

Dr Megan Hitchins – empathy and excellence deliver exciting results



Dr Megan Hitchins was never much interested in any career other than medical researcher. Now the Head of the Medical Epigenetics Laboratory she founded in the Lowy Cancer Research Centre at the University of New South Wales (UNSW), Megan has always had a strong fascination with the things that cause disease. Having been brought up in Africa – where her parents were a radio operator and nurse with a flying doctor service – Megan often saw first-hand the effects of poverty and disease. It upset her, and still does. The plight of African children, and even animals, would sometimes move her to tears.

“So I’d be a hopeless doctor, I know. That’s one reason I work behind the scenes in research. In the end it was the things that caused disease that fascinated me most.”

Providing hope

This fascination, helped along initially by two Cure Cancer Australia grants, has laid the foundation of an illustrious career that’s already been responsible for uncovering new genetic cancer risks, revealing how cancer is passed on in some families and providing hope for sufferers.

Megan’s research focus, for which she has gained wide recognition, is the role of epigenetic errors in hereditary cancer, as well as the interaction between genetic and epigenetic changes in the development of the disease. She and her colleagues have been published in many prestigious journals including the New England Journal of Medicine, Nature Genetics and Cancer Cell.

Megan did her first degree in biology and her PhD in clinical genetics in London, and worked there for five years as a post-doctoral researcher.

“At that time I was working on paediatric and prenatal genetic diseases,” she says. “It was something I really wanted to do.”

When Professor Robyn Ward, Clinical Director of the UNSW Cancer Research Centre, attended a lecture Megan had given, she was impressed. Later, despite Megan’s youth, Robyn invited her to apply for a job in Australia she had spent three years trying to recruit for. She accepted the position and moved to St Vincent’s Hospital, Sydney in 2004.

An exciting field

A move into the field of hereditary cancer was an attractive proposition, because with new developments in genetic testing, Megan believed she could make a bigger difference in the lives of individuals who were at high risk of the disease. “We could help prevent them from developing it,” she explains. “This wasn’t possible for children actually born with a genetic disease.”

The first of Megan’s Cure Cancer grants looked at “epigenetic silencing,” specifically the patterns of gene silencing that occur in bowel cancer. The second, in 2006, examined genetic markers of what are now recognised as “cancer stem cells,” in which cancers originate.

As a consequence of her early work, Megan received a Career Development Fellowship from the Cancer Institute of New South Wales in January 2008. She also won NHMRC project grants that year and the next, propelling her into her independent research position and the establishment of the Medical Epigenetics Lab. She is now the recipient of an NHMRC Fellowship.

Fresh breakthrough

A fresh breakthrough, one that Megan considers extremely exciting, came in 2011 when she and colleagues discovered that subtle changes to the outside of an anti-cancer gene attract a paralysing biochemical which stops the gene working, increasing the risk of developing the disease.

Dr Megan Hitchins (continued)

Scientists have known changes inside the cancer prevention gene MLH1 could be passed from one generation to the next and increase the risk of developing bowel, uterine and other cancers. But they didn't know why about 30% of families with a history of cancer did not show any changes inside their MLH1 genes.

Then Megan and her team discovered that these genes had undergone a tiny external genetic "typo" – which was passed on and increased the cancer risk across generations. This mistake effectively attracts a paralysing methylating chemical that switches off the gene, and hence its ability to prevent cancer.

This discovery, which Megan admits was hugely satisfying, could lead to much more effective screening for cancer and save many lives.

"This is about just one gene," she adds. "Now we'll look at other cancer genes in families whose cancer causes remain unknown. And we'll start implementing what we've learned in a routine screening procedure that could easily be implemented on a grand scale."

This would ensure more people were made aware of the risks earlier, and those who are detected as being at high risk may therefore avoid developing cancer.

"At present if you have a genetic or epigenetic-based defect, you're at risk of developing cancer, but if don't know that or why it's causing it in your family, you'll develop it out of the blue," explains Megan.

Early surveillance

However if people know they have a gene fault, they can be put onto clinical surveillance programs. An annual colonoscopy could reveal potentially cancerous polyps that could be removed, for example. These people could then also be advised about other lifestyle factors that might exacerbate risks like smoking, obesity and so on. If they're at significant risk genetically, by minimising those other risk factors, they may be able to minimise early age onset.

Looking back

Megan views the Cure Cancer grants as "hugely important". When you're at the early stage of a research career there's little opportunity to attract independent money to set up your own projects, she says. The grants provide a good bridge for early career researchers to go from being dependent on funding for experiments by others, to being independent young scientists themselves.

"Having those two grants helped me get funding from other mainstream bodies and numerous other grants for equipment and projects as well as fellowships. I really don't know how I'd have made that leap if it hadn't been for Cure Cancer."