Research Update • Le point sur la recherche

Looking into tumours with new imaging technology

Lions Gate Hospital in North Vancouver has acquired Canada's first positron-emission tomography (PET) coincidence camera, whose unique imaging abilities will enable clinicians to study breast cancer and lymphoma. The camera is actually an existing, single-photon emission computed tomography (SPECT) camera that was upgraded at a cost of $275 000 by the Lions Gate Hospital Foundation to allow simultaneous emissions of 2 photons. A dedicated PET scanner costs about $2 million, and Dr. Philip Cohen, division head of nuclear medicine at the hospital, says the 3 available in Canada are all used for neurologic research.

Cohen says the presence of the camera is "quite significant," and he has already been approached by colleagues across the country seeking information about it. While the coincidence PET system is less sensitive than the dedicated scanners, advances in technology may make them comparable within a few years.

The PET scanner uses a radioactive sugar substance, F-18 fluorodeoxyglucose, as the contrast medium. This substance is currently being supplied by the TRIUMF physics program at the University of British Columbia. Because of its extremely short half-life — 90 minutes — the substance is made and shipped by courier on the same day the patient is scheduled for a PET scan. Tumours take up the substance readily, and the resulting 3-dimensional images have contrast superior to those produced by magnetic resonance imaging or conventional computed tomography. The images are also virtually 100% accurate, in contrast to mammograms, which may have high rates of false-positive and -negative findings. Mammograms are still the procedure of choice, however, for detecting primary breast cancer lesions, says Cohen. PET scanning is particularly valuable for monitoring a tumour's response to chemotherapy and detecting recurrence. In the US, Cohen says, every type of tumour except prostate cancer has been scanned successfully.

Cohen has already conducted PET scanning in 6 patients and this winter he plans to add 50 women with stage IV breast cancer, as well as patients with lymphoma. He plans to conduct scanning in each of the patients 4 times over about 2 years. "We should be able to tell them after a few weeks of chemotherapy how they are responding," he says. "That's the theory." — © *Heather Kent*

In the news . . .

Enzyme explains celiac disease

A new model for celiac disease has resulted from studies of an enzyme called transglutaminase (*Nature Med* 1998;4[6]). Celiac disease causes intestinal inflammation upon exposure to wheat gliadin. Transglutaminase accepts gliadin as a substrate. Scientists have found that the enzyme has an effect on T-cell recognition of gliadin, leading to an autoimmune reaction when wheat is ingested.

More cloning around

In the latest cloning experiments, biologists have cloned mice by introducing nuclei from cumulus cells to enucleated oocytes (*Nature* 1998;394:369). Cloning was also tried with nuclei from Sertoli and neuronal cells, but these experiments failed.

Unlikely vaccine delivery vector

Special characteristics of the *Salmonella typhimurium* bacterium make it an ideal way to deliver certain antigens. This means that it could be the basis of vaccines for some diseases (*Science* 1998;281:565-8). In an experiment, viral epitopes were delivered successfully to cytosol in the host cells through the use of *S. typhimurium*. Strains that are not virulent are being considered for this purpose.

Regrowing heart cells after heart attack

Heart attacks often result in necrosis of heart cells, which cannot be regenerated. This can lead to congestive heart failure. For the first time, scientists have regrown heart cells by transplanting myoblasts into the infarcted area of the heart (*Nature Med* 1998;4:929). In experiments in rabbits, the transplanted cells took on the characteristics of heart cells, improving heart performance and systolic and diastolic function.