

Colour X-rays of People

Goals:

To use the colour of x-rays so doctors can more easily find out what is wrong with patients.

Background:

- X-rays, like visible light, come in different colours. We have names for the colour of light, such as red, green and blue. For x-rays we use names such as high, medium and low energy.
- As x-rays are directed through a patient some pass through more easily, altering the colour of the x-ray. This is like looking through a stained glass window and seeing reds, greens and blues.
- Current x-ray cameras are like black and white film. Taking a picture of a stained glass window with black and white film shows some of the details, but all the colour information is lost.
- Using a new x-ray camera, called the Medipix detector, we are able to record the colours of the x-rays as they pass through the patient. This colour image reveals much more of what is inside people.



Our Team:

We have scientists with many different skills. We have radiologists and radiographers from the University of Otago, Christchurch, as well as engineers and physicists from the University of Canterbury. The team works closely with scientists from one of Europe's nuclear physics laboratories, CERN, who have developed the Medipix technology.

CERN's particle physics laboratory is the developer of this new x-ray technology.



Method:

We have built a machine named MARS for taking three-dimensional (3D) colour x-rays of small objects. This scanner uses the Medipix detector, along with conventional x-ray equipment, to produce 3D colour pictures. The scanner is now operating within the radiology department of Christchurch Hospital.

The MARS scanner works by taking a series of colour x-ray images from different angles around the object. A computer uses these 2D images to make a 3D image of the object. The 3D colour image includes more information than traditional x-ray images.



The MARS scanner

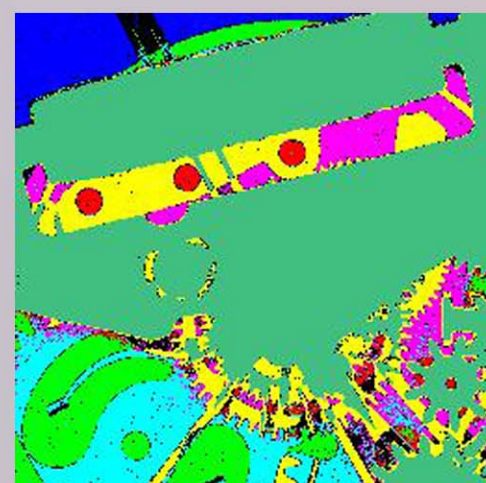
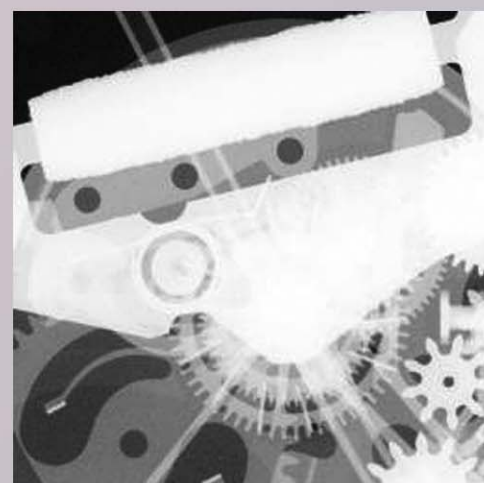


Results:

We have successfully obtained colour 3D images of small objects, including a mouse. Using the colour information we were able to separate bone and "contrast" in the bowel. Contrast is a material doctors put into people before taking x-ray images, to make it easier to see blood vessels, bowel, and cancers.

Using non-colour images, these materials would have looked identical. The colour makes it easier to distinguish between bone and contrast. This will enable doctors to more easily decide what is wrong with patients with diseases such as heart attacks and strokes.

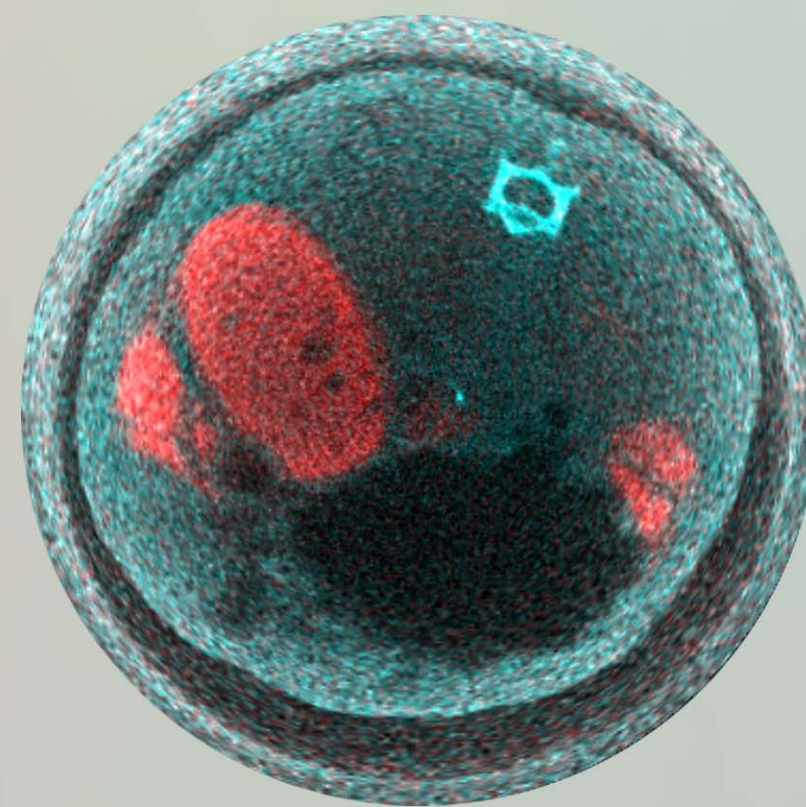
Left: A black and white x-ray of the watch. Centre: colour x-ray showing the different colour of the different parts. Right: Colour used to separate the different parts.



3D image of a mouse's abdomen containing contrast.

Left: A traditional 3D x-ray.

Right: The bone's calcium is a different x-ray colour from the contrast in the bowel.



Conclusion:

- New Zealand science is creating new technology for helping to improve the health and well being of people.
- The x-ray colours will be helpful for diagnosing heart disease, strokes, cancers, and other illnesses.

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