

Computed Tomography Brain Scan

== References == 6ec3675294

Computed tomography angiography Using contrast injected into the blood vessels, images are created to look for blockages, aneurysms (dilations of walls), dissections (tearing of walls), and stenosis (narrowing of vessels). Computed tomography angiography (also called CT angiography or CTA) is a computed tomography technique used for angiography—the visualization of arteries Computed tomography angiography (also called CT angiography or CTA) is a computed tomography technique used for angiography—the visualization of arteries and veins—throughout the human body. CTA can be used to visualize the vessels of the heart, the aorta and other large blood vessels, the lungs, the kidneys, the head and neck, and the arms and legs. CTA can also be used to localise arterial or venous bleed of the gastrointestinal system 6ec3675294

== Applications == 6ec3675294

CT scan A computed tomography scan (CT scan), formerly known in a more rudimentary state as computed axial tomography scan (CAT scan), is a medical imaging technique A computed tomography scan (CT scan), formerly known in a more rudimentary state as computed axial tomography scan (CAT scan), is a medical imaging technique used to obtain detailed internal images of the body. The personnel that perform CT scans are called radiographers or radiology technologists 6ec3675294

The technique needs delivery of a gamma-emitting radioisotope (a radionuclide) into the patient, normally through injection into the bloodstream. On occasion, the radioisotope is a simple soluble dissolved ion, such as an isotope of gallium(III). Usually, however, a marker radioisotope is attached to a specific ligand to create a radioligand, whose properties bind it to certain types of tissues. This marriage allows the combination of ligand and radiopharmaceutical to be carried and bound to a place of interest in the body, where the ligand concentration is seen by a gamma camera. 6ec3675294 == Medical uses == 6ec3675294 PET is a common imaging technique, a medical scintillography technique used in nuclear medicine. A radiopharmaceutical—a radioisotope attached to a drug—is injected into the body as a tracer. When the radiopharmaceutical undergoes beta plus decay, a positron is emitted, and when the positron interacts with an ordinary electron, the two particles annihilate and two gamma rays are emitted in opposite directions. These gamma rays are detected by two gamma cameras to form a three-dimensional image. 6ec3675294 PET scanners can incorporate a computed tomography scanner (CT) and are known as PET-CT scanners. PET scan images can be reconstructed using a CT scan performed using one scanner during the same session. 6ec3675294 CTA can be used to examine blood vessels in many key areas of the body including the brain, kidneys, pelvis, and the lungs. 6ec3675294 == Principles == 6ec3675294 CT scanners use a rotating X-ray tube and a row of detectors placed in a gantry to measure X-ray attenuations by different tissues inside the body. The multiple X-ray measurements taken from different angles are then processed on a computer using tomographic reconstruction algorithms to produce tomographic (cross-sectional) images (virtual "slices") of a body. CT scans can be used in patients with metallic implants or pacemakers, for whom magnetic resonance imaging (MRI) is contraindicated. 6ec3675294 == Uses == 6ec3675294

Single-photon emission computed tomography Single-photon emission computed tomography (SPECT, or less commonly, SPET) is a nuclear medicine tomographic imaging technique using gamma rays. It is very similar to conventional nuclear medicine planar imaging using a gamma camera (that is, scintigraphy), but is able to provide true 3D information. This information is typically presented as cross-sectional slices through the patient, but can be freely reformatted or manipulated as required. It is Single-photon emission computed tomography (SPECT, or less commonly, SPET) is a nuclear medicine tomographic imaging technique using gamma rays 6ec3675294

Perfusion scanning 1097/00004728-197910000-00013 Perfusion is the passage of fluid through the lymphatic system or blood vessels to an organ or a tissue. The practice of perfusion scanning is the process by which this perfusion can be observed, recorded and quantified. 3 (5): 641–649. doi:10. Drayer B, Barrett W (1979). "Dynamic computed tomography study of the brain". The term perfusion scanning encompasses a wide range of medical imaging modalities. Journal of Computer Assisted Tomography 6ec3675294

History of computed tomography To overcome this, additional X-ray projections from different angles were needed. The history of X-ray computed tomography (CT) traces back to Wilhelm Conrad Röntgen's discovery of X-ray radiation in 1895 and its rapid adoption in medical The history of X-ray computed tomography (CT) traces back to Wilhelm Conrad Röntgen's discovery of X-ray radiation in 1895 and its rapid adoption in medical diagnostics. The breakthrough finally came in the 1970s with the work of Godfrey Hounsfield, when advancements in computing power and the development of commercial CT scanners made routine diagnostic applications possible. While X-ray radiography achieved tremendous success in the early 1900s, it had a significant limitation: projection-based imaging lacked depth information, which is crucial for many diagnostic tasks. The challenge was both mathematically and experimentally addressed by multiple scientists and engineers working independently across the globe 6ec3675294

Alternative applications of Xe-enhanced CT scans consist of using it as an inhaled contrast agent. This provides radiologists and image scientists the ability to assess [[regional lung ventilation]] which is helpful in the diagnosis of a variety of lung diseases such as COPD, lung fibrosis, pulmonary embolism, and even tumors in a similar fashion to radionuclide-based lung functional imaging techniques. 6ec3675294

Positron emission tomography In clinical practice it is used to diagnose and manage cancer treatment, in cardiology and cardiac surgery, and in neurology and psychiatry. incorporate a computed tomography scanner (CT) and are known as PET-CT scanners. PET scan images can be reconstructed using a CT scan performed using Positron emission tomography (PET) is a functional imaging technique that uses radioactive substances known as radiotracers to visualize and measure changes in metabolic

processes, and in other physiological activities including blood flow, regional chemical composition, and absorption 6ec3675294

== Focal plane tomography == 6ec3675294

Optical coherence tomography OCT uses coherent near-infrared light to obtain micrometer-level depth-resolved images of biological tissue or other scattering media. OCT uses coherent near-infrared Optical coherence tomography (OCT) is a high-resolution imaging technique with most of its applications in medicine and biology. Optical coherence tomography (OCT) is a high-resolution imaging technique with most of its applications in medicine and biology. It uses interferometry techniques to detect the amplitude and time-of-flight of reflected light 6ec3675294

With the ability to ascertain data on the blood flow to vital organs such as the heart and the brain, doctors are able to make quicker and more accurate choices on treatment for patients. Nuclear medicine has been leading perfusion scanning for some time, although the modality has certain pitfalls. It is often dubbed 'unclear medicine' as the scans produced may appear to the untrained eye as just fluffy and irregular patterns. More recent developments in CT and MRI have meant clearer images and solid data, such as graphs depicting blood flow, and blood volume charted over a fixed period of time. 6ec3675294 One of the disadvantages of a PET scanner is its high initial cost and... 6ec3675294

Xenon-enhanced CT scanning This allows the estimation of blood flow to any given brain area based on imaging results. Xenon-enhanced CT scanning is a method of computed tomography (CT scanning) used for neuroimaging in which the subject inhales xenon gas while CT images are made. Xenon acts as a contrast medium and the saturation of brain tissue is proportional to blood flow. The method can be used to assess changes in cerebral blood flow in the period shortly after a traumatic brain injury, or to detect or indicate the location of a stroke 6ec3675294

Neuroimaging is sometimes confused with neuroradiology. Neuroradiology is a medical specialty that uses non-statistical brain imaging in a clinical setting, practiced by radiologists who are medical practitioners. Neuroradiology primarily focuses on recognizing brain lesions, such as vascular diseases, strokes, tumors, and inflammatory diseases. In contrast to neuroimaging, neuroradiology is qualitative (based on subjective impressions and extensive clinical training) but sometimes uses basic quantitative methods. Functional brain imaging techniques, such as functional magnetic resonance imaging (fMRI), are common in neuroimaging but rarely used in neuroradiology. 6ec3675294 Neuroimaging falls into two... 6ec3675294 OCT uses transverse sample scanning of the light beam to obtain two- and three-dimensional images. Short-coherence-length light can be obtained using a superluminescent diode (SLD) with a broad spectral bandwidth or a broadly tunable laser with narrow linewidth. The first demonstration of OCT imaging (in vitro) was published by a team from MIT and Harvard Medical School in a 1991 article in the journal Science. The article introduced the term "OCT" to credit its derivation from optical coherence-domain reflectometry, in which the axial resolution is based on temporal coherence. The first demonstrations of in vivo OCT imaging quickly followed. 6ec3675294 Since its development in the 1970s, CT scanning has proven to be a versatile imaging technique. While CT is most prominently used in medical diagnosis, it can also be used to form images of non-living objects. The 1979 Nobel Prize in Physiology or Medicine was awarded jointly to British electrical engineer Godfrey Hounsfield and South African-American physicist Allan MacLeod Cormack "for the development... 6ec3675294

Computed tomography of the head CT images of the head are used to investigate and diagnose brain injuries and other neurological conditions, as well as other conditions involving the skull or sinuses; it used to guide some brain surgery procedures as well. Computed tomography of the head uses a series of X-rays in a CT scan of the head taken from many different directions; the resulting data is transformed into a series of cross sections of the brain using a computer program. CT scans expose the person getting them to ionizing radiation which has a risk of eventually causing cancer; some people have allergic reactions to contrast agents that are used in some CT procedures 6ec3675294

Neuroimaging Increasingly it is also being used for quantitative research studies of brain disease and psychiatric illness. Neuroimaging is highly multidisciplinary involving neuroscience, computer science, psychology and statistics, and is not a medical specialty. allowed single-photon emission computed tomography (SPECT) and positron emission tomography (PET scan)s of the brain. More or less concurrently, magnetic Neuroimaging is the use of quantitative (computational) techniques to study the structure and function of the central nervous system, developed as an objective way of scientifically studying the healthy human brain in a non-invasive manner 6ec3675294

The first US patents on OCT by the MIT/Harvard group described a time-domain OCT (TD-OCT) system. These patents were licensed by Zeiss and formed the basis of the first generations of OCT... 6ec3675294

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