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RESEARCH AREA

Have you ever wondered why children learn new languages or sports easily, but as adults this becomes much harder? This is because the brain's neural circuits gradually "freeze" over time. But what if we could reopen this window?

In our lab, we develop methods through which the adult brain can regain its youthful adaptability—we call this neural plasticity. Specifically, we research how to repair neural connections that formed incorrectly during childhood. We focus on vision restoration: our goal is to heal children and adults who, for example, did not develop normal vision due to amblyopia (lazy eye).

To do this, we use tools like optogenetics (we control neuron activity with light) and advanced brain imaging. With these, we can track from the molecular level to the whole brain what went wrong, and how we can reactivate the brain's own healing mechanisms.

If you're interested in how scientific discovery can lead to medical breakthroughs, with us you can experience the entire process: you can conduct animal experiments, use modern microscopes, and learn data analysis. Together we can explore how the human brain could transcend its own limitations.

TECHNIQUES AVAILABLE IN THE LAB

In our lab, you can learn techniques used in the world's leading research centers. Here's what you'll do:

Brain Imaging and Precision Intervention

You'll learn how we can „see" the living brain in action using specialized microscopes and ultrasound technology. With microsurgical methods, we deliver viruses to the brain—these viruses don't cause illness, but instead introduce genetic „switches" into neurons.

Controlling and Observing the Brain

Using optogenetics, you can turn neurons on and off with light—as if you had a remote control for the brain. You can also measure the results: with electrodes you'll record the electrical signals of neurons while subjects solve visual tasks in automated systems.

Data Analysis with Artificial Intelligence

The experiments generate enormous amounts of data. You can process these with deep learning algorithms to discover the rules governing how brain plasticity changes.

SELECTED PUBLICATIONS

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