Researchers find increased activity in part of the subthalamus during mouse mother/pup interactions

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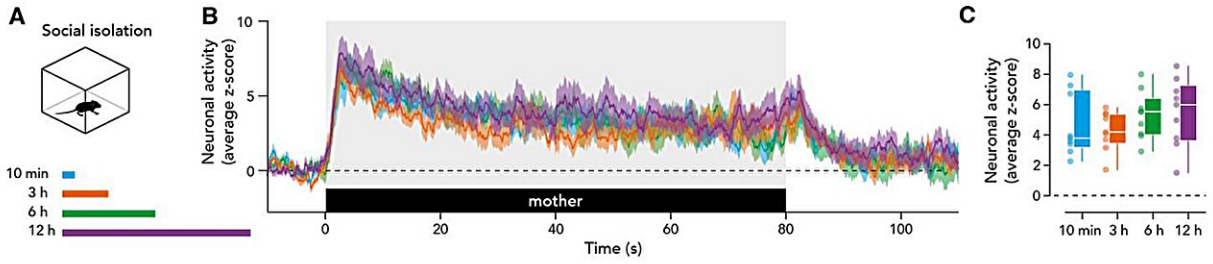

The response of ZI^{SST} neurons to social interactions with their mother after different periods of social isolation. (A) P16-P18 mice are isolated for 10 min, 3h, 6h or 12h. (B) Average Z score of ZI^{SST} neuron activity in response to interaction with the mother after different periods of isolation. (C) Mean Z score of ZI^{SST} neuron activity. Credit: *Science* (2024). DOI: 10.1126/science.adk7411

A combined team of physiologists and medical researchers from Yale University and Sorbonne Université, ICM, has found a part of the mouse brain that becomes more active when mothers and their pups interreact.

For their study, published in the journal *Science*, the group implanted fiber-optic probes into mouse pup brains to learn more about what happens during early social interactions between infants and mothers that leads to bonding.

Prior research has shown that strong bonds are built between many animal mothers and their offspring—such bonding pushes the mother to teach her offspring how to survive and to protect them from harm. It also pushes the offspring to see the mother as a source of survival.

But little is known about what happens in the brain to induce such bonding. In this new effort, the research team determined which parts of the brain are involved in such bonding and what happens to them as bonding occurs.

The researchers began their effort by building on prior work that had suggested bonding between mothers and offspring may have origins in the zona incerta—a bit of gray matter in the subthalamus, which is just below the thalamus. Prior research has shown that neurons in this brain region, in infants, send signals to other parts of the brain, helping to regulate growth.

To learn more about this activity, the team implanted fiber-optic probes that allowed them to monitor neural firing. They also collected brain samples and found that neurons in the zona incerta express a hormone called somatostatin, which is known to regulate many bodily functions by preventing the release of other hormones, such as corticosterone.

The team then studied the behavior of the zona incerta as the mouse pups engaged in various activities, including nursing. The researchers found that when the pups made contact to nurse, the neurons in that part of the brain became more active. The neurons also became more active when the pups encountered other lactating mothers, though not as much.

The researchers also tried isolating the pups and found that doing so drastically reduced activity in the zona incerta—although they also found that artificially inactivating the neurons prevented the pups from becoming distressed when separated from their mothers.

More information: Yuexuan Li et al, Neurons for infant social behaviors in the mouse zona incerta, *Science* (2024). DOI: 10.1126/science.adk7411