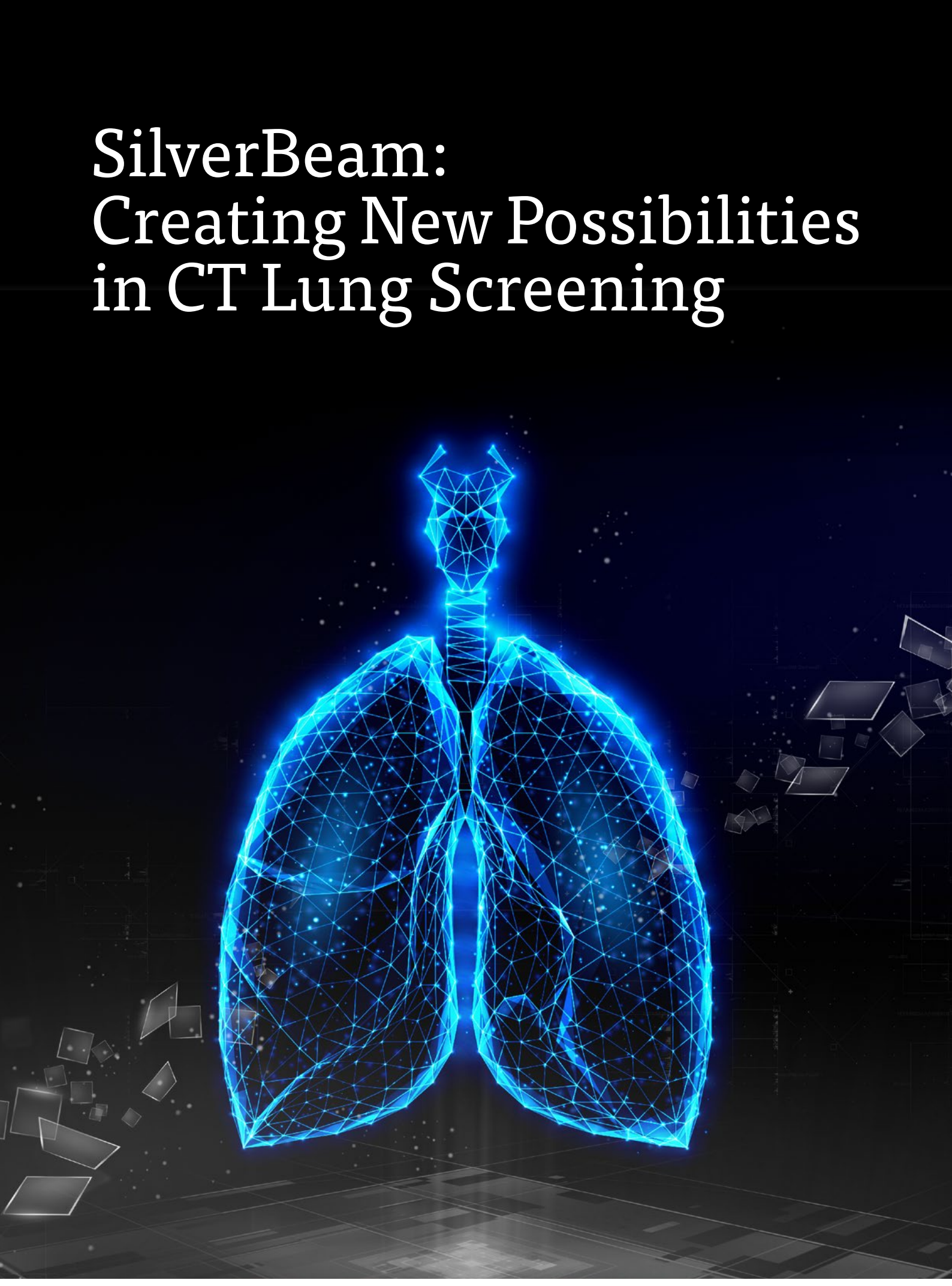
SilverBeam: Creating New Possibilities in CT Lung Screening



Canon Medical introduced SilverBeam, a beam shaping energy filter that delivers AI enhanced, high quality, low noise CT images optimized for lung screening. With continued high demand for chest CT, as well as interest in many countries in establishing national screening programs to detect lung cancer early, the new filter is being welcomed by specialists all over the world. Dr. Marcus Chen, Director of Cardiothoracic Imaging at the National Institutes for Health (NIH), Maryland, US, was involved in the development of SilverBeam. He explained to VISIONS how SilverBeam is a 'game-changer' in ultra-low-dose lung imaging.

SilverBeam Filter works to remove low-energy photons from the beam spectrum, which do not contribute to image quality but do increase dose and scatter. SilverBeam selectively optimizes beam energy.

When combined with Canon Medical's Advanced intelligent Clear IQ Engine (AiCE) technology, this beam-shaping energy filter can harness the power of AI to deliver high resolution and low noise for applications such as lung screening.

"The NIH has been working with Canon Medical on SilverBeam technology since October 2021," said Dr. Chen. "SilverBeam is a filter that is applied to the X-ray spectrum to better visualize the lungs but, at the same time, to reduce the X-ray dose and to work in conjunction with deep-learning reconstruction. So, with SilverBeam, we are better able to see the lung parenchyma."

"The images we can obtain are sharper especially in the soft tissue, as SilverBeam reduces noise. We're now able to see more solid details such as ground-glass opacities, which can otherwise be difficult to visualize, and we can more accurately measure lung nodule sizes," he added.

"Overall, we're able to significantly reduce the radiation dose, which improves patient safety."

Innovative collaboration

NIH has collaborated with Canon Medical for more than a decade towards improving CT technology and image quality across many applications.

"Over the past twelve years, we have had five different Canon Medical CT scanners," Dr. Chen reflected. "In 2009, we invested in the Aquilion ONE, because we felt that the best way to image the heart was to image it in one heartbeat with the Aquilion's wide volume technology. This proved very advantageous. In 2015, we hosted the prototype ultra-high-resolution CT system with four-times the resolution of a normal CT scanner, and slice thickness of 0.25 mm. In 2020, we upgraded to the Aquilion ONE / PRISM Edition, which has spectral imaging."

Game-changer

Designed to work in combination with AiCE, SilverBeam delivers AI enhanced, high quality, low noise CT lung cancer screening images at the radiation dose on the order of a typical chest x-ray exam.

"Overall, I am very excited by the SilverBeam Filter," said Dr. Chen. "It improves image quality and reduces the amount of image noise. What I'm most excited about is how much it's able to reduce the radiation dose, while preserving overall image quality and diagnostic accuracy."

"Now, we are able to offer ultra-low dose chest for lung cancer screening. That's a game-changer!"

Dr. Marcus Chen, Director of Cardiothoracic Imaging at the National Institutes for Health (NIH), Maryland, US .

How important is lung cancer screening?
In 2020, lung cancer was of cancer death worldwide, causing an estimated 1.8 million deaths[1]. Studies have shown that screening with low dose CT for high-risk individuals can help diagnose cancer early when successful treatment is more likely.

A short history of lung cancer screening
Screening people without symptoms for early signs of lung cancer began in the 1950s with chest X-rays to find early lung tumors in groups of men in the 1950s, but due to disappointing results lung cancer screening was put on the backburner.

In 1977, the first CT study scans to look for lung cancer was published[2]. Computing power combined with x-rays meant the lungs could be seen in more detail than before, but the amount of radiation that patients were exposed to in a CT scan was much higher than traditional chest X-rays.

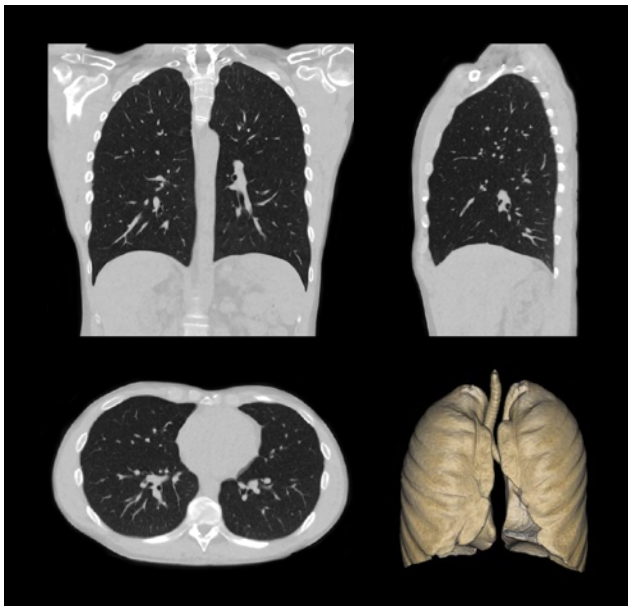
In 1996, researchers showed that newer CT scanners using a lower radiation dose, were better at detecting abnormalities.[3]

In 2002, a large-scale trial - the National Lung Screening Trial (NLST) - was started in the US. It involved more than 50,000 people at high risk for lung cancer, who were screened annually for three years, using either a chest X-ray or the low radiation dose CT scan. The results showed around a 20% reduction in the number of lung cancer deaths in the group monitored with the low dose CT scans compared to X-rays. The results were published in 20114 and one death from lung cancer was avoided for every 330 people screened with low-dose CT compared to an X-ray.

Now, various countries are looking into introducing some form of national screening for lung cancer in high-risk patients.

The dose is reduced by enough to enable specialists to reassure any patients who might be reluctant to have a scan due to concerns about exposure to radiation.

"I have had patients who are reluctant to come in for a chest CT because of the fears of radiation," said Dr. Chen. "However, now with the SilverBeam Filter, that barrier is removed. And now, we are able to offer ultra-low dose chest CT for screening for lung cancer. That's a game-changer!" //

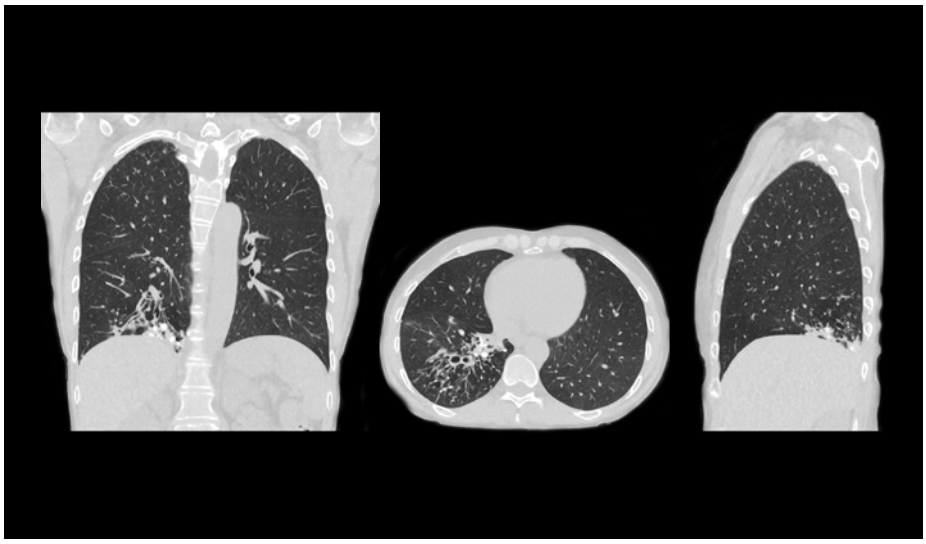


CT Lung acquired with SilverBeam technique, $CTDI_{vol}$ 0.4 / DLP 18.7.

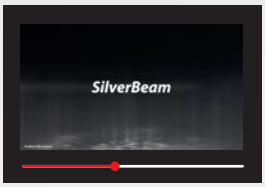
Read more about SilverBeam:
https://eu.medical.canon/products/computed-tomography/aq_one_prism_features-benefits#silverbeam

References

[1] *Insert reference from presentation.*
[2] *https://pubmed.ncbi.nlm.nih.gov/865129/*
[3] *https://pubmed.ncbi.nlm.nih.gov/8939234/*
[4] *https://pubmed.ncbi.nlm.nih.gov/21714641/*



CT Lung acquired with SilverBeam technique, $CTDI_{vol}$ 0.6 / DLP 24.5.



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