamic Center of Tucson	****
Intermediate Capacity Transit	****
Interactive Communications Technologies	****
In the Commonwealth	****
Included to Teach	****
Impact on Teaching	****
In Computer Tech	****
Instructional Consultation Teams	****
In Circuit Testers	****
Internet Communication Technology	****
Internet and Computer	****
Information and Computer Technology	****
Industry to Continuously	****
Interface for the Connection	****
International Corporate Travel	****
In Charge of Telecommunications	****
Industrial Chemistry Technology	****
In Combined Transport	****
In on Community	****
Indicators in Conjunction	****
Incorporated in the Teaching	****
International Congress on Thrombosis	****
Investigation and Current	****
Infrastructure the Creation	****
Inner City Tennis	****
Irish Corporation Tax	****
Instructor Candidate Training	***
Infrastructure of Computers	***
ITS in Conjunction	***

Request for Reconsideration of Final Action
Attachment E

International Coal Trade	***
Impact of Those	***
Integrated Communications Technology	***
Institute for Chemical Technology	***
International Corporate Taxation	***
Information and Community Technology	***
Info Communications Technology	***
International Cyber Team	***
Its Computer Telephony	***
Institute of Computing Technology	***
Interest in Computers	***
Interactive College of Technology	***
Infrastructure the Type	***
International Currency Technologies	***
Infrastructure and Coordinating	***
Information Computer Technology	***
Image Converter Tube	***
Inter Country Team	***
Integrated Chip Technology	***
Instytut Cybernetyki Technicznej	***
Information and Computing Technology	***
Information Communications and Telecommunications	***
Institutional and Capacity	***
In the Centre of Town	***
In Country Training	***
International Council of Tanners	***
Importance of Traditional	***
Irresponsible Captain Tylor	***
Info Communication Technologies	***
Innovative Cell Technologies	***
International Counterparts in Terms	***
Interceptarea Convorbirilor Telefonice	***
Initiatives in the County	***
Intercollegiate Championship Tournament	***
Infrastructure for Collaborative	***
Institute of Counter Terrorism	***
Internationale Container Transport	***
In India Celebrates	***
Infrastructure for This	***
Industry Canada Tel	***
Integrated Control Technology	***
Institute of Computer Technologies	***
Infection Control Team	***
Internet to Community	

	***
Institute of Communication Technologies	***
Information and Computer Technologies	***
In Center Training	***
Indian Country Tourism	***
Institut Chemische Technologie	***
Instituto Cultural Tampico	***
Islamic Community of Tampa	***
Impact on Community	***
Initiative on Cooperation	***
International Childcare Trust	***
International Cajun Trio	***
Institute of Cytology	***
In Classics Teaching	***
Information Communication and Technologies	***
It Comprises Three	***
Integrating Current Transformer	***
Information Communication Technical	***
Integrated Control Technologies	***
Instytutu Cybernetyki Technicznej	***
Industrial Computer Tomography	***
Institute of Comprehensive Transportation	***
In Innovation Clusters	***
Implementation Coordination Team	***
Irish Childbirth Trust	***
Industry Competitiveness Through	***
Information Centre Title	***
In Challenging Times	***
International Crime and Terrorism	***
Informatics the Computer	***
Information Communication and Telecommunications	***
Increasing of Them	***
International Conference Terrorism	***
Internet Communication Technologies	***
Information Communication Team	***
International Context Together	***
Immuno Chromatographic Test	***
International Congress of Toxicology	***
Intelligence and Terrorism	***
In the Coursework That	***
Information Computer and Telecommunication	***
International Computers and Tabulators	***
Information on Clients	***
Image Content Technology	

	***
Interpersonal Computing and Technology	***
International Club Tournaments	***
Inverted Core Technology	***
In Categorie Tekstbureaus	***
Information Communication These	***
Institute of Cell Therapy	***
Integrating Computers in Teaching	***
Institute for Cellular Therapeutics	***
International Center for Telemedicine	***
Integrated Card Technology	***
Information and Communication This	***
Immunochromatographic Card Test	***
International Commission on Trichinellosis	***
Instrument Current Transformer	***
Internet and Communications Technology	***
Isovolumic Contraction Time	***
Information Communication Techonology	***
International Commercial Terms	***
Institute for Consultancy	***
Intermex Carinska Tarifa	***
International Centre of Training	***
Is to Contribute to Transforming	***
Interior Car Tuning	***
Information Communication Telecom	***
In Circuit Tests	***
Invasive Cardiovascular Technology	***
Information and Communication Towards	***
Innovation Communications Technology	***
Institute of Creative Technology	***
Integrated Computerised Tax	***
Impacts of Telecommunications	***
Industrial Conference on Telecommunications	***
International Centre of Technology	***
Invincible Counter Troll	***
Industrial Computed Tomography	***
Interactive Computer Technology	***
In the Country Towards	***
Ionia Community Theatre	***
Individual Classroom Teachers	***
Informatics and Computing	***
Isovolumetric Contraction Time	***
Increasing the Capabilities	***
Interagency Collaborative Team	

	***
In Classrooms These	***
Incident Command Training	***
Implementing the Country	**
In the Curriculum Teaching	**
Insulin Coma Therapy	**
Integrated CMOS Technology	**
immobilized cell technology	**
immunoreactive cationic trypsin	**
immunoreactive cationic trypsinogen	**
Impedance Clotting Time	**
impulse conduction time	**
incremental challenge test	**
infiltrated connective tissue	**
inflamed connective tissue	**
inflation-catheter technique	**
information/communication technology	**
inhaled corticosteroid treatment	**
initial collecting tubule	**
initial collecting tubules	**
inner capsule thickness	**
inner cerebral trauma	**
inorganic ceiling tile	**
integrated connective tissue	**
intensified conventional therapy	**
intensified conventional treatment	**
intensive care teams	**
intensive conventional therapy	**
Interactive computer teaching	**
interlobular connective tissue	**
intermittent cyclic therapy	**
intermittent cyclical therapy	**
internal carotid thrombosis	**
interstitial cell tumors	**
interstitial connective tissue	**
Into the Cabinet	**
intra-coronary thrombolysis	**
intracellular Ca2+ transient	**
intracellular calcium transient	**
intramyocardial conduction time	**
Intraoral Cariogenicity Test	**
intraperitoneal calcium therapy	**
intrinsic connective tissue	**
Islet cell tumor	

	**
Isolated cell transplantation	**
isolated clinical tachycardia	**
isotope clearance technique	**
isotopic captopril test	**
isovolumetric contraction times	**
Iterative Classification Tree	**
treatment--intensified conventional therapy	**
Institute of Clay Technology	**
International Communications Technology	**
International Complementary Therapy	**
It Contained Three	**
International Center for Transitional	**
International CMOS Technology	**
Initiatives in Communities	**
Insulating Core Transformer	**
Idiopathic Copper Toxicosis	**
Indicators on Community	**
Illinois Center for Transportation	**
International Consultants and Technocrats	**
Institute of Complementary Therapies	**
International Conferences on Technology	**
Invested in Capacity	**
Institute of Circuit Technology	**
International Cavitation Technologies	**
Introduction to Christian	**
Irreversible Component Transformation	**
Integrated Computer Technology	**
Inversion Composite Technology	**
Infrastructures to Create	**
Intensive Community Treatment	**
Interactive Community Theatre	**
International Call Transfer	**
impression cytology with transfer	**
in the connective tissue	**
Incident Coordination Team	**
infiltrated connective tissue area	**
inflammatory cell infiltrate	**
inflammatory cell infiltrates	**
intensified conventional insulin therapy	**
intensified conventional insulin treatment	**
intensive conventional insulin therapy	**
intermittent cyclic EHDP treatment	**
Intra-Oral Cariogenicity Test	

	**
intra-oral cariogenicity test	**
intra-oral cariogenicity tests	**
isovolumic contraction time interval	**

Note: Acronym Finder has 88 verified definitions for ICT

< Previous	Abbreviation Attic Surfer		Next >
ICSTS	ICSV	ICT-CAS	ICT5
ICSU	ICSW	ICT-SW	ICTA
ICSUA	ICSWP	ICT1	ICTAA
ICSUAB	ICSWS	ICT4D	ICTAC
ICSUD	ICSZ	ICT4G	ICTAE

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

What does **CT** stand for?

Your abbreviation search returned 195 meanings

Category Filters > All definitions (195) | Information Technology (21) | Military & Government (39) | Science & Medicine (59) | Organizations, Schools, etc. (31) | Business & Finance (25) | Slang, Chat & Pop culture (21)

sort results: alphabetical | **rank** ?

Rank	Abbr.	Meaning
*	CT	Cable Tray
*	CT	Cable Tunnel
*	CT	Cable, Test
*	CT	Cadet in Training (Texas A&M Corps of Cadets)
*	CT	Calcitonin
*	CT	Calendar Time
*	CT	Calf Thymus
*	CT	Calgary Transit
*	CT	CALTRANS (California Department of Transportation)
*	CT	Can't Talk
*	CT	Canada Trust
*	CT	Canadian Tire
*	CT	Canterbury (postcode, United Kingdom)
*	CT	Cape Town (South Africa)
*	CT	Captain Tsubasa (Japanese comic)
*	CT	Carat
*	CT	Carbon Tetrachloride
*	CT	Carboxyl-Terminal
*	CT	Card-To-Tape
*	CT	Career Trainee
*	CT	carton
*	CT	Cascaded Triplet
*	CT	Catania, Sicilia (Italian province)
*	CT	Catechesi Tradendae (On Catechesis in our Time)
*	CT	Cavitation Tunnel
*	CT	Cazic Thule (Everquest)
*	CT	Cedar Trust
*	CT	Cellular Telephone
*	CT	Census Tract
*	CT	Center Thickness (of contact lens)
*	CT	Center-Tapped (electrical: transformer)
*	CT	Central African Republic
*	CT	Central Teaching
*	CT	Central Time
*	CT	Central Transition

Request for Reconsideration of Final Action
Attachment F

* CT	Certificate of Teaching	
* CT	Certificate of Transliteration	
* CT	Certification Test	
* CT	Certification Testing	
* CT	Certified in Thanatology: Death, Dying and Bereavement (Association for Death Education and Counseling)	
* CT	Certified Thanatologist	
* CT	Certified Translator (American Translators Association)	
* CT	Ceská Televize (Czech Television)	
* CT	Changing Times (journal)	
* CT	Channel Terminator	
* CT	Channel Tunnel (England/France)	
* CT	Chaos Theory	
* CT	Charge Time (gaming)	
* CT	Charge Transfer	
* CT	Charitable Trust	
* CT	Charlie Tango (ham radio)	
* CT	Charlize Theron (actress)	
* CT	Chemical Terrorism	
* CT	Chemical Test	
* CT	Chemical Titles (periodical)	
* CT	Cherished Teddies (Enesco collectible figurines)	
* CT	Chicago Tribune	
* CT	Chimney Tray	
* CT	China Town	
* CT	Chiropractic Technologist	
* CT	Chlamydia Trochomatis	
* CT	Cholera Toxin	
* CT	Chris Tucker (actor)	
* CT	Christianity Today (magazine)	
* CT	Chrono Trigger (video game)	
* CT	Church Times (UK)	
* CT	Cigarette Tax (various locations)	
* CT	Cipher Text	
* CT	Circle Trip (airlines)	
* CT	Circular Trunking	
* CT	City Temple (Cardiff, UK)	
* CT	Clamp Terminal	
* CT	Classic Trilogy (Star Wars)	
* CT	Classroom Teacher	
* CT	Clear Trunk	
* CT	Client Task	
* CT	Clinical Terms	
* CT	Clinical Trial	
* CT	Clock Time	
* CT	Clock Tower (computer game)	
* CT	Clone Trooper (Star Wars)	
* CT	Clotting Time (test of blood)	
* CT	Cloud Top	
* CT	Cloud Type	
* CT	Club Triumph (UK)	
* CT	CoachTrack (coaching software by Eclipse Computing)	
* CT	Coal Terminal	

* CT	Coat and Tie	
* CT	Coattails (multi-game guild)	
* CT	Cocteau Twins (band)	
* CT	Cognitive Therapy	
* CT	Cognitive Turnover (work psychology)	
* CT	Cognizant Test	
* CT	Coiled Tubing (oil & gas)	
* CT	Cold Tolerance	
* CT	Cold Turkey	
* CT	Collaborative Tools	
* CT	Collecting Tubule	
* CT	Color Transparency	
* CT	Colour Television	
* CT	Combat Trains	
* CT	Combined Testing	
* CT	Combined Trial	
* CT	Combustion Turbine	
* CT	Come Together (Beatles song)	
* CT	Comité Technique (French: Technical Committee)	
* CT	Command Transmitter	
* CT	Commercial Thinning (forestry)	
* CT	Commissario Tecnico (Italian: national's soccer team Head Coach)	
* CT	Commission de la Transparence (French healthcare quality-assessment agency)	
* CT	Commissioning Team	
* CT	Common Terms	
* CT	Common Tier	
* CT	Communications Technician (AWACS communications position)	
* CT	Communications Technology	
* CT	Communications Terminal	
* CT	Communist Terrorists (British Malayan Conflict)	
* CT	Community Title (Australia)	
* CT	Compact Tension (metallurgy)	
* CT	Comparison Text	
* CT	Compatibility Technology	
* CT	Compensation Theorem	
* CT	Compensatory Time	
* CT	Competition Tribunal (Canada)	
* CT	Complementary Therapy	
* CT	Computed Tomography (imaging technique)	
* CT	Computer Technician	
* CT	Computer Technology	
* CT	Computer Telephony	
* CT	Computer Terminal	
* CT	Computer-aided Tomography (less common)	
* CT	Computerized Axial Tomography (also see CAT; CT is preferred)	
* CT	Computerized Tomography	
* CT	Condensed Tannin	
* CT	Confederation Test	
* CT	Confederation Text	
* CT	Conflict Transformation	
* CT	Conformance Tester	
* CT	Conformance Testing	

* CT	Connecticut (US postal abbreviation)
* CT	Connective Tissue
* CT	Conning Tower
* CT	Conspiracy Theory (movie)
* CT	Constant Temperature
* CT	Constitutional Tribunal
* CT	Contact Team
* CT	Contact Time
* CT	Continuation Training
* CT	Contracting
* CT	Contractor Test
* CT	Contractor Testing
* CT	Contraterrene (anti-matter, science fiction)
* CT	Control Task
* CT	Control Techniques (Emerson Electric Company; St. Louis, MO)
* CT	Control Telemetry (US DoD)
* CT	Control Tower
* CT	Control Transformer
* CT	Cooling Tower
* CT	Cooperative Trust Company of Canada
* CT	Coordinated Turn Model
* CT	Copper Tube
* CT	Cordless Telecommunications
* CT	Cordless Telephone
* CT	Core Team
* CT	Corey Taylor (Slipknot)
* CT	Corporate Technology
* CT	Cortico-Thalamic
* CT	Counseling and Testing
* CT	Count
* CT	Counter
* CT	Counter Terrorist
* CT	Counterterrorism
* CT	Country Team
* CT	Court
* CT	Cover Test (ophthalmology)
* CT	Crawler Transporter (NASA)
* CT	Crazy Taxi (Dreamcast game)
* CT	Crazy Town (band)
* CT	Create Tasker
* CT	Creatine Transporter (genetics)
* CT	Creative Touring (Lexus)
* CT	Credit Time (US NIH)
* CT	Crimp Tool
* CT	Critical Technology (EU program)
* CT	Critical Thinking
* CT	Cross Talk
* CT	Cross Traffic
* CT	Cryptologic Technician (formerly Communications Technician; USN Rating)
* CT	Cum Tempore (Latin: at a later date)
* CT	Current Transformer
* CT	Curve-to-Tangent Point

* CT	Customer Test	
* CT	Cut Throat	
* CT	Cyber Terrorism	
* CT	Cycle Time	

Note: We have 164 other definitions for CT in our Acronym Attic

new search | suggest new definition

Search for CT in Online Dictionary Encyclopedia

<< Previous	Abbreviation Database Surfer		Next >>
CSYP	CSZ	CT&E	CT-CTL
CSYS	CSZB	CT-1	CT-HRP
CSYSA	CSZC	CT-2	CT-O
CSYT	CSZM	CT-A	CT-ORH
CSYV	CSZP	CT-B	CT-RCFM

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What does **MRI** stand for?

Your abbreviation search returned 57 meanings

Category Filters > | All definitions (57) | Information Technology (6) | Military & Government (12) | Science & Medicine (19) | Organizations, Schools, etc. (18) | Business & Finance (18) | Slang, Chat & Pop culture (0)

sort results: alphabetical | **rank** ?

Rank	Abbr.	Meaning
*	MRI	Machine Readable Information
*	MRI	Machine Readable Instruction
*	MRI	Magnetic Resonance Imaging
*	MRI	Magnetorotational Instability (physics)
*	MRI	Magnum Research Incorporated
*	MRI	Mail Routing Instruction (US DoD)
*	MRI	Maintenance Requirements - Instruments
*	MRI	Major Research Initiative
*	MRI	Major Research Instrumentation Program (National Science Foundation)
*	MRI	Management Recruiters International
*	MRI	Management Reports International
*	MRI	Managing Retirement Income (class & conference)
*	MRI	Manchester Royal Infirmary
*	MRI	Marginal Reliability Importance
*	MRI	Market Research Indonesia
*	MRI	Market Research, Inc. (New York)
*	MRI	Maryland Rock Industries, Inc.
*	MRI	Master Record Index
*	MRI	Material Receipt Inspection
*	MRI	Material Requirement Internal
*	MRI	Material Research Institute (Pennsylvania State University)
*	MRI	Mathematics Research Institute (various locations)
*	MRI	Matz's Ruby Interpreter (computer programming)
*	MRI	Mauritius
*	MRI	Max Rubner-Institut (German research institute)
*	MRI	Mean Recurrence Interval (engineering measurement)
*	MRI	Measurement Recording Instrument (Hale Propeller, LLC)
*	MRI	Mediamark Research Intelligence
*	MRI	Mediamark Research, Inc.
*	MRI	Medical Records Institute
*	MRI	Medical Reengineering Initiative
*	MRI	Medical Research Institute (dietary supplements; San Francisco, CA)
*	MRI	Medical Resources, Inc. (various locations)
*	MRI	Medium Resolution Instrument
*	MRI	Member of the Royal Institution (of Great Britain; London)

Request for Reconsideration of Final Action
Attachment G

* MRI	Metallurgy Research Institute (Zimbabwe)	
* MRI	Meteorological Research Institute	
* MRI	Mexican Restaurants, Inc. (Houston, TX)	
* MRI	Michigan Retail Index	
* MRI	Midwest Research Institute	
* MRI	Migrants' Rights International (Switzerland)	
* MRI	MILSTRIP Routing Identifier	
* MRI	Mineral Resources International (Ogden, UT)	
* MRI	Ministry of Research and Innovation (Canada)	
* MRI	Mission Readiness Inspection (USAF)	
* MRI	Missouri River Institute	
* MRI	Mitsubishi Research Institute (Japan)	
* MRI	Mixed Reality Interface	
* MRI	Miyabi Research Institute (Japan)	
* MRI	MODERATE RISK OF ISOLATION	
* MRI	Molecular Research Institute (est. 1979; California)	
* MRI	Montgomery Research, Inc. (San Francisco, CA)	
* MRI	Moores Rowland International (accounting; Taiwan)	
* MRI	Morning Room Inspection	
* MRI	Morrison Research Initiative	
* MRI	Multi-Resolution Integration (algorithm)	
* MRI	Myers Research Institute	

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