



Princess Margaret Hospital  
University Health Network

# Media Release

For immediate release

## **Canadian Scientists Unlock Secret of Calcium Waves in Cells**

### ***Key step in process of developing targeted therapeutics to combat epilepsy***

**(Toronto Dec. 12, 2002)** — Scientists from Toronto's Princess Margaret Hospital are able to depict for the first time how an important molecule called IP<sub>3</sub> and its receptor interact to control calcium levels in cells, a process that is vital to normal brain function.

The study is published in this week's edition of the international scientific journal *Nature*, and is a collaboration between scientists at Princess Margaret Hospital's research arm, Ontario Cancer Institute (OCI), the University of Toronto, and the University of Tokyo.

The IP<sub>3</sub> molecule is one of a dozen molecules within cells that act as messengers, translating chemical stimulus outside of the cell into a physiological response—for instance, an increase in glutamate triggers memory. The translation by the IP<sub>3</sub> molecule is accomplished by setting waves of different calcium levels within the cell, with the receptor regulating the ebb and flow of these calcium waves. The process is critical to normal brain function, playing an important role in memory and learning. It is also believed to play a key role in epilepsy, since mice lacking IP<sub>3</sub> receptors suffer epileptic seizures and improper brain function.

The scientists examined the atomic structure of the IP<sub>3</sub> molecule and its receptor, and now know exactly how they bind together. Having an accurate 3D picture of the molecule-receptor interaction may aid in the design of drugs that either enhance or block the process of setting calcium levels in cells.

"Imagine the receptor as a doorway through which calcium passes in order for the cells to react," said Ivan Bosanac, lead author of the study, researcher at OCI, and Ph.D. candidate at the University of Toronto. "What we've done is describe the doorway's keyhole and how the IP<sub>3</sub> molecule acts as the key to unlock it."

"This finding represents an important milestone in developing potential drug therapies that could one day combat diseases such as epilepsy," said Dr. Mitsu Ikura, Senior Scientist with OCI, and Professor of Medical Biophysics at University of Toronto. "Although development of such therapies is years away and will require much more research, understanding how the molecule IP<sub>3</sub> binds with its receptor is critical to regulating calcium levels in cells and ensuring normal brain function."

The research was supported by a fellowship from the Canadian Institutes of Health and Research, a grant from the Howard Hughes Medical Institute and by a grant from the Institute of Physical and Chemical Research (RIKEN), in Japan. Dr. Ikura is a Canadian Institutes of Health Research Investigator. His laboratory at Princess Margaret Hospital is also supported by the George and Helen Vari Foundation.

Princess Margaret Hospital and its research arm, Ontario Cancer Institute, have achieved an international reputation as global leaders in the fight against cancer. Princess Margaret Hospital is a member of the University Health Network, which also includes Toronto General Hospital and Toronto Western Hospital. All three are teaching hospitals affiliated with the University of Toronto.

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