

Studying the Lines of Communication Between Cells



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With breakthroughs in medical research happening at a 21st-century pace, we can lose sight of the fact that our knowledge of the human body barely scratches the surface. That's why scientists like Dr. Ania Majewska are so important to our understanding of what makes our bodies work.

Dr. Majewska's fascination lies in the synapses between cells, the lines of communication that connect neurons into networks. When synapses stop working properly, the malfunction produces neurological disorders.

"Synapses are incredibly hard to study because they are so tiny," said Dr. Majewska. "We have tools to look at them and see how they relate to the network overall."

Dr. Majewska developed an interest in synapses during her Ph.D. research at Columbia University with Dr. Rafael Yuste, where she received her introduction to in vivo research. "Dr. Yuste studied the visual system," she said. "Today, I study how the synapses affect the visual cortex." Her lab studies the synapse's plasticity—how it changes its internal parameters through experience.

Learning how changes in the synapses affect the visual system can help scientists understand their effect in other parts of the body, Dr. Majewska explained. Already the lab has made some exciting discoveries. "We have found that microglia"—the first line of defense against attacks on the central nervous system—"are critical parts of what the circuit does. We had thought that they just waited for something bad to happen."

The results may provide a springboard for new ways to approach autism, Alzheimer's disease, and other neurological disorders. "What gets me up in the morning is that the techniques we use allow us to look inside a brain while an animal is doing something, and see these cells and how they interact," she said. "We learn a tremendous amount from that."

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