



# Canadian Light Source Inc.

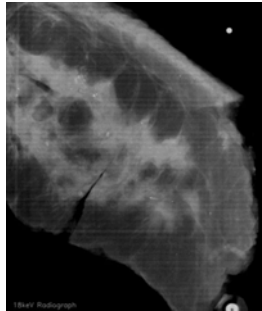
National Synchrotron Science Facility



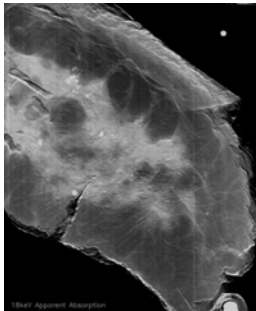
## Applications in Cancer Research

Many different synchrotron beamlines will allow researchers to use new and versatile techniques in experimental cancer research.

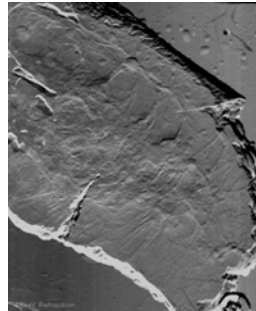
Synchrotron light has the ability to image soft tissues. Superior imaging can lead to earlier and more precise diagnoses. Imaging has applications in all sorts of tumour detection, including mammography (images courtesy of Dr. Dean Chapman, IIT).



Breast tissue imaged using conventional techniques

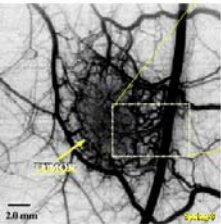


Breast tissue imaged using DEI absorption techniques

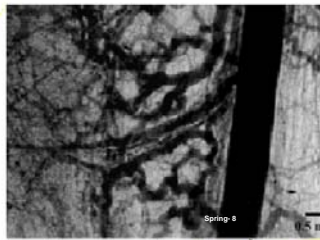


Breast tissue imaged using DEI refraction techniques

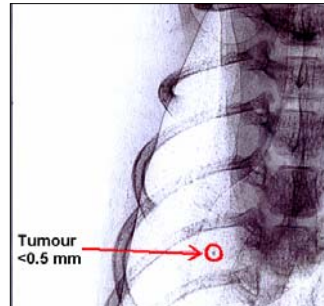
Synchrotron light also allows researchers to see the shape and size of tumours more clearly than conventional methods.



Angiography image of an auricle specimen obtained by a 24 µm pixel size detector

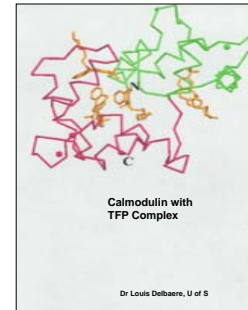
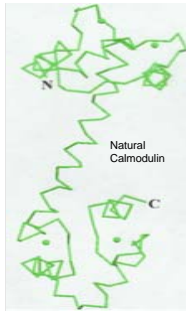


Angiography image of the same auricle specimen obtained using a 6 µm pixel size detector



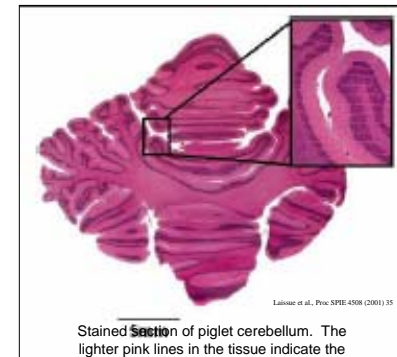
Lung tumour in a rat (image courtesy of of Spring-8)

Synchrotron light allows researchers to examine the structure of proteins via Protein Crystallography. Proteins can often be used to indicate abnormalities in the body. For example, an excess in activity of the calmodulin protein can sometimes indicate the presence of cancerous tissues. Calmodulin is an important protein in DNA synthesis, and thus cell growth.



If researchers can determine the structure of a protein, they are better able to develop drugs which could diminish the effects of the overactive protein. In this case, TFP complex (a synthetic drug) has been attached to calmodulin, changing the structure of the protein and blocking the transport of calcium, which represses the growth of the tumour (<http://www.jbc.org/cgi/reprint/276/11/7797>)

Synchrotron light may also have therapeutic uses. Microbeam Radiation Therapy (MRT) and Computer Tomography (CT) therapy may offer greater precision and effectiveness in eliminating tumours than current radiation therapies, especially in delicate areas, including the brain.



Stained section of piglet cerebellum. The lighter pink lines in the tissue indicate the path of the microbeams. Note that the surrounding tissue appears to be normal.

[www.lightsource.ca](http://www.lightsource.ca)