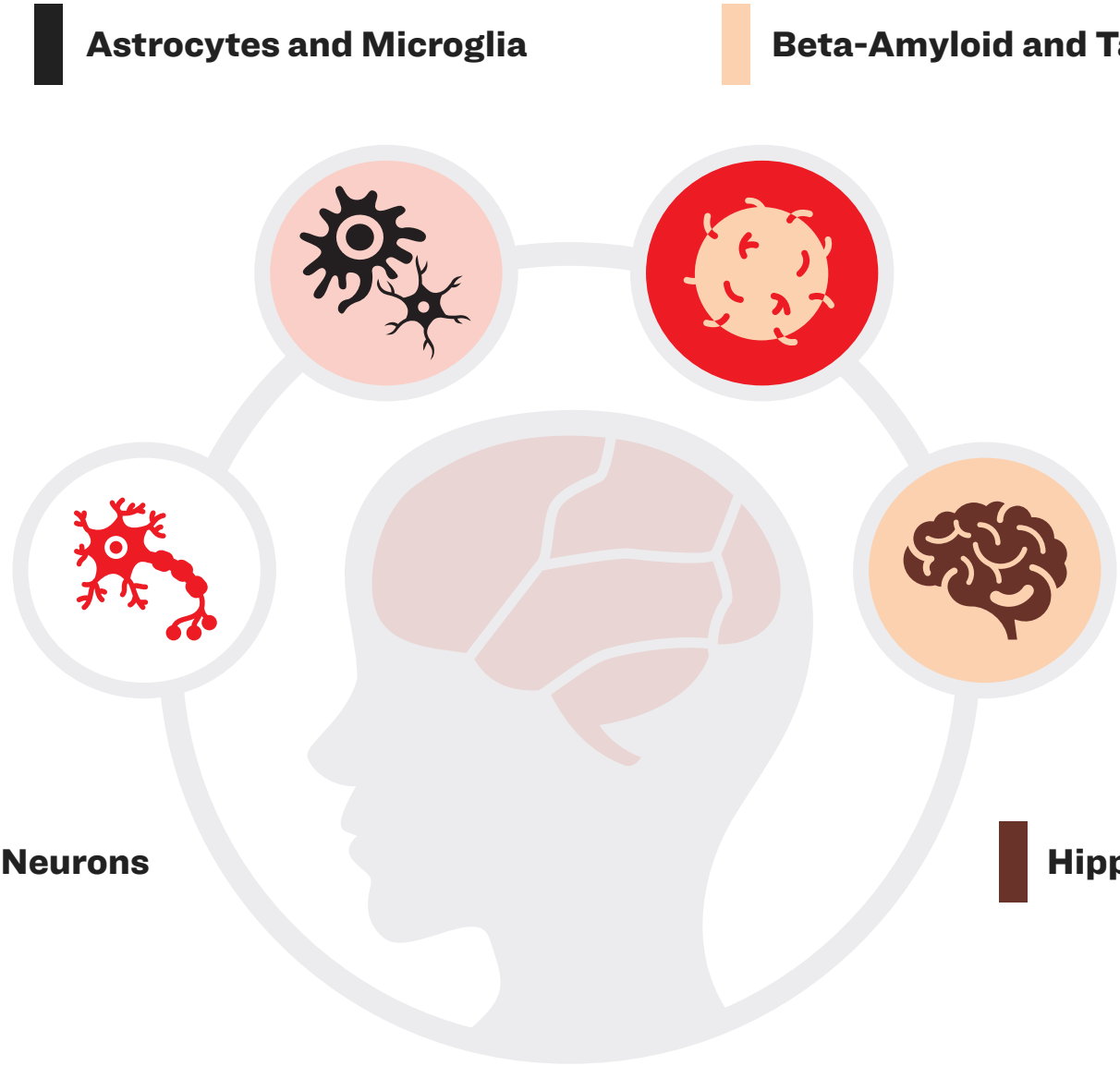
Lilly Alzheimer's Disease Program

How Alzheimer's Disease Transforms the Brain



Neurons

First, to understand how the brain changes when Alzheimer's disease enters the picture, let's talk about neurons. Billions of them.

See how you're staring at this image? When we stare, shout, walk, or remember, it's the result of signals passing through the 100 billion nerve cells in our brain called neurons.

Electrical charges help these neurons talk to each other. These charges can generate enough electricity to power a low-wattage bulb![1] The combination of these electrical and chemical signals is responsible for the actions mentioned above.

Astrocytes and Microglia

Keeping the neurons healthy is important to do things like move or remember things. This is where astrocytes and microglia come in. These are cells in the brain that clear away debris and protect neurons from physical or chemical damage.

Alzheimer's disease disrupts the balance that keeps neurons healthy. This may happen a decade or more before a person starts to show symptoms.[2]

Beta-Amyloid and Tau

Research suggests that two proteins are involved in driving changes to the brain due to Alzheimer's disease: beta-amyloid and tau.[3] For reasons still unknown, these proteins become toxic and cause problems in the brain.

- Beta-amyloid clumps together to form plaque. These amyloid plaques build up between neurons.
- Tau accumulates inside neurons and eventually forms tangles.

As amyloid plaque builds up, tau spreads rapidly through the brain. It's too much for astrocytes and microglia to deal with. Because microglia are no longer able to keep up with clearing debris and astrocytes become stressed, chronic inflammation occurs within the brain.[4]

Eventually, neurons can no longer communicate, and they die.

Hippocampus

As neurons die, the brain shrinks. The damage often starts in the hippocampus, which is responsible for learning and memory.[2] The more neurons die, the less a person with Alzheimer's disease is able to think, remember, make decisions, or function independently.[4]

Clinical research studies are exploring ways to stop or slow down the appearance of memory and thinking problems associated with Alzheimer's disease. If you or a loved one is affected, there may be options through clinical research.

Sources

[1] https://kids.nationalgeographic.com/science/article/your-amazing-brain
[2] https://www.nia.nih.gov/health/alzheimers-disease-fact-sheet
[3] https://jamanetwork.com/journals/jamaneurology/fullarticle/1817720#
[4] https://www.nia.nih.gov/health/what-happens-brain-alzheimers-disease