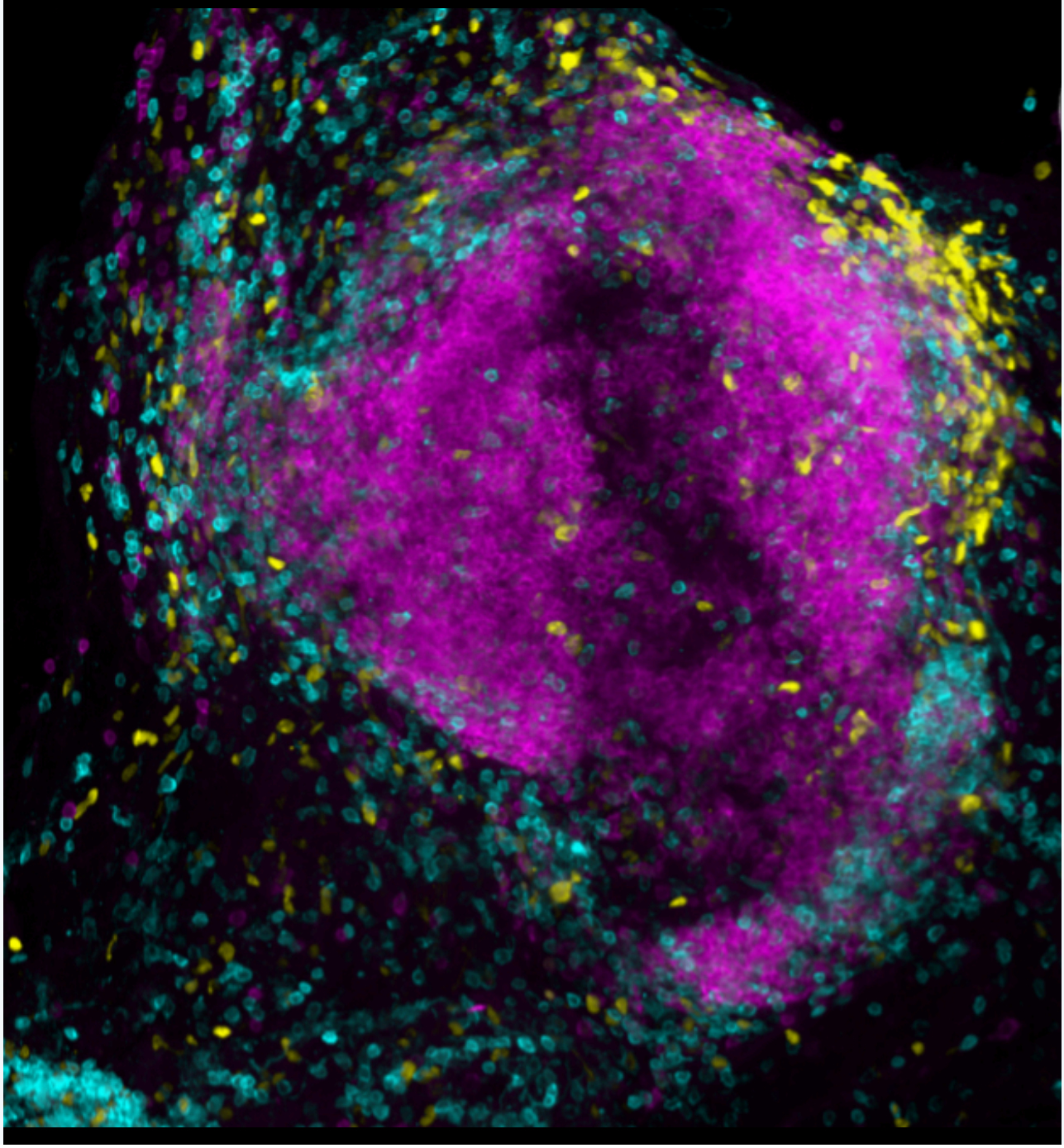
View in browser

Okun Lab

Updates From Okun Lab



This image depicts an aggregation of immune cells in a tissue close to the brain borders in a mouse. In purple is a dense follicle of B cells, immune cells that secrete antibodies against specific pathogens. In cyan are T cells surrounding the B cell follicle; these cells interact with B cells to generate a strong immune response. In yellow, a proliferation marker indicates that these cells are actively growing and dividing.

A structure such as this is known as an ectopic lymphoid structure - an organized cluster of immune cells forming at a site of inflammation. In this case, it is located in the meninges, the tissue that surrounds and protects the brain. The presence of such structures suggests an ongoing inflammatory response. While these immune cell clusters can help fight disease, their presence near the brain may also contribute to neurological damage.

A recent study from our lab showed that these structures accumulate in the meninges during aging and in Alzheimer's disease mouse models. Our ongoing research aims to understand how these immune structures interact with the brain and whether they contribute to disease progression in Alzheimer's.

Image credit: Amit Fruitman. Fluorescent imaging of immune cell aggregation in the meninges of a mouse brain. The Paul Feder Okun Laboratory for Alzheimer's Disease Research.

Where Brain Meets Immunity: New Clues from the Meninges

In our lab, we are interested in how the brain communicates with the immune system, particularly at its borders. The brain is wrapped in protective layers called the meninges, which were once thought to serve mainly as a barrier. We now know they are an active immune interface. In this study, we examined small clusters of immune cells in this outer layer that form organized hubs during aging and in disease.

One of the most striking aspects of our findings is how strongly biological sex shapes these immune changes. As animals age, these immune hubs generally increase, but not in the same way for males and females. In males, we see a steady accumulation over time. In females, however, there is a clear peak in midlife followed by a decline later on. This divergence becomes even more pronounced in disease related conditions, where the number, structure, and timing of these immune features differ between sexes.

Importantly, these changes cannot be explained by a single hallmark of Alzheimer's disease alone. Instead, they appear to reflect a broader immune response at the brain's borders. This suggests that what happens outside the brain tissue itself may be just as important as what happens within it.

For those of us working to understand Alzheimer's disease, these findings reinforce a key message: sex differences matter. They may help explain why women are at higher risk and often experience the disease differently. Looking ahead, we believe that studying these immune processes will open the door to more personalized approaches to diagnosis and treatment, tailored not only to the disease, but also to the individual.

Read More

Check out our new website: okunlab.com

What's New In The Field

Tattoo Ink’s Hidden Effects Beyond the Skin

Tattoos are often seen as purely cosmetic, but new research suggests their effects may go much deeper. Scientists found that tattoo ink can travel from the skin into nearby lymph nodes, where it remains for months and interacts directly with immune cells. This buildup triggers long-lasting inflammation and can even damage key immune cells, raising new questions about how the body responds to these widely used pigments.

The study also uncovered an unexpected link between tattoos and vaccine responses. Depending on the type of vaccine,

tattoo ink was shown to either weaken or enhance the body's immune reaction. While these findings still need confirmation in humans, they highlight a surprising possibility: something as common as a tattoo could subtly influence how our immune system functions over time.

Read Full Article

Okun Lab

Check out our new website: okunlab.com

The Paul Feder Laboratory for Alzheimer's disease research

The Gonda Multidisciplinary Brain Research Center

The Mina and Everard Goodman, Faculty of Life Sciences

Bar-Ilan University, Ramat Gan, Israel