Growing Compasses for Cancer Treatment

Some bacteria make internal compasses by growing tiny magnetic crystals called magnetosomes. Using the CLS, researchers from McMaster University have been able to “see” the magnetism of magnetosomes inside individual bacterial cells for the first time. This finding illuminates how magnetosomes grow in bacterial cells in response to genetic and environmental factors. Such understanding could be utilized by researchers to genetically manipulate the bacteria to grow magnetosomes that are tailor made for use in new kinds of data storage devices, nanomachines, delivery systems for drug treatments, and for cancer chemotherapy.


Combating Malignant Tumours

Limitations in the ability to detect residual cancer cells from surgically-removed tissues are a major obstacle in fighting malignant tumours. Researchers used the CLS to identify the specific chemical signatures that distinguish tumour and normal tissues at the sub-cellular level. The molecular signatures of tumour tissue were compared against healthy tissue in order to determine differences between the two samples. This will aid in early identification and complete removal of malignant brain tumours.


Cancer-Fighting Nanomaterials

Scientists have developed a way to target brain cancer cells using titanium dioxide nanoparticles bonded to soft biological material. Using a synchrotron, it was found that a bare titanium dioxide nanoparticle bonds with an antibody and attaches itself to brain cancer cells. When exposed to concentrated white light, the titanium dioxide creates free radicals of oxygen that cause the cancer cells to die. Unlike other cancer treatments the antibody targets only cancer cells leaving healthy cells unaffected.


Growing Light on Breast Cancer

Over 23,000 new cases of breast cancer were diagnosed in Canada in 2011. In coming years, small but growing number of cases will be an aggressive form of the disease that strikes women in their late twenties or early thirties, that tends to run in families. A University of Alberta research group is using the CLS to unravel how changes in a gene called BRCA1 lead to breast cancer. The research points to better diagnostic tests and potential treatments for the disease.