Transformative Technology Sparks Collaboration and Knowledge Exchange

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Dr. Edward Fon

Researchers are studying underlying biological mechanisms and testing new therapies to find more effective treatments for diseases like Parkinson's

One of the major limitations in finding treatments for brain diseases such as Parkinson's has been the difficulty acquiring appropriate tissue samples from patients.

"People will give you a bit of their blood or their skin, but they won't give you a piece of their brain," says Dr. Edward Fon, Scientific Director of the Early Drug Discovery Unit (EDDU) at The Neuro (Montreal Neurological Institute-Hospital).

But a promising technology developed in the past decade is changing that. The method involves converting adult stem cells into what's called an "inducible pluripotent stem cell." These new cells can then be reprogrammed into desired cell types – like brain cells.

"Now, just from a blood sample, we can reprogram those blood cells into stem cells, and then make those stem cells grow into neurons, other types of brain cells, or even three-dimensional brain organoids, that have electrical activity and express the same kinds of genes that cells within a real brain do," says Dr. Fon.

With these stem cells, researchers can study underlying biological mechanisms and test new therapies, with the hope of finding more effective treatments for diseases such as Parkinson's, ALS, and more.

Dr. Fon was part of a team, led by Dr. Jack Puymirat (Université Laval), that received a 2014 Brain Canada Platform Support Grant (PSG) to develop the Human Inducible Pluripotent Stem Cell (hiPSC) platform. The $1.5 million grant helped make this transformative technology accessible to researchers across Canada.

In addition to helping lead the platform, Dr. Fon is a seasoned Parkinson disease researcher who will use the new technology to advance his work understanding the molecular events leading to the degeneration of dopamine neurons. He says he is excited by the potential for using the hiPSC platform to illuminate the mechanisms underlaying Parkinson's.

Research in the neurosciences has always required a combination of skill, imagination, conviction, and insight. Increasingly, however, research also requires access to biobanks, clinical trial networks, drug discovery platforms, and shared facilities and equipment. These platforms play a critical role in fostering innovation and interdisciplinary collaboration. As such, access to platforms is imperative to address the evolving needs of high-impact research.

Brain Canada launched its PSG program after recognizing the essential need these collaborative platforms. By bringing together cutting-edge equipment, technology, and services and making them widely available, these platforms accelerate research outcomes beyond what a single researcher might achieve with just the resources in their own lab. Through PSGs, Brain Canada continues to fill a critical gap in funding as it pertains to the development, operation, and maintenance of research platforms.

"Many brains are better than one," says Dr. Viviane Poupon, Brain Canada President and CEO. "When we work together to invest in platforms that facilitate innovation and interdisciplinary collaboration, we are convening experts across fields and enabling science to move a lot quicker."

"Brain Canada's initial investment and support of the platform was absolutely instrumental in getting things off the ground. Making these stem cells takes a huge number of resources. But this platform gives us significant economies of scale," says Dr. Fon.

Since receiving the 2014 grant, the hiPSC platform has evolved from a local project at the Université Laval into the Early Drug Discovery Unit (EDDU), an open drug discovery platform. The platform now serves researchers across Canada and has stimulated national and international collaboration.

Funding provided by Brain Canada has been made possible by the Canada Brain Research Fund (CBRF), an innovative arrangement between the Government of Canada (through Health Canada) and Brain Canada Foundation. To date, Health Canada has invested over $130 million through the CBRF which has been matched by Brain Canada Foundation and its donors and partners.

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