CT SCANNER BUYERS GUIDE

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Computer Tomography Scanner Buyers Guide Book

Amber Diagnostics Inc. created the CT Scanner Buyers Guide Book to help you understand and address common concerns before making an investment in purchasing a CT system. With over twenty years in the medical imaging equipment industry, we have applied our knowledge, research, and experience to compile general information in regards to CT scanners. Of course, we are always here to answer any questions you have along the way! Our goal is to ensure you have a convenient reference at hand, giving you the wisdom and confidence to go forth in purchasing medical equipment that will be an ideal fit for your practice and your budget.

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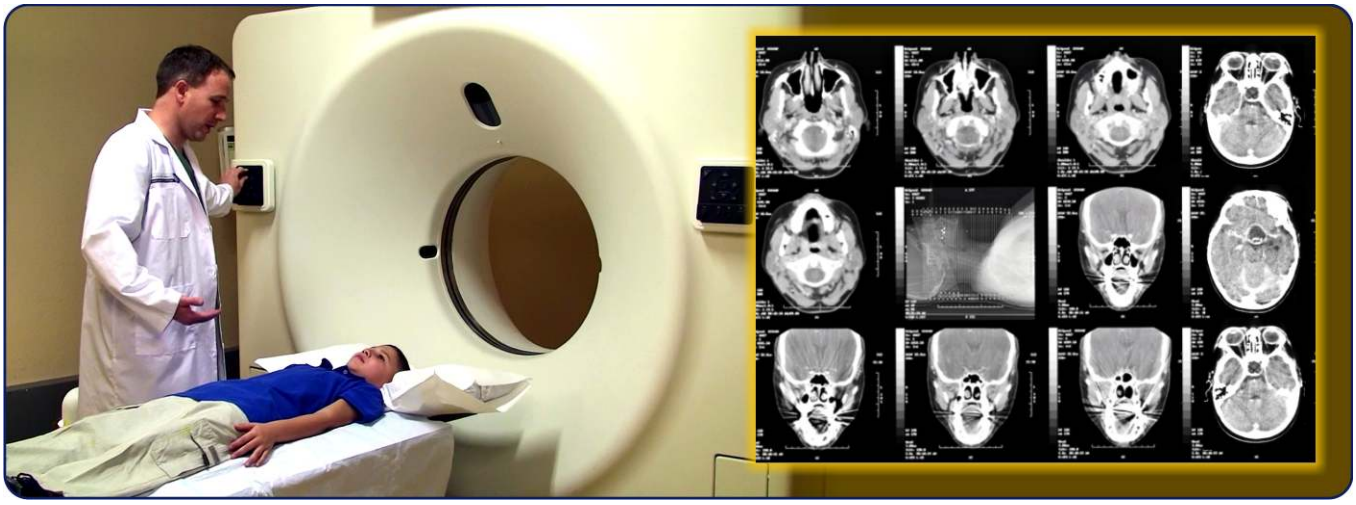


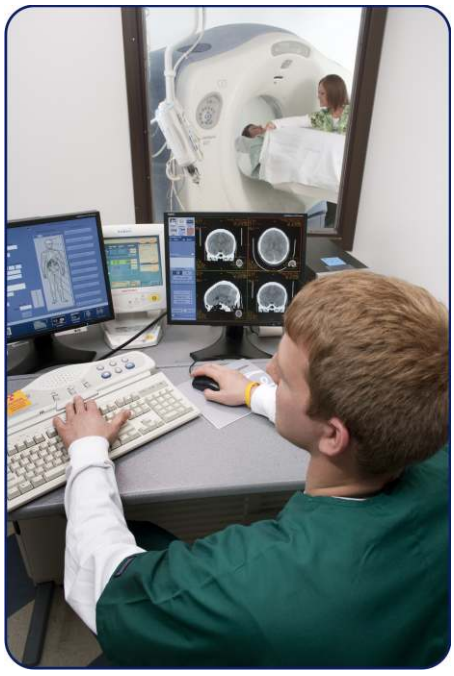
CT Scanner Overview

Introduced in the early 1970s, the computed tomography (CT) procedure advanced rapidly and has become the imaging exam of choice. The CT scan allows for thin cross-sectional views of body organs and tissues, using non-invasive radiographic techniques. Since the computerized image is so sharp, focused, and three-dimensional, many tissues can be better distinguished via CT scans than on standard x-rays.

CT scans, also known as computerized axial tomography or CAT scans, are done through the use of a 360-degree x-ray beam and computerized production of images. They can utilize a number of imaged slices to reconstruct the tomographic plane of the patient. These images are then used for diagnostic purposes.

CT applications include detecting a wide range of abnormalities or diseases in any part of the body such as cancer, trauma, infection, inflammation, calcium scoring, pneumonia, tuberculosis, angiography, stroke, bone fracture, sinusitis, spinal column damage, and much more.

Sinus studies. The sensitivity of the CT allows for pinpointing areas of chronic sinus infection, and is useful for planning prior to functional endoscopic sinus surgery. The CT scan can also show details of sinusitis; the extent and location of tiny fractures of the sinus and nasal bones; and evaluate trauma or disease of the sphenoid bone.

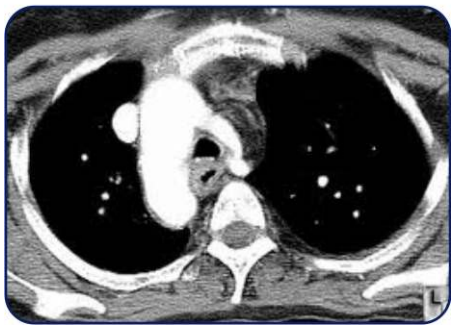


Brain studies. CT brain scans can detect different types of tumors, strokes, or other lesions in the brain area such as hematomas (collections of blood that have escaped from the vessels). Congenital abnormalities in children, such as hydrocephalus, may also be confirmed with a CT.

Body scans. CT body scan (from the chin to below the hips) can identify abnormal body structures and organs such as tumors, cysts, fractures, and other damages. Throughout the body, a CT scan may be used to observe abdominal organs, such as the liver, kidneys, adrenal glands, spleen, pancreas, and lymph nodes.

Aorta scans. CT scans can focus on the thoracic or abdominal sections of the aorta to locate aneurysms and other possible aortic diseases. Aorta scans provide the ability to visualize and measure the thickness of the artery, which is very helpful in diagnosing aortic aneurysms, aortic clots, or aortic rupture.

Chest scans. CT scans of the chest are useful in distinguishing tumors and in detailing accumulation of fluid in chest infections. Chest CT studies can also identify further problems in the heart and lungs.



Virtual endoscopy. Virtual endoscopy is a new technique that uses spiral CT for doctors to see inside organs and other structures without surgery or special instruments. One type of virtual endoscopy, known as CT colonography or virtual colonoscopy, is under study as a screening technique for colon cancer.

The CT Scan Procedure
Computed tomography scans do not cause any pain. During a CT scan, a patient is asked to lie very still on a narrow table that slides into the center of the scanner, called the gantry.

They may even be asked to hold their breath for a few seconds, to prevent blurring of the pictures. CT scans take anywhere from 15 minutes to 1 hour to complete, and the length of the procedure depends on the size of the area being x-rayed.

Some patients may be concerned with claustrophobia, but the width of the gantry is wide enough to usually prevent feelings of claustrophobia. Aftercare is generally not required following a CT scan. The technologist will continue to keep an eye on the patient for possible adverse contrast reactions immediately following the exam.

Contrast Agents: Contrast agents, or “dyes”, are often used in CT exams to demonstrate certain anatomic details that, otherwise, may not be visible. If contrast agents are used in the CT exam, these will be administered (by mouth, injected into a vein, by enema, or given in all three ways) several minutes before the study begins.

The CT Image: CT scans allow for a more three-dimensional effect. Clear-cut sections of the body can be located and imaged as cross-sectional views, and various densities of tissue can be easily distinguished. Standard findings on a CT exam show bone, the densest tissue, as white areas. Tissues and fluid will show as various shades of gray, and fat will appear dark gray or black. The radiologist can determine if tissues and organs appear normal by the different gradations of the gray scale. Radiologists can also differentiate among types of tumors throughout the body by viewing details of their makeup.

Preparing for the CT Scan

Be sure to remind your patients of these simple steps prior to their scheduled CT scan:

- Wear comfortable, loose-fitting clothing to the exam. (Hospital gowns may be provided during the scan.)

- Metal objects including jewelry, eyeglasses, dentures and hair accessories should be left at home or removed prior to exam. Hearing aids and removable dental work may also need to be removed.

- If contrast material will be used during the exam, patients may be asked to avoid eating or drinking anything four to six hours prior to the scan.

- Be sure to inform the physician of all medications or about any allergies, especially to contrast materials (such as iodine or even shellfish). Bring a list of current medications (prescriptions, over the counter medications, and vitamins.)

- Inform the doctor of any recent illnesses or medical conditions, or history of heart disease, asthma, diabetes, kidney disease, or thyroid problems. Any of these conditions may increase the risk of an unusual adverse effect.

- Women should always inform their physician or technologist if there is any possibility that they are pregnant. Pregnant women or those who could possibly be pregnant should not have a CT scan unless the diagnostic benefits outweigh the risks.

Risks

The most common concern with CT scans is the radiation exposure. It is true that the radiation exposure from a CT scan can be higher than from a regular x-ray.

However, not having the procedure can be more risky than having it. People considering a CT scan must weigh the risks and benefits. This will be discussed more in depth later in this book.

Types of CT Scanners

The CT scanner has been referred to as one of the most important advances in radiology since the x-ray. The introduction of CT scanning, particularly the new spiral (or helical) CT, has helped cut down the need for invasive procedures. During a helical CT, the x-ray machine rotates continuously around the body, following a spiral path to make cross-sectional pictures of the body, whereas the traditional CT allows the technologist to take slices one after another at very small and precise intervals. Major benefits of the spiral CT include its ability to create 3-D images of areas inside the body; its ability to better detect small abnormalities; and its rapid scan time, which means less time for patients to lie still.

There are also wide-bore CT scanners that come with larger gantry openings and maximum field of view in comparison to conventional scanners. These are basically ideal for oncology exams, and can also be practical for scanning bariatric patients.

Which Slice Would You Like?

The decision to purchase a multi-slice CT involves sensible considerations such as equipment costs, demographics, and whether it fits in with the overall budget. You will need to decide on the number of slices and workflow features you need. Equipment sellers (such as Amber) should be able to review the capabilities of different machines, and help make suggestions based on your needs.

Single slice scanners are capable of acquiring one image per gantry rotation. A scanner with more slices allows faster acquisition; for instance, a multi-slice would make it easier to examine unruly children or weak elderly patients that can't lie still for too long. While multi-slice scanners have become the industry norm, the single slice machines are still a useful component, and should continue to be around for quite some time.

The ideal slice count depends on the types of services or exams you tend to provide, which is also based on the demographics of your target patients. Multi-slice comes in 4, 6, 8, 16, 32, 40, and 64 slice configurations. Additional slices enhance diagnostic capabilities and broaden the range of applications, especially if the facility will be performing cardiac studies.

2, 4, 6 or 8-slice CT systems are all whole-body scanners capable of scan routine 0.8 to 0.5-second full 360-degree rotation scans, while acquiring multiple slices in a single rotation. These models are perfect for mid-to-high volume locations and will provide fast scanning and excellent image quality.

16-slice system. 16-slice systems can perform a wide variety of sophisticated and complex imaging procedures. It provides full organ coverage with high resolution imaging, but is not considered adequate for detailed cardiac analysis such as coronary vessel analysis.

32 to 40 slice scanners. These scanners generally feature shorter examination times than the 16-slice, with reduced likelihood of motion artifacts.

64-slice system. A 64-slice scanner is said to have significantly improved CT Angiography (CTA), and is particularly recommended for cardiac studies. The speed and sensitivity of these scanners allow physicians to see how well the heart is contracting, to view the walls of arteries for plaque formation, and to observe the tiniest of vessels and arterial branches. They can produce exceptionally sharp images of the finest details, and significantly reduce scan time.

Scanners with the capability of acquiring more than 64 slices per rotation are also available on the market. These are specialist systems focused primarily towards cardiac exams.

Additional Features to Consider

Now remember, when considering which scanner to purchase, not only is it important to consider the number of data slices, but also to take into account the length of coverage in one rotation. The rotation time of the tube and the detectors surrounding the patient (gantry rotation time) has a direct effect on overall scan time.

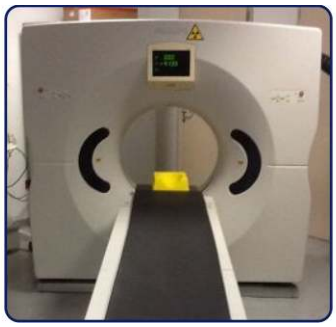
Although most exams do not require the smallest slice width, CT scanning systems with thinner (and more) slices in one rotation, can handle the more complex exams and diverse patient populations. Scanners are able to achieve rotation times of less than 0.3 seconds, but these fast rotations are best reserved for studies such as cardiac scanning (to minimize image artifacts caused by heart motion).

0.5 second rotations are usually more adequate for general body scanning, while 1 second rotation times are ample for head scanning.

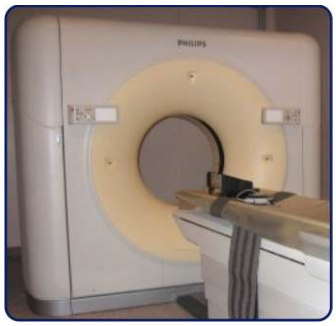
CT systems may also differ based on the speed of image reconstruction. Acquiring more slices is not beneficial if patient throughput is delayed by slow image reconstruction. But buying a high specification computer is only worth it if it will be well-utilized.

Finally, think about how images will be manipulated, interpreted and managed. Hospitals may choose to have advanced 3D CT computer applications for manipulating and/or reading. Additionally, radiologists should decide on a method of storage for large data sets. Regardless of the interpreting method, a hospital may continue with hard copy archiving, implement an intermediate electronic data storage solution, or may move to the full PACS electronic workflow (which

The charts below are designed to serve as an example of how single and multi-slice CT systems on the market compare to one another. (Of course there are so many more to choose from, which is what we are here to help you with!) Whether you are looking to purchase single-slice, multi-slice, or Mobile CT scan systems, Amber has the resources and knowledge to help you select your perfect system!

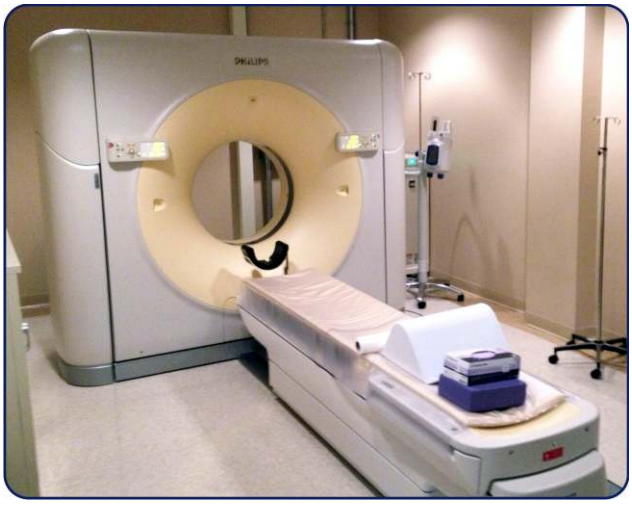



CT Model	> GE ZX/i	> Philips Secura	> Siemens Emotion	> Toshiba Asteion VR
>> SCANNER GANTRY				
Aperture (cm)	70	72	70	72
Maximum scan field of view (cm)	50	51	50	50
Nominal slice widths (mm)	1, 2, 3, 5, 7, 10	1, 2, 3, 5, 7, 10	1, 2, 3, 5, 8, 10	1, 2, 3, 5, 7, 10 (0.8 optional)
>> TUBE & GENERATOR				
Generator power rating (kW)	53	60	40	48
Anode heat capacity (MHU)	6.3	7.7	3	4 (nominal)
>> SCANNING				
Scan times (sec) * partial scans	0.46*, 0.7, 1, 1.5, 2, 3	0.45*, 0.7, 1, 1.4, 2	0.5*, 0.8, 1, 1.5	0.5*, 0.75, 1, 1.5, 2, 3
>> DETECTION SYSTEM				
Detector type	Solid state (Lumex)	Solid state (ClearView™)	Solid state (Ultra Fast Ceramic)	Solid state
>> IMAGE RECONSTRUCTION				
Reconstruction matrix	512 x 512	512 x 512	512 x 512	512 x 512



CT Scanner Model	> Brilliance 16-slice	> Aquilion 16
Company	Philips Healthcare	Toshiba
>> GANTRY		
Detectors, type	Solid-state GOS	Solid-state Gd(2)O(2)S
Detector width	0.75 mm	32 mm
# of rows	16	40
Reconstructed slice width options (mm)	0.6 - 12	0.5, 1, 2, 3, 4, 5, 8
Elements per row	672	896
# of detection elements	16,128	14,336 active
Rotation times, sec., 360°	0.5, 0.75, 1, 1.5, 2; 0.4	0.4, 0.5, 0.6, 0.75, 1, 1.5
>>X-RAY TUBE		
Heat storage, HU	8 (MRC technology)	7.5 MHU
Tube focal spot (mm)	Small 0.5 x 1, large 1 x 1	1.6x1.4, 0.9x0.8 (IEC standard)
>>X-RAY GENERATOR		
kW output	60	60
>>IMAGE RECONSTRUCTION		
Computer CPU	Intel, Windows OS	Dual Intel Xeon
Scan FOVs	Up to 50	Up to 50
Reconstruction matrices	512x512; 768x768; 1024x1024	512 X 512
Reconstruction time, sec	N/S	Up to 12 frames/s
Per slice, sec	Up to 20ips w/ 3-D cone beam	0.035
For localization scan, sec	N/S	Real time
>>RADIATION DOSE		
Dose-modulation technique	DoseRight	YES

CT Scanner Model	> LightSpeed VCT Select	> Brilliance 64
Company	GE Healthcare	Philips Healthcare
>> GANTRY		
Detectors, type	HiLight ceramic matrix 3	Solid-state GOS with BIP
Detector width	40 mm	40 mm
# of rows	64	64
Reconstructed slice width options (mm)	0.625, 1.25, 2.5, 3.75, 5	0.5-12.5 axial; 0.55-7.5 spiral
Elements per row	912	672
# of detection elements	58,368	43,008
Rotation times, sec., 360°	0.35, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 2	0.4, 0.5, 0.75, 1, 1.5, 2
>>X-RAY TUBE		
Heat storage, HU	8,000,000	MRC 8 MHU
Tube focal spot (mm)	0.7 x 0.6 & 0.9 x 0.11	Small 0.5 x 1 ; Large 1 x 1
>>X-RAY GENERATOR		
kW output	100	60
>>IMAGE RECONSTRUCTION		
Computer CPU	Open architecture (LINUX)	Windows XP Dell Precision
Scan FOVs (cm)	25, 50	50, 25
Reconstruction matrices	512 x 512	5, 122; 7, 682; 10, 242
Reconstruction time, sec	Up to 6 ips (16 option)	Up to 33 ips
Per slice, sec	As fast as 0.167 (0.063 option)	Up to 33 ips
For localization scan, sec	Real time	Up to 18 sec for 175 cm
>>RADIATION DOSE		
Dose-modulation technique	3-D	Angular & Longitudinal (Z-DOM)



Economic Considerations & Costs

As costs of CT scanners decline rapidly, making a move towards purchasing an advanced multi-slice CT is becoming easier these days. In fact, an advanced multi-slice unit is priced less than a single-slice CT scanner was years ago. However, even though the price of multi-slice scanners has been dropping, associated costs may be higher given the complexity of these machines.

So it is still crucial to justify whether your facility can afford the machine, and if it will be utilized properly. Obviously, low-volume facilities will not benefit much from higher slice counts.

While declaring a particular price on CT scanners is too broad of a topic, do understand that brand new CT equipment can cost you up to one million dollars. Of course buying used equipment will cut costs significantly! The more slices you need for your practice, the bigger investment you will need to make. Brands such as Siemens and Philips will cost less than a Toshiba and GE. Also, water cooled scanners are generally less expensive than air cooled scanners.

Higher costs for equipment can be counterbalanced by the profit made through the machine. With multi-slice CT equipment, hospitals can conduct a broader range of examinations, exams can be performed more quickly, and more procedures can be performed in a single day (while maintaining the same level of staff and other fixed costs). Faster, flexible services can potentially attract more patients to keep your equipment in full use. Essentially, the increase in patient volume can help with your return on investment.

Buying Used Medical Equipment

Buying used or refurbished CT scanners is certainly a cost-effective strategy that can get the same job done on patients for a lower cost, than when buying new equipment.

Remember, just because a piece of equipment is labeled as “used” does not make it less effective or less functional.

For any reason, whether it is a surplus of machines or a decline in business, a medical company may decide to sell equipment that is perfectly functional. Even if the machine has barely been touched, it is no longer considered new, and becomes secondary.

This also means a very good piece of equipment is now on the market for a low price.

As with any investment (new, used or refurbished), you always want to buy with a trusted source (like Amber) that guarantees quality.

Also, know exactly what's included in the terms; get a copy from your provider listing the refurbishments and the coverage of the warranty (if applicable).

As long as you are working with a reliable seller, the benefits will certainly outweigh the financial risks of buying used medical equipment.

Don't be afraid to ask any questions. If your seller is well-experienced and knowledgeable, they will have no problem in answering your questions or directing you to those who will know. If you are not ready to buy, there are rental options available as well.

Refurbished & Used CT Scanners for sale by Amber Diagnostics.
Our professional Sales Team is ready to help you every step of the way through the CT purchase process. We offer complete CT buying, planning, shipping, installation and technical service. Whether you are looking to purchase single-slice, multi-slice, or Mobile CT scan systems, Amber has the resources and experience to get the job done right.

All Computed Tomography systems can be custom refurbished to meet all of your specific financial and technical requirements.

Rental Solutions

Amber Diagnostics offers mid and long-term CT scanner rental services with turnkey service and technical support for hospitals, clinics, urgent cares and physician offices.

Benefits of Renting a CT with Amber:

- Easy, flexible terms
- Exceptional customer service
- Advanced imaging technology
  (allows for increased throughput and patient comfort)
- Experienced technical support
- Wide variety of equipment platforms
- Current software upgrades and imaging accessories

Renting CT equipment is an ideal option for those who are unsure of patient volume; need mobile imaging for events; or even if facilities are experiencing equipment downtime. We will provide high quality medical equipment to meet the needs of providing continuous patient care while maintaining your imaging revenue.

A Brief Look at Reimbursements

Reimbursements can also play a role in getting your return on investment, but keep in mind that reimbursement figures differ based on insurance carrier and site of care. As for the Centers for Medicare & Medicaid Services (CMS), the codes have changed for abdomen and pelvis CT scans performed together, cutting the reimbursement in half for these new combined-code services.

For example, each time these scans are run together on the same patient, for the same reason, and on the same service date, you could lose hundreds of dollars in reimbursements, regardless of whether the test requires a contrast agent. Despite the fact that a multitude of studies indicates that medical imaging exams are directly linked to greater life expectancy, declines in mortality rates, and are generally safer and less expensive than invasive procedures, cuts to funding for medical imaging scans in the Medicare fee schedule are still in the works.

As reimbursement rates vary from state to state, it is beneficial to understand the rules and regulations of the particular site your practice is located in. This will better educate and prepare you for any impact this will have on your services.

Tips for Purchasing A CT Scanner

As with any investment you make, you want to do your research and homework beforehand. Be prepared to ask all the appropriate questions, and have answers ready for the seller about what you are looking for, your demographics, and especially your budget.

Below are some tips to help you out prior to purchasing your system.

- Before buying a CT scanning system, facilities must evaluate patient population, clinical needs, and desired throughput.
- Be sure you know what type of CT scanner your facility requires. Amber's professional sales team can also help you determine the right CT scanner for your requirements.
- Remember, multi-slice CT scanning systems can handle more complex exams and more varied patient populations. On average a 16-slice CT system can adequately perform most routine clinical exams.
- Computer Tomography systems may also be different in the speed of image reconstruction, so choosing the right hardware and software configurations is key to optimizing patient throughput.
- Buyers should also consider the systems cycle time, spatial resolution, data-storage features, and helical scanning protocols when comparing CT models & manufacturers.
- Be sure to cover all the potential safety measures in early design considerations before the purchase of CT systems, because they raise the cost of construction.
- Buyers should always ask about the length of warranties, and which services and parts are covered in the warranty. You want to make certain the warranty covers enough for long term success.
- To really understand its functionality and compatibility to the specific facility, customers are encouraged to examine CT scanner models they are considering as it is operating.
- Site planning & room construction woes? Not only does it require careful planning, but speculation from different individuals can mean constant changes, delayed implementations, and ultimately extra costs. To mitigate these hassles, ask the vendor to provide a carefully designed plan.
- Construction considerations should include power, air conditioning, and OEM installation requirements. A CT system's ability to produce artifact-free images may rely heavily on the electrical power energizing the instrument. Buyers should install surge suppressors and means for automatic disconnection if the power fails.
- Keep in mind that the reliability and lifespan of the CT scanning system can be harmed if adequate air-conditioning for the computer equipment is not provided.

Finally, always choose an experienced supplier whose CT service and training resources are reliable and reputable. **Contracts between buyer and supplier should always be guaranteed in writing.**

SITE PLANNING with CT SCANNERS

Before you close in on that low-priced CT scanner, think about space. Room configurations require careful planning; and you must also prepare for site inspections that can ultimately result in delays and extra costs if not done properly.

To help mitigate these hassles, a carefully designed plan by a qualified professional specifying floor plans, equipment placement, plumbing, power requirements, shielding, and other potential safety measures should be composed for all CT site locations. (Keep in mind, the site planning information in this section is primarily for reference. Local and state requirements; site conditions; and personal preferences may also have a major impact on your final layout).

Computed Tomography systems are typically located in the ER, or a radiology suite. Sometimes they can also be found near cath labs and cardiology suites.

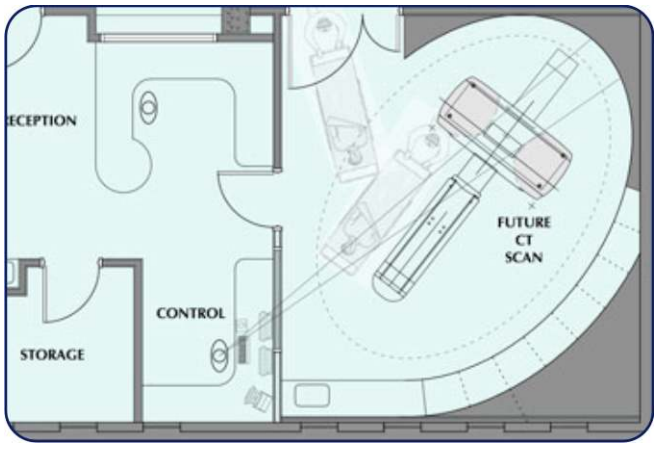
When planning to implement one of these systems in a facility, it's not just about the scan room itself, but also the surroundings. It is necessary to consider uncontrolled areas above and below the facility (especially PET/CT) as well as those on the same level.

Proper planning should be done by a qualified expert that has knowledge of both the clinical operation of an imaging facility and radiation protection design methods for CT scanners.

Shielding Considerations

Ceilings and/or floors with occupied areas above or below CT scan rooms will most likely require shielding. Uncontrolled areas with high occupancy should be located as far from the CT exam room as possible. If uncontrolled areas are located either above or below the PET uptake and imaging rooms, the spacing between floors may need additional shielding. Moreover, floors need to be able to support the additional weight associated with added shielding.

Recommended ceiling heights for exam rooms should be at least 8ft. Typically, it is presumed that the patient is about 1 meter above the floor; and the dose rate is calculated at 0.5 meters above the floor (for rooms on top) and at 1.7 meters above the floor (for rooms below the exam room). Additional shielding is recommended for the nursing stations, the control room, and even vertical barriers.



The patient and the CT scanner itself are considered “sources of radiation” to personnel and the public. Technicians that work directly with the patients are prone to being exposed to the most doses that can stem from patient injections, patient positioning, and unavoidable exposure during imaging. Dose levels in controlled areas are subject to ALARA (As Low As Reasonably Achievable) considerations with the maximum limits said to be 50 mSv per year.

Portable lead shields can be used effectively to shield patients in uptake rooms. Other shielding considerations also include walls generally requiring 0.5 to 1.0 inch lead, doors needing 0.25 to 0.5 inches lead; and viewing windows should generally be leaded glass or acrylic.

Gantry
The gantry can be cooled with chilled water derived from a closed loop connection from either an onsite chilled water supply or the heat exchanger. Chilled water supply must be available onsite in order to supply the heat exchanger that is located inside the gantry.

If the facility will not supply chilled water, a heat exchanger cabinet is needed. The heat exchanger cabinet is then cooled with an outdoor cooling unit. As for an air-cooled gantry – this type of gantry has integrated cooling fans for air intake and air exhaust.

In this instance, room air is used as cooling air, but requires thorough speculation (i.e., room size, thermal insulation, etc.) to ensure the temperature range of air needed for the system will be properly maintained.

Climate Control
The CT exam room is recommended to remain anywhere from 64-75 degrees Fahrenheit (18-24 degrees Celsius). The rest of the CT suite can be set as low as 59 degrees to 75 degrees. It is absolutely imperative that the climate be maintained at all times, even non-operating hours such as weekends, holidays, and overnight.

Heat output in one section of the facility should not change the humidity and temperature in other areas. If this is a cause for concern, the exam room should be individually controlled to meet the temperature requirements.

Power Supply
Construction for a CT imaging center or mobile CT sites need to be performed in compliance with all applicable local and national electric codes (NEC) and regulations.

Power requirements such as supply configuration, line voltage, branch power, and circuit breakers will vary based on factors such system requirements and power consumption (whether it is standard water/water heat exchanger or air cooled system, or has an optional water/air split cooling system).

Do keep in mind that the exam room should contain at least one emergency power off button.

Additional Resources for Radiology Regulations

As you purchase your next CT Scanner, be sure to research radiation protection policies for your particular state. It is a good idea to have a qualified professional evaluate your site and make knowledgeable recommendations.

Below are radiology health department website links for each state, which is a good starting point to attain information and documents. Do note that not all states have the same requirements, and not all states provide specific information on their website.

Alabama – Public Health Radiation Rules
Alaska – Radiological Health
Arizona – Radiation Regulatory Agency
Arkansas – Health Radiation Control
California – Radiologic Health Branch
Colorado – Department of Public Health
Connecticut – Radiation Division
Delaware – Office of Radiation Control
Florida – Bureau of Radiation Control
Georgia – Environmental Protection Division
Hawaii – Indoor and Radiological Health Branch
Idaho – Lab and X-Ray Certification
Illinois – Radiation Safety and X-Ray Registration
Indiana – Medical Radiology Services Program
Iowa – Bureau of Radiological Health
Kansas – Health & Environment-Radiation
Kentucky – Radiation Health Branch
Louisiana – Radiological Services
Maine – Environmental Health-X Ray
Maryland – Radiation Health Program
Massachusetts – Radiation Control Program
Michigan – Radiation Safety
Minnesota – Heath Radiation Control
Mississippi – Radiological Health
Missouri – Radiation Control
Montana – Radiographic Registration
Nebraska – X-Ray Programs
Nevada – Radiation Control Program
New Hampshire – Radiological Health
New Jersey – Radiation Protection
New Mexico – Radiation Control Bureau
New York – Radiological Preparedness
North Carolina – Health Services Radiation
North Dakota – Radiation Control X-Ray
Ohio – Radiological Licensure
Oklahoma – Protective Health X-Ray
Oregon – Radiation Protection
Pennsylvania – Radiation Protection
Rhode Island – Radiation Control
South Carolina – Radiological Health
South Dakota – X-Ray Facility Inspections
Tennessee – Radiological Health
Texas – Radiation Control Program
Utah – Radiation Control X-Ray Section
Vermont – Radiological Health
Virginia – Health X-Ray Machine Program
Washington – Health Radiation
West Virginia – Radiological Health
Wisconsin – Radiation Protection
Wyoming – Department of Health

Radiation in CT Scans

No matter how much we try to avoid it, small doses of radiation seem to be everywhere - from computer monitors, television sets, and airport body scanners to nuclear power plants, smoke detectors, and dental x-rays.

According to the latest estimates, an average person in the U.S. receives an effective dose (the radiation risk averaged over the entire body) of about 3 millisievert (mSv) per year just from natural sources and cosmic radiation.

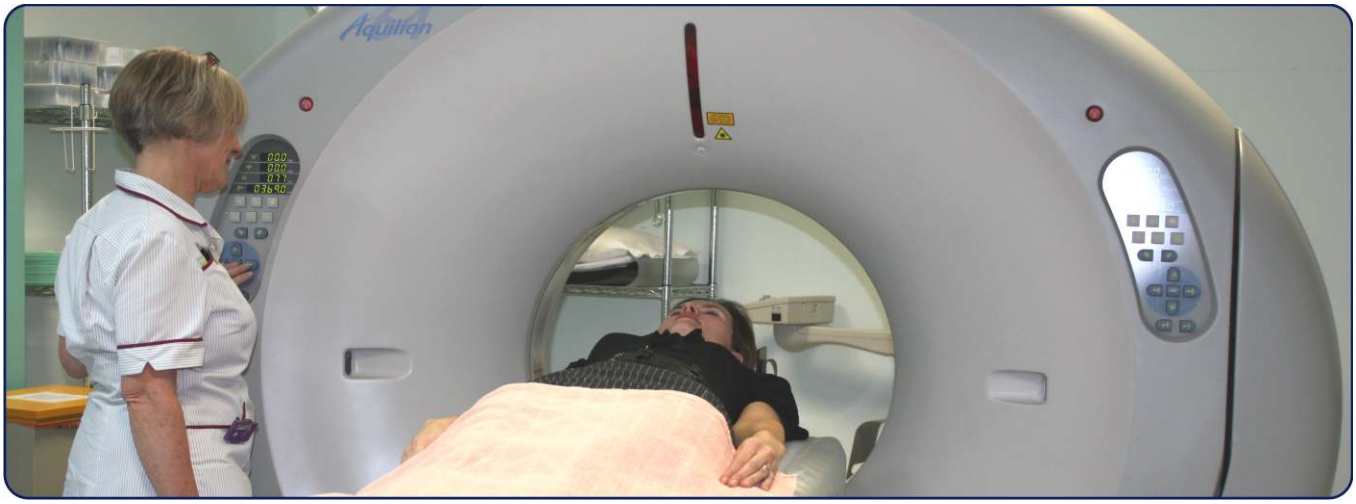
Remember, these natural “background” radiation doses vary widely from one part of the country to another. For example, it is believed that residents living in the plateaus of Colorado or New Mexico receive about 1.5 mSv more per year than those living near sea level.

What Can Patients Do to Help Themselves?

Radiation exposure should be limited whenever possible. Still, when a CT scan is deemed critical, patients should get it.

"Those [radiation] doses just are not really significant at this point compared to the benefit of extending lives, saving lives and improving the quality of lives," says Dr. Ellenbogen of the American College of Radiology, also a radiologist at Southwest Diagnostic Imaging Center in Dallas.

While you can't go back in time to calculate the doses of radiation received in the past, you can certainly take steps moving forward. For example, many are now only considering procedures such as dental X-rays and additional CT scans if there is a cause for concern – not just for preventive reasons anymore.



Radiation Exposure Estimates

The chart below is a comparison of effective radiation dose with background radiation exposure. The effective doses are typical values for an average-sized adult, and the actual dose can vary substantially, based on a person's size for instance.

CT procedure:	Estimated effective radiation dose:	Comparable to natural background radiation for:	* Risk level from examination:
ABDOMINAL REGION:			
Abdomen and Pelvis	10 mSv	3 years	Low
Abdomen and Pelvis, repeated with & without contrast material	20 mSv	7 years	Moderate
Colonography	10 mSv	3 years	Low
CENTRAL NERVOUS SYSTEM:			
Head	2 mSv	8 months	Very Low
Head, repeated with and without contrast material	4 mSv	16 months	Low
Spine	6 mSv	2 years	Low
CHEST:			
Chest	7 mSv	2 years	Low
Chest Low Dose	1.5 mSv	6 months	Very Low
HEART:			
Coronary Computed Tomography Angiography (CTA)	12 mSv	4 years	Low
Cardiac CT for Calcium Scoring	3 mSv	1 year	Low

Risk Level	*Approximate additional risk of fatal cancer from exam (adult):
Negligible:	less than 1 in 1,000,000
Minimal:	1 in 1,000,000 to 1 in 100,000
Very Low:	1 in 100,000 to 1 in 10,000
Low:	1 in 10,000 to 1 in 1000
Moderate:	1 in 1000 to 1 in 500

Chart derived from: http://www.radiologyinfo.org/en/safety/index.cfm?pg=sfty_xray

Remember, there are ways radiation exposure can be fine-tuned to help lower radiation levels. Those who use radiology equipment must be adequately trained in equipment operation and radiation safety principles to protect the patients and personnel that are subject to exposure.

Still Have Questions? We Have Answers.

Though this guide book is intended to inform you on the basic foundations of buying, installing, and safely utilizing a CT system, we understand it will raise particular questions along the way.

Our knowledgeable and attentive team at Amber Diagnostics is here to answer all your questions, address your concerns, and help you find the ideal CT scanner based on your specific business and budget. If the time is not right for you to purchase radiology equipment just yet, give us a call anyway! We will be happy to guide you throughout the process.

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Be sure to subscribe to our Amber Blog as well for tips and trends in the imaging industry.

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CT SCANNER BUYERS GUIDE

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