



Detector technology

Computed tomography (CT) has established itself in modern medicine as an important technology for the rapid detection of diseases. However, CT scans to date show deficits in the diagnosis of certain diseases or cannot be used without hesitation in every patient due to the X-rays or the contrast media containing iodine.

Quantum counting CT scanners currently represent the most innovative technological advance in the field of CT examinations and, with their new detector technology, are expected to eliminate the shortcomings of conventional methods.

The new generation of computer tomographs works on the basis of a quantum-counting detector based on cadmium telluride. The elementary advantage gained from this is that X-rays are no longer converted into visible light but into electrical signals, which means that the energy information is retained. In this way, the informative value of the images can be significantly increased.

Previous detectors, on the other hand, change the X-rays into visible light, which produces an image when it hits a light sensor. The disadvantage of this process is that important energy information of the X-rays is lost in the process, which greatly reduces the sharpness and contrast of the images produced and thus impairs diagnosis.

The new quantum-counting computer tomograph has two X-ray emitters and two detectors, which is why it is also referred to as a dual-source system. In this way, the acquisition time can be reduced while at the same time obtaining more precise images and a greater amount of information. In addition to facilitating and accelerating diagnosis, the additional energy information often avoids time-consuming and cost-intensive additional examinations that are supposed to confirm the diagnosis.

The technology is particularly helpful for images of moving organs such as the heart and lungs. Here, the smallest structures can be assessed without motion blur and the morphology is complemented by functional capabilities, which also enables progress monitoring of diseases.

Another decisive advantage of the technology is the enormous reduction in radiation and the contrast medium required. With a saving of up to 40 percent, high-risk patients now also have access to a computed tomographic examination. The technology is still in the research stage, but it is already being used in hospitals at home and abroad and is showing promising results.

INNOVATIVE TECHNOLOGICAL APPROACHES

- ◆ **Company:**
Siemens Healthineers
- ◆ **Product:**
quantum counting computer tomograph (Naeotom Alpha)
- ◆ **Field of application:**
detection of diseases/ diagnosis / screening
- ◆ **Advantages:**
40% less X-rays and contrast medium

Higher image sharpness and contrast

More usable information

Reduction of time-consuming and cost-intensive additional examinations after conventional CT scan

Nominated for the German Future Prize

In 2021, the quantum-counting computer tomograph from Siemens Healthineers was one of the nominees. The team of Dr. rer. nat. Björn Kreisler, Prof. Dr. rer. nat. Thomas Flohr and Dr. rer. biol. hum. Stefan Ulzheimer competed against two other innovative teams. In the end, the team that worked in depth on the development of an mRNA vaccine against Covid-19 was the winner.

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