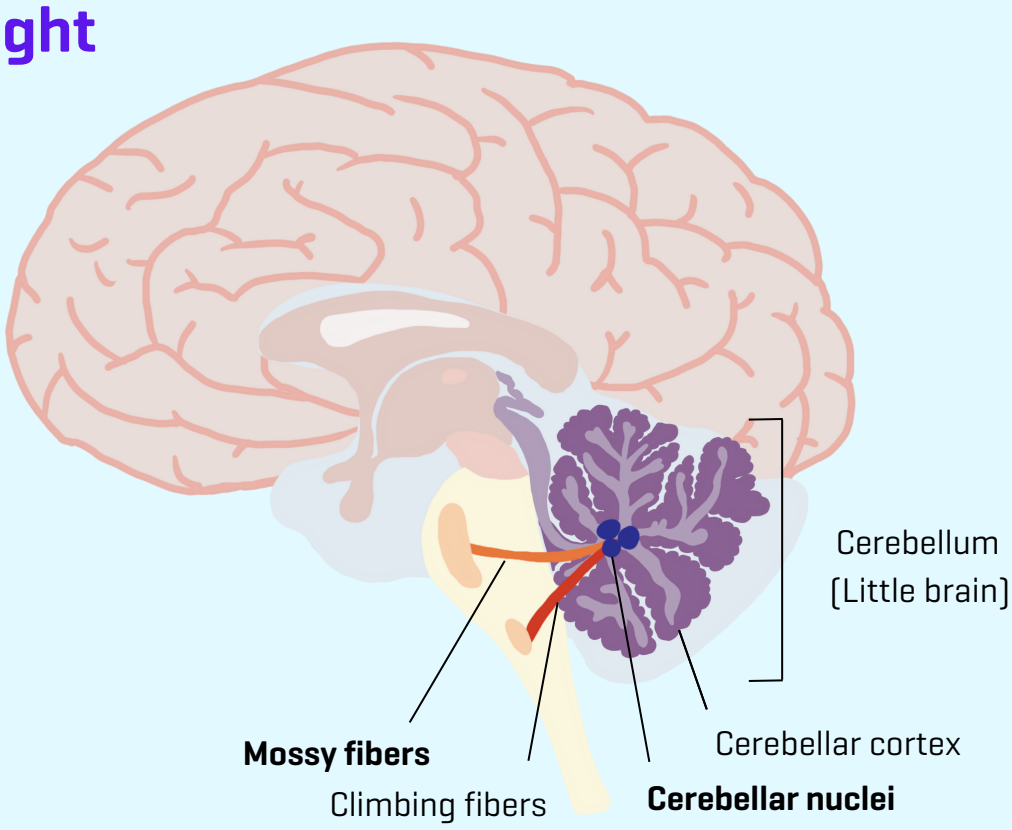
Nuclei in our little brain turn out to be more important than initially thought



Associative learning was always thought to be regulated by the cortex of the little brain. However, new research shows that the nuclei actually make a crucial contribution to this learning process.

If a teacup is steaming, you'll wait a bit longer before drinking from it. And if your fingers get caught in the door, you'll be more careful next time. These are forms of associative learning, where a positive or negative experience leads to learning behaviour. We know that our little brain is important in this form of learning. But how exactly does this work?

To investigate this, researchers looked at the little brains of mice. First, mice were shown a flash of light. Then, they received an air-puff in the eye. Once the mice learned that there was an association between the two, they pre-emptively closed their eyes at the light flash.

Output center

The little brain receives input from various brain areas through different types of connections: mossy fibers and climbing fibers. It is thought that mossy fibers transfer information about the light, and that the climbing fibers transfer information about the air puff. This information converges in the cerebellar cortex and nuclei.

The team has found that mossy fibers establish stronger connections to the nuclei and that activation of these mossy fibers in the nuclei results in learning. This also leads to altered electrical activity in nuclear cells.

What does this mean?

Our results contribute to a better understanding of how the brain works and what happens during the learning process. This also leads to more knowledge about how damage to the cerebellum affects functioning, which may help patients in the future.

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