Recent Advances in Biomedical Imaging by SR

Rob Lewis
Centre for Synchrotron Science, Monash University, Melbourne, Victoria, Australia

It has been known for many years that the use of a synchrotron allows X-ray imaging to be performed in ways which exploit different physical principles to conventional X-ray absorption radiography. Two different techniques will be highlighted.
Phase contrast X-ray imaging is sensitive to changes in the refractive index of the medium and provides very significant improvements in image contrast for weakly absorbing soft tissues. The air tissue interface produces perhaps the largest refractive index change in the body and so phase contrast techniques are ideally suited to imaging the lung. Our team has developed quantitative techniques that can identify and locate airway liquid and allow the study of the clearance of liquid from the lungs of small animals at birth. Dynamic studies have been performed using rabbits whilst developmental studies have utilised the Australian marsupials, wallabies and dunnarts. It is envisaged that the work may lead to improved strategies for managing newborn infants, as well as improving the management of other lung diseases in both humans and animals
Scientists have long desired a method for tracking the progress of individual cancer cells in vivo. Whilst methods for tracking single cells still elude us, contrast enhancement using gold nano-particles seems to provide a powerful method for tracking clusters of cells in the body. Results of trial experiments using gold labelled cells in mice will be reported.