Suckling infants trigger surges of trust hormone in mothers' brains

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Researchers from the University of Warwick, in collaboration with other universities and institutes in Edinburgh, France and Italy, have for the first time been able to show exactly how, when a baby suckles at a mother's breast, it starts a chain of events that leads to surges of the "trust" hormone oxytocin being released in their mothers' brains.

The study, published on 18th July in the journal *PLoS Computational Biology*, focuses on the role of oxytocin, a very important hormone recently found be involved in the enhancement of "trust" and love in humans and animals. Oxytocin has long been known to be the trigger that, when released into the blood, causes milk to be let down from the mammary gland. When oxytocin is released within the brain, it also helps to strengthen the bond between mother and child, but to have these effects, a very large amount must be released abruptly to cause a wave of the hormone that can spread through the brain.

What was not known before this study is exactly how the few thousand neurones, which are specialized to release oxytocin, are marshalled together to produce a sufficiently intense burst of activity to do all of that. In fact, even when a child is not suckling these neurons are continually producing oxytocin but in small amounts and in a much more uncoordinated way. Previous studies on individual neurons have found no obvious way of modifying their behaviour to get the coordinated response needed to produce the large, regular pulses of oxytocin that are needed.

Now this University of Warwick led team of experimental neuroscientists and theoreticians have found a likely answer. The neuroscientists have found that in response to suckling the neurons start releasing oxytocin from their "dendrites" as well as from their nerve endings - this was unexpected because dendrites are usually thought as the part of a neurone which receive, rather than transmit information.

The dendrites usually create a weak network of connections between neurons. However the researchers have now shown that the release of oxytocin from the dendrites allows a massive increase in communication between the neurons. This co-ordinates a "swarm" of oxytocin factories, producing massive intense bursts of oxytocin release at intervals of around 5 minutes or so.

The synchronous activation of the few thousand oxytocin producing neurons is an example of "emergent" process. It develops in just the same way as a flock of birds or insects - closely coordinated action developing without a single leader.

University of Warwick computational biology researcher Professor Jianfeng Feng said:

"We knew that these pulses arise because, during suckling, oxytocin neurons fire together in dramatic synchronized bursts. But exactly how these bursts arise has been a major problem that has until now eluded explanation. This research has allowed us to incorporate all the latest research in a large computational model of the whole population of oxytocin cells."

"In this model we have shown that the dendritic interactions are enhanced enough to trigger a massive positive-feedback on activity. The model gives us a possible explanation of an important event in the brain that could be used to study and explain many other similar brain

activities."

Source: University of Warwick