

New map of a rat brain makes it easy for scientists and doctors to explore the brain and connectome

October 21 2014, by Robert Perkins

What's the route between smell and memory? Where's the connection between habits and Parkinson's disease? How does habit detour into addiction?

To answer these and other complex scientific and medical questions, two USC Dornsife scientists have built Golgi (www.useGolgi.com), an interactive map of a rat brain that makes exploring the brain as easy as using Google Maps.

The new web app, unveiled today, offers details at the click of a button about how the regions of the brain communicate and interact. Golgi will help accelerate the research and treatment of ailments like Parkinson's and depression by layering complex scientific data onto a single simple brain map that provides information to doctors and researchers quickly and intuitively.

"We have a big advantage because we're the only group—really in the world—that has a flat map of the brain," said National Academy member Larry Swanson, professor of biological sciences at USC Dornsife and recent past president of the Society for Neuroscience.

Swanson, a longtime pillar of the neuroscience community, collaborated with 25-year-old USC Dornsife graduate student Ramsay Brown, who designed the program while an undergraduate worker in Swanson's lab.

Golgi takes the existing pool of knowledge about the brain and makes it easy to access by scientists and doctors, saving time and offering potentially new connections. It uses research on rat brains, which are close enough to human brains to offer valuable insights but are far easier to study and therefore represent a larger pool of research data.

To display the brain's three-dimensional structure on two-dimensional screens, Swanson and Brown used the embryonic brain—which begins as a flat sheet of cells—as a guide. This flattens the brain and keeps related portions of the brain located close together. Flattening the brain lets users click around and display connectome and other data directly on regions they're interested in learning about for research or treatment.

"We designed a really intuitive way to explore the more nuanced details about the brain and connectome," Brown said. "Making this data easy and accessible will improve how scientists and doctors explore, explain and treat human conditions and restore quality of life—and that's really special to us."

Brown and Swanson think this program is just the beginning. Connectomics, the subfield of neuroscience that studies and maps the brain's wiring, is advancing quickly and providing better maps as the technique evolves. Programs like Golgi will help doctors and researchers make sense of these new maps and make better medical and scientific decisions faster.

"Many people now think that understanding these neurological diseases is going to require understanding the circuitry of the [brain](#)," Swanson said.

More information: The map can be found online at www.useGolgi.com and correspondence can be sent to usegolgi@gmail.com.

Provided by University of Southern California

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