

EXPLORER: The World's First Full-body 3D Medical Imaging Scanner

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The first images from the world's first total-body 3D medical imaging scanner were released earlier this month.¹ EXPLORER scanner, developed by UC Davis scientists Simon Cherry and Ramsey Badawi, "is a combined positron emission tomography (PET) and x-ray computed tomography (CT) scanner that can image the entire body at the same time."²

The EXPLORER Scanner

The EXPLORER scanner essentially builds up "a detailed three-dimensional model in less than a minute. Your doctor can then look at cross sections of just your knee or heart, for example, or has the option of zooming out to see all your organs squashed into one image—the 'maximum intensity projection'."³

The scanner is capable of generating movies as well as static models, while exposes patients to as little as a fortieth the radiation of a traditional PET scan.⁴ The technology is expected by the scientists who developed it to have "countless applications, from improving diagnostics to tracking disease progression to researching new drug therapies."⁵

Early images of humans that have been scanned by the EXPLORER were to be shown at the Radiological Society of North America (RSNA) meeting, which ran from November 25th through November 30, 2018 in Chicago, IL. A sample image was also uploaded YouTube earlier in the month.⁶

Background and Implications

In a YouTube video posted on the UC Davis Website along with a written news story⁷, a full background story and further details were provided by the scientists behind the development of EXPLORER and by author Dorsey Griffith, who is with UC Davis Health Public Affairs. The following are the key points:

The researchers envisioned creating a full-body medical scanner 13 years ago, with the aim of capturing images quicker, better, or with less radiation than current scanners. Ramsey Bawadi noted that the idea was initially considered 'too grandiose', and it was ridiculed. In spite of skepticism, he and colleague

¹ Griffith, Dorsey. Human Images From World's 1st Total-Body Scanner Unveiled. UC Davis Website – Science & Technology News. November 19, 2018. Available at: <https://www.ucdavis.edu/news/human-images-worlds-first-total-body-scanner-unveiled>. Accessed on November 30, 2018.

² Human Images from the World's First Total-Body Medical Scanner Unveiled. UC Davis Website – Biomedical Engineering Blog. November 19, 2018. Available at: <https://bme.ucdavis.edu/blog/human-images-from-the-worlds-first-total-body-medical-scanner-unveiled/>. Accessed on November 30, 2018.

³ Wood, Charlie. MEGAPIXELS: Doctors can now see everything inside you at once. Popular Science. November 27, 2018. Available at: <https://www.popsci.com/megapixels-total-body-scanner>. Accessed on November 30, 2018.

⁴ *Ibid.*

⁵ Human Images, *op. cit.*

⁶ EXPLORER Total Body PET Scan. Simoncherry Channel – YouTube. November 17, 2018. Available at: <https://youtu.be/thGvKugDPDE>. Accessed on November 30, 2018.

⁷ Human Images, *op. cit.*

After receiving a \$1.5 million grant from the National Cancer Institute in 2011, 'which allowed them to establish a wide-ranging consortium of researchers and other collaborators', Bawadi and Cherry secured a \$15.5 million grant from the National Institutes of Health (NIH) to build a scanner that could be 40 times faster.

It worked. Bawadi noted that they can obtain high level detail images in a minute or less. Similar images would take 'almost half an hour for a regular scan'. The further benefit is that the level of exposure to radiation for such scans has been dramatically reduced. These factors are expected to greatly open up the 'application space' for PET scanning, according to Cherry.

In particular, the scanner may be widely used to study cancer, inflammation, infection, immunological or metabolic disorders, and many other diseases. The scanner is set to begin operating in Sacramento, CA as early as June 2019.

In addition to the involvement of UC Davis and NIH, the scanner was developed in collaboration with United Imaging Healthcare. And, human studies were performed in collaboration with Zhongshan Hospital, located in Shanghai.

This work with Hongcheng Shi, director of nuclear medicine at Zhongshan Hospital is expected to continue as the scope of early human studies on the scanner expands.

Certainly, the size and scope of the work surrounding the EXPLORER stretches well beyond those mentioned here. As noted, the early grant funds helped to establish a wide-ranging consortium, which is known as the EXPLORER Consortium. UC Davis maintains a website with details about the consortium, its members, and regarding all news related to the EXPLORER. To follow news and developments about the EXPLORER and the consortium, be sure to monitor this site: <https://explorer.ucdavis.edu/>