THALAMUS

regulates adaptability of the adult brain

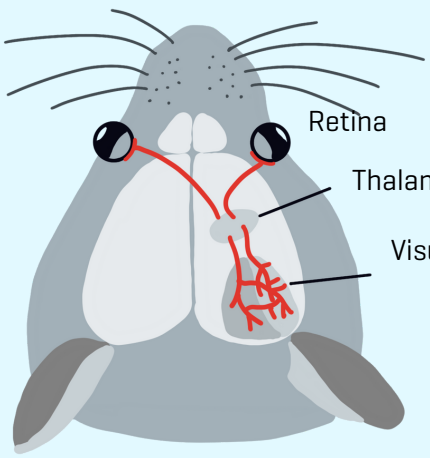
It is generally believed that the adaptability of the adult brain mainly takes place in the cortex. However, a new study shows that the thalamus, a relay station for incoming motor and sensory information, plays an unexpectedly important role in this process.

Learning new things requires a tremendous capacity of our brains. The adaptation of our brain as a result of new experiences is called plasticity. Where this plasticity takes place in adult brain is not well understood.

To gain more insight into this question, a. new study examined the visual system of mice. When one eye of the mouse is occluded for several days, it appears that the visual cortex responds less effectively to the closed eye and better to the open eye. How this is precisely regulated has been unclear for a long time. But these new results bring an important player to the forefront: the thalamus.

Visual system

Visual information reaches the thalamus through the retina. This brain nucleus then transmits processed information to the visual cortex and vice versa.



Critical periods versus adult brain

There are periods during our development when neural networks show a lot of plasticity, known as critical periods. Five years ago, the team discovered that the thalamus plays a crucial role in the plasticity of the visual cortex during critical periods of development. Now they have discovered that the thalamus also plays an important role in later-life plasticity in the adult brain.

The team discovered this by disabling the GABA-alpha 1 subunit in the thalamus of mice. This subunit is responsible for inhibiting the thalamus, and without it, no plasticity occurs. They also found that at a young age, plasticity in the thalamus and cortex influence each other much more, while in the adult brain, the thalamus is particularly important for plasticity in the cortex but not the other way around.

What does this mean?

Plasticity is important in many processes, such as memory. It is possible that the origin of learning disabilities lies in the thalamus rather than the visual cortex. Similarly, in the case of lazy eye, it is commonly believed to be a problem of the visual cortex, but what if it actually originates from the thalamus?

This study provides a hint that we need to look beyond the cortex, which can provide guidance for a new treatment strategies.

Click here for more information and the full press release.