Unlocking the secrets of the brain’s connection to pain

**Advanced brain imaging, led by doctors like Karen Davis, is bringing patients one step closer to personalized precision pain solutions**

Judy Gerstel

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**Dr. Karen Davis has devoted her life to learning about something no one wants, and there’s still so much to learn, she says, about pain.**

She was turned on to the topic by her North York, Ont., high-school biology teacher, Marty Greenberg. “He showed us they’d just discovered opiates receptors,” she recalls. “It was a cool idea that we have mechanisms in the brain to not only feel pain, but also to modulate pain.”

“That really got me hooked on the whole topic of pain and pain control.”

Now, many years later, Dr. Davis is an emeritus neuroscientist and author of more than 150 published papers. Many have been cited hundreds of times by other scholars. She’s a senior scientist and division head at the Krembil Research Institute and a professor in the Department of Surgery at the University of Toronto.

Her highly informative TED-Ed video entitled “How Does Your Brain Respond to Pain?” has been viewed more than 1.1 million times.

Dr. Davis still finds the work of the brain and how it relates to pain fascinating. For example, she says, “when you decide to modulate a small lesion in the brain to target a specific area of pain.”

Early results of a research study of the treatment for trigeminal neuralgia (a facial pain syndrome) were extremely promising in some patients, she reports.

“That the patients who responded showed reversal of abnormalities in one part of the brain. That’s [exciting that] treatment is reversing abnormality.”

Innovative research in neuroscience, Dr. Davis explains, “is not only about what is not working, but also about what parts of the brain have the capacity to bring about change.”

She’ll be studying exactly that as one of the principal investigators of the Chronic Pain Network.

It’s one of five new national research networks in a $62.5-million federal program called Canada’s Strategy for Patient-Oriented Research.

“Chronic pain is so widespread in our society,” says Dr. Davis. “Studies have shown how prevalent it is. But society just wants you to grin and bear it.”

One in three Canadians experiences chronic pain, and the cost for health care, wages and lost productivity is more than $40 billion annually.

“Society tends to focus research dollars and attention on diseases that can kill you, and rightly so,” she says, “but chronic pain is an enormous, silent societal issue.”

**Discussion about medical assistance in dying brought the issue “out of the closet,” Dr. Davis says, “because pain and suffering can be so severe that people want to end their lives.”**

She’s met many patients with chronic pain conditions who weren’t believed. “They were told it was psychological, all in their head, and this influenced how their employers and family members regarded them.”

But with scanning technology, she explains, “we were able to show that their brains were functioning abnormally (in response) to pain originating, for example, in the gut from IBS (irritable bowel syndrome).”

“Patients were thrilled to know that it was real, that it’s not a psychiatric condition, not malingered. The brain response is abnormal. There are many chronic pain conditions where patients are told they’re making it up or exaggerating.” Dr. Davis says.

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**Should brain scans be used to measure pain?**

Being able to scan the brain with advanced imaging technology provides huge benefits to pain researchers like Krembil Research Institute senior scientist Dr. Karen Davis, to clinicians and to patients.

But there’s also a dark side to brain imaging.

For example, using it to prove that someone does or does not have pain, especially in legal and insurance cases, is an ethical issue, says Dr. Davis and many colleagues.

She’s spearheading an international effort to explore the ethics of using information from brain scans, how it should or shouldn’t be used and by whom and for what purposes.

Dr. Davis cites the privacy issue, comparing brain scans to genetic screening, and she believes the information should be used solely for treatment that benefits the patient.

“Using brain scans to diagnose pain is something I’m against,” she says firmly. “It’s essentially like a lie detector test, mostly for legal cases. I’ve been fighting against that.”

She says judges tell her they’re dealing with this every day in court. “It’s an issue in Canada,” she says. “People come to me that work for insurance companies.”

“If you can think of anything more intrusive than taking a biopsy, that’s what a brain scan is,” she adds.

“Can Brain Imaging Be a Pain-o-Meter?” was the title of her presentation last year at a Harvard Law School conference titled “Using Brain Imaging Helps Law Re-Envision Pain.”

Her answer to the pain-o-meter question is a clear “No!”

**Says Dr. Davis: “It’s not what the technology should be used for. She says people with chronic pain are constantly being asked to prove they’re in pain.”**

She now serves as Chair of the Special Presidential “Task Force on the Use of Brain-Based Diagnostic Tests for Chronic Pain.”

The task force is part of the International Association for the Study of Pain.

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