Rx: Radiation

A Computed Tomography (CT) scan has become a key diagnostic tool for a wide variety of diseases and injuries. Some 80 million CT scans are performed each year in the United States, up from 3 million in 1980.

Should patients be concerned that the cumulative radiation exposure from medical imaging examinations could increase their risk of developing cancer? Researchers estimate that at least 2 percent of all future cancers in the United States from will be directly attributable to radiation exposure from CT scans. That’s approximately 29,000 cases of cancer with an estimated 15,000 deaths per year in the US alone.

Fortunately, Redlen Technologies has developed a new generation of high-performance detection and imaging technology that improves the speed and quality of CT images while reducing patient exposure to radiation.

Cadmium Zinc Telluride (CZT) semiconductor radiation detectors, produced by Redlen, have high spatial resolution, low dead space, excellent energy resolution and potentially improved tumor contrast compared with many types of cancer imaging available today. It gives doctors better information for more accurate diagnosis and will in many cases avoid the need for biopsies. Two examples of where this advanced materials technology is being put to use (Nuclear Cardiology and CT Scanning) are discussed below:

Identification of Cardiology Tissue at a Higher Resolution

![Comparison of standard and CZT enabled image processing](image_url)
SPECT Imaging (Breast/Cardiovascular)

Higher sensitivity CZT detectors provided by Redlen are already replacing traditional systems used for Myocardial Perfusion Imaging (MPI), a test that shows how well blood perfuses through the heart muscle. Since 2011, Redlen has been manufacturing CZT wafers for Spectrum Dynamics D-SPECT cardiology camera. In breast imaging, Redlen’s CZT technology gets the physician to a faster, more accurate decision, often without a biopsy. Typically, patients scanned with traditional analog Single Photon Emission Computed Tomography (SPECT) cameras, have radiation doses of 9-11 mSV. CZT technology reduces the median radiation doses to under 3 mSV.

X-Ray/Computed Tomography (CT)

Redlen is partnering with most of the leading global medical imaging companies such as Hitachi Medical Corporation to develop a direct conversion semiconductor x-ray detector module required for new Photon Counting Computed Tomography (PCCT). The new PCCT systems will advance CT imaging with capabilities such as tissue discrimination, higher image resolution, and further radiation dose reduction. Studies have shown that CT radiation dose reductions using CZT is reduced by almost half.

Why isn’t this technology in every machine?

Redlen has commercialized CZT detectors in cardiac and breast cancer imaging. They are working with the majority of the top tier CT companies in the market. It is expected to take a couple more years to fully commercialize and gain approvals for this equipment and then a capital equipment replacement cycle will begin.
Measuring Impact
The radiation produced from one chest CT scan is equivalent to 100 chest x-rays. That has a significant impact when over 80 million CT scans are performed in the United States every year. As Redlen’s CZT detectors are integrated into new SPECT and CT imaging modules, diagnosing diseases such as cancer can be quicker and much more effective. In addition, it can reduce the increased risk of cancer from radiation exposure during these scans. That’s a direct impact on 1.7 million people diagnosed with cancer this year in the United States (2017). CZT-powered diagnostics will improve outcomes and more directly, reduce mortality by radiation each year.

The Future of Imaging
High resolution CZT provides better image quality and tissue detection. This allows for earlier cancer diagnoses resulting in less invasive diagnostics, a huge win for cancer treatment, and a reduced burden on patients and their families. The speed and quality at which CZT-enabled scans can provide diagnostics will allow more patients to access imaging tests, reduce wait times, and avoid biopsies. Finally, the ability to reduce radiation exposure reduces the health risk of diagnostic tests for patients, improving outcomes and reducing mortality.

Pangaea IMPACT Target: Lives Impacted
Lives Impacted is a simple way to quantify the impact of Pangaea’s health-focused portfolio companies. Pangaea targets companies that can have a major impact on patient outcomes while also reducing healthcare costs.