DISCOVERY

YEAR AHEAD FULL OF EXCITING CHALLENGES FOR LOW LABORATORY

Numerous research topics will keep the Low Laboratory team busy throughout 2015 and beyond. The team is led by Professor and Associate Head of Research Walter Low, Ph.D. Several projects are just getting started, adding to work already being done.

Following is a brief summary:

- **Creating Young Blood for Rejuvenating Old Brains** – builds on other researchers’ work in which organs of older mice such as hearts and skeletal muscle were rejuvenated after being infused with blood from younger mice. When the same process was applied to the brain, the mice began showing improved cognitive function. This work could potentially help people with Alzheimer’s Disease.

- **Image Guided Transcranial Focused Ultrasound Therapy for Neurological Disorders** – this project will use highly focused ultrasound to stimulate brain tissue to attract reparative stem cells. This technique could be used to help treat disorders such as stroke, according to Low.

- **Creating Human Dopamine Neurons in Human-Pig Chimeras for Parkinson’s Disease** – Low’s team will curtail a cell’s ability to develop dopamine nerve cells and introduce pluripotent stem cells to see if they can be directed to become authentic dopamine cells. This work may help people with Parkinson’s disease, which is caused by a lack of dopamine.

- **DNA Technologies – Developing and Analyzing a New Tool for Sensing and Targeting Disease** – the work will use nano-technology to create a DNA molecule that detects and treats brain tumor cells.

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Maximizing Safety and Quality

“This is a big goal,” said Safety and Quality Lead Daniel Guillaume, Associate Professor and Chief of Pediatric Neurosurgery, University of Minnesota Masonic Children’s Hospital.

“We want patients in Minnesota to have the safest, best care in the nation,” Guillaume said. “We’re working with the U’s quality team to develop specific ways to measure how we’re doing.”

The measurements are based on nationwide data about hospital performance. “It’s not perfect, but it helps us see how we compare,” said Guillaume. Partnering with university data analysts, the Safety and Quality Team is making sense of the data, which looks at measures such as mortality rates, complications, infections, and readmission.

“The goal is to be in the top 10 percent in the country in each category,” Guillaume noted. “In some areas, such as mortality rate and hospital acquired conditions, we’re currently there.

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Low Laboratory, continued

- Creating Humanized Mice from the Inside Out to Test the Feasibility of Using the CCR5-delta 32 Mutation to Treat HIV Infection – past HIV patients had their immune systems completely replaced using a donor’s blood and were unexpectedly cured of AIDS. The donor had a special mutation that prevented expression of the CCR5-Delta 32 molecule on the surface of the donor’s immune cells. “Those molecules are used by the HIV virus to bring the virus into the body,” said Low. His team will use skin cells from people with the mutation to make immune cells. They will also genetically “humanize” mice and give them the CCR5-Delta 32 mutation. They will use the resulting mouse model to develop human blood that carries the CCR5-Delta 32 mutation to treat patients with AIDS and AIDS-related dementia.

Full story: http://tinyurl.com/na6swpq

Vision 2033, continued

“Focusing on safety is nothing new,” he continued. “We’ve never been so aggressive, however, about holding ourselves accountable for achieving our goals.”

In addition to the U’s Vice President of Clinical Quality, Kristin Mascotti, M.D., Guillaume is working with Department Chair, Stephen Haines, M.D., and residents Amit Goyal, M.D., Cati Miller, M.D., and Paramita Das, M.D., to “weave safety and quality into everything we do.”

In June 2011, 38-year-old Michelle Nelson woke up with a terrible headache. She figured it would go away. It didn’t. After a week, she went to her family physician and asked for a brain MRI. Although skeptical, he did it for her. It showed no reason for the headache. Neither did any of her lab work.

Nelson made an appointment with a neurologist. And then another. After trying new drugs and having more tests done, she still had the headache. She was beginning to think the pain would never go away.

The pain started robbing her of things. Her smile. The ability to chew food. Driving over bumps. “I was losing bits and pieces of myself and nothing helped,” she said. “It was scary for everyone who loved and cared about me to see me like this.” (Nelson, second from left, is pictured below with her family.)

After a negative reaction to a new drug sent her to the ER, Nelson was seen by a neurosurgeon who had her worked up for pseudotumor cerebri, otherwise known as idiopathic intracranial hypertension/IIH (intracranial pressure that increases for no obvious reason; symptoms mimic those of a brain tumor, but no tumor is present). The rare condition annually affects just one or two people (mostly women) per 100,000 in the United States.

IIH is difficult to diagnose, as Nelson discovered. And even when she had a solid diagnosis, she struggled to find a doctor who would work with her for the long term – until she dropped her case information off at the University of Minnesota Neurosurgery Clinic.

To Nelson’s delight, Andrew Grande, M.D., said he would take her case. “Everyone who knows my story knows how grateful I am for Dr. Grande, and for the University of Minnesota,” she said.

For the rest of the story, you can read Nelson’s charming first-person account here: http://tinyurl.com/odfgfnc.
Quick reaction coupled with special procedure help Minnesota stroke victim

Zimmerman resident, Mike DeMars, tried to get out of bed on February 11, 2015, and ended up flat on his face. His wife, Kim, heard the thud and went to investigate.

“Mike was lying on the floor on his stomach,” she said. “When he looked up at me, I could see that the entire left side of his face was drooping and his speech was slurred.” Kim realized that Mike was having a stroke and called 9-1-1.

Mike was lucky. Kim is a physical therapist at Fairview Northland Medical Center in Princeton, Minn. Her training meant that he would get the help he needed in time.

After being transported to Princeton, brain scans would reveal the sizeable clot that caused the stroke. “My carotid artery was 90 percent blocked,” Mike said.

The doctors told Kim they were heliporting Mike to the U of M in Minneapolis. She was impressed by the confidence that they had in the U. “How right they were,” she said. “It was definitely a great place to go.”

At the university, Mike underwent a procedure known as a neurothrombectomy performed by interventional neuroradiologist Bharathi Jagadeesanan, M.D.

During the procedure, Jagadeesanan inserted a small catheter into the femoral artery in Mike’s groin and ran it all the way up to the blood vessel in the brain that contained the clot. “We then passed a device known as a stent-retriever through the catheter and let it sit in the vessel for three to five minutes,” he said. “That allowed the meshing of the stent to catch the clot, like a net catches a fish, and we slowly removed it.”

Mike felt great after the procedure and wanted to go home, but still had issues with his left side. The U’s Physical Medicine and Rehabilitation Department would help him begin to recover full use of his left arm, leg and hand.

Considering Mike’s experience, Kim believes that what they say about stroke is true. “Don’t waste any time,” she said. “It’s so important to get the right people involved and let them determine what’s going on and why.”

To help keep track of how Mike and other patients who receive this procedure are doing, the university is participating in the national STRATIS Registry.

Full article: http://tinyurl.com/pbevaro

Stroke victims need more help

U of M neurosurgeon Andrew Grande, M.D., is an avid hockey player. He is also a scientist whose work focuses on using stem cells to treat stroke. Those interests came together when Detroit Red Wings legend Gordie Howe suffered a stroke late last year and then sought experimental stem cell treatment in Mexico.

Howe’s journey was chronicled by Karen Bouffard in a Feb. 11 article in The Detroit News. It inspired Grande to write a commentary for The News.

Grande acknowledged that patients such as Howe often desperately seek treatment outside the United States, given their limited options here. He passionately believes that there is an urgent need for developing new treatments for stroke.

Of the 800,000 people who have a stroke annually in the U.S., less than five percent receive treatment. As more and more people are affected by this devastating condition, Grande asserts that everyone should demand a change – for better stroke education, fundraising and research.

“My dream is that people around the world can rise up and insist that we do better for stroke victims, that we find a cure,” he said.

Full article: http://tinyurl.com/lpkp9a8

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Neurosurgery resident enters brave new world: medical device innovation

“It’s one of the best things I’ve ever done,” gushed fourth-year neurosurgery resident Akshay Gupte, M.D., M.P.H. Gupte is one of eight Innovation Fellows in the U of M’s Medical Devices Center. He is more than halfway through the year-long program.

The program is highly collaborative. The current batch of fellows is from several disciplines, including medicine, physics, electrical and mechanical engineering, audiology, and materials science, as well as the medical device industry. “It’s made me realize the value of fresh eyes,” Gupte noted.

He explained that the program is broken into four phases, which he described as:

1. **Boot camp.** About 100 guest speakers provided their viewpoints to the fellows about subject areas ranging from the medical device industry, to academics, to how government is helping local device startups, to procuring venture capital.

2. **Clinical immersion.** “They let us loose and encouraged us to observe in any field, including surgeries, ICUs, clinics, pediatrics,” Gupte said. “Two of us went on 13-hour ride-alongs with EMTs [Emergency Medical Technicians] to get a sense of what the needs are for patients being transported.” The immersion phase touched on most aspects of medicine, both inside and outside the hospital, Gupte noted. At the end, the fellows had identified 600 clinical needs, which they then filtered down to about 40 projects on which to focus.

3. **Brainstorm/design/prototype.** Each fellow is spearheading a couple of different projects, as well as participating on other teams. “We will take a much deeper dive and assess what has been done and how things could be done better, cheaper, safer, and more effectively,” said Gupte.

4. **Sell.** The teams will pitch their developed ideas to potential investors and the university; some may even create start-up companies.

Gupte’s fellowship wraps up in mid-August.