

T-radiation threatens to cut X-rays to the bone.

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AUSTRALIAN researchers are leading the world in developing a safe, new form of radiation called T-rays, which could replace potentially cancerous X-rays in some cases.

Scientists at the University of **Adelaide** and the Royal **Adelaide** Hospital have teamed up with New York's Rensselaer Polytechnic Institute to advance the use of TeraHertz (THz) radiation, or T-rays.

T-rays could be used in medicine, agricultural science, forensic science and food safety, eliminating the need for dangerous X-rays in some fields.

University of **Adelaide** electrical and electronic engineering department lecturer **Derek Abbott** said T-rayresearch was a "hot area", with scientists from Japan, China, Korea and Germany trying to keep up with the Australians and Americans.

"We are the first people in Australia to deal with this technology," said Dr Abbott, who leads the **Adelaide** team.

"It's still in the research area because it's so new. When something's hot off the press, it does take a while to get into commercial things. But it's not far off ... within the next five years."

Dr Abbott said T-rays were first generated in 1991 by American scientists who developed a way to produce the radiation using laser technology.

The THz region of the electromagnetic spectrum lies on the border between microwaves and light (the oppositeend of the spectrum to X-rays), where it had been difficult to generate T-rays either electronically or thermally. Now, T-rays are generated using lasers which pulse at a rate of one thousand trillion pulses per second.

But T-ray images can take up to 10 minutes to produce using current methods, so the **Adelaide** team's first aim is to develop quicker, cheaper ways of generating the images.

T-rays are sensitive to moisture, so they could be used in agriculture to detect the water flow within plants to help manage irrigation.

Dry, non-metallic materials such as plastics, paper and cardboard are transparent to T-rays, so they could beused in the quality control of packaged food.

Their ability to identify materials could see them harnessed in forensic science.

In the medical field, T-ray imaging was limited to the surface of the human body but could be used to estimate the depth of burns, for corneal imaging, dental imaging or to detect early warning signs of skin and scrotal cancer, Dr Abbott said.

"The catch about T-rays as far as medicine is concerned is that it's very sensitive to water, so you can't use T-rays to go right through the body," he said. "It won't totally replace X-rays, but it's a big start to be able to replace X-rays at some levels. The more you can reduce the amount of time you use X-rays, the better."

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