Molecules hold promise for detecting, treating cancer and neurodegenerative diseases

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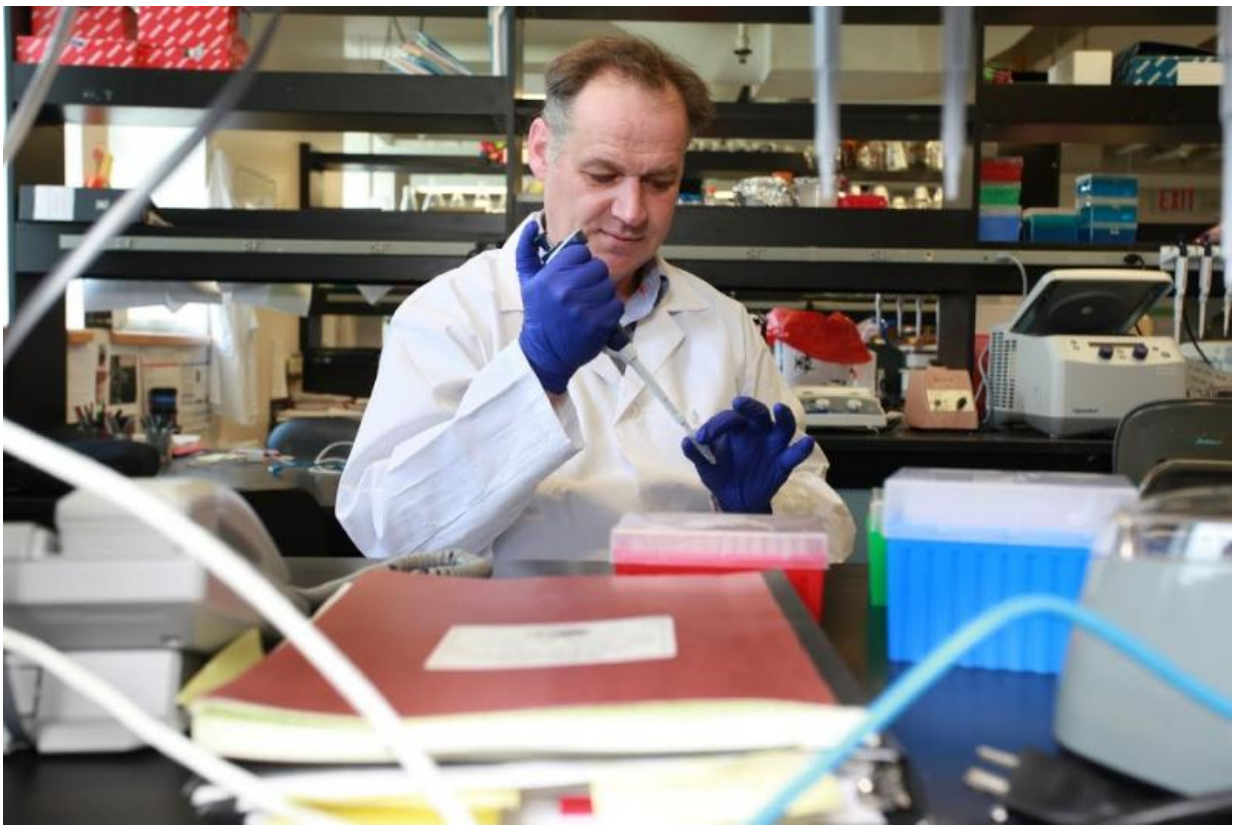

Neil Renwick is working on new ways to treat cancer. Credit: Bernard Clark

Neil Renwick spent his early years working as a medical officer in the Australian outback, Thailand and Papua New Guinea. Today, those

formative clinical experiences with rare and unusual diseases are guiding his explorations into the genetic mechanisms of disease, and putting him at the forefront of a rapidly emerging molecular frontier.

A certified pathologist and clinician scientist in the Kingston General Hospital Research Institute, Dr. Renwick studies select cancer and neurodegenerative diseases in which ribonucleic acid (RNA) control is disturbed.

Among many functions, RNA is the intermediate molecule between DNA and protein. "It has a lot of information that makes a gene into a protein, so it is a good diagnostic and therapeutic target," he explains.

Long viewed by researchers as "information carriers," RNA regained the spotlight in the early 2000s, following a series of discoveries showing that another class of RNA, named microRNA, plays a key role in controlling messenger RNAs and their protein products.

Dr. Renwick's own interest in RNA was sparked at The Rockefeller University when he worked with Prof. Tom Tuschl, who discovered many microRNAs and developed silencing RNA technology. "He figured out how to switch off any gene," he says. "It works brilliantly in cell lines, now we're trying to figure out ways to use it to cure disease."

Dr. Renwick's research involves examining at microRNAs in tissue samples from neuroendocrine tumors. A second project is looking at mutations in genes that encode RNA-binding proteins and result in amyotrophic lateral sclerosis (ALS). Two different diseases, but they are linked through defective RNA control.

Identifying and studying how RNAs cause or mediate disease is not as straightforward as it sounds. "The work is technically challenging," Dr. Renwick says. "It's hard to work with RNA molecules because they

break down easily. You have to know how to handle them."

His Laboratory of Translational RNA Biology is one of a small cohort of labs in Canada that specialize in this field – but his lab is the only one using state-of-the-art tests, or assays, for detecting RNAs that he developed while training with Prof. Tuschl. "We have the most accurate techniques for doing this," he says.

A key to his work is the capability to capture and analyse the huge volumes of data produced by RNA profiling. "There will be a big computational component to this work," he says. "We are lucky; we have pipelines to analyse the data."

A recruit to Queen's and KGH through the Southeastern Academic Medical Organization (SEAMO), Dr. Renwick says his new job fulfils a long-time ambition to have his own lab. "I was looking all over the planet for an opportunity. The SEAMO Clinician Scientist program is the way everyone should be going. It's an innovative program."

The Queen's-KGH environment is another positive. "It's a good opportunity for me to be around other pathologists with extensive experience. And the hospital environment is important because it enables you to see how your work impacts real life. I think Queen's and KGH are going to be very competitive going forward because they have the experience, and the patient base, and the basic science. All the components are here."

Provided by Queen's University