What is this research about?
During late pregnancy and the nursing period after birth, the female body produces a hormone called prolactin, which is responsible for milk production. In several species of mammals including rats and mice, this increase in prolactin is also responsible for the onset and continuation of maternal nurturing behaviours such as grooming babies, building nests, and retrieving wandering babies, as well as for a reduction in maternal aggression. Psychological or physiological stress, however, triggers the release of the stress hormone cortisol and other glucocorticoids, which decreases prolactin. Recently, scientists have identified a protein which may be important in keeping glucocorticoid activity low, and therefore prolactin levels high, in the brains of new mothers. This protein, called Luman/CREB3-recruitment Factor or LRF for short, is thought to help regulate the effects of glucocorticoids in the brain. To test the effects of this protein on glucocorticoid activity, prolactin levels, and nurturing behaviour, scientists developed a breeding line of mice (called LRF-/- mice) that aren’t able to produce the LRF protein and compared them to normal mice.

What did the researchers do?
The researchers studied the nurturing behaviour of LRF-/- and normal or “wildtype” female mice that had recently given birth. They also measured the levels of prolactin and LRF in the female mice, the activity of glucocorticoids in the brain, and the ability of prolactin to signal to other parts of the body. Some LRF-/- mothers were given prolactin directly, or a drug that decreased glucocorticoid activity. Finally, the effects of LRF on glucocorticoid activity in mouse brain cells were also examined.

Keywords:
Maternal behaviour, postpartum depression, prolactin, stress hormones, mice

What you need to know:
Mice that couldn’t produce the LRF protein displayed several postpartum depression-like symptoms, including severe maternal neglect and increased aggression. The LRF protein increases the levels of prolactin, a hormone involved in nurturing and milk production, by counteracting the effects of stress hormones called glucocorticoids.
What did the researchers find?

LRF-/- mothers showed severe maternal neglect: 80% of litters failed to survive past 24 hours, many pups were abandoned outside the nest and/or were not fed, and some pups appeared to have been attacked or even killed. LRF-/- mice spent less time crouching over pups in the nest, and more time on non-pup related activities. LRF-/- females also had lower levels of prolactin before and after birth, more glucocorticoid activity, and problems with prolactin signalling. Some nurturing behaviours could be restored by giving LRF-/- mothers either prolactin directly, or a drug that decreased the activity of glucocorticoids in the brain. LRF blocked the brain receptors for glucocorticoids from sending out signals and also helped remove these receptors.

How can you use this research?

Endocrinologists and obstetricians can use this research to better understand how hormonal changes in late pregnancy and the nursing period after birth may affect maternal behaviour.

Psychiatrists and psychologists can use this research to better understand how hormonal changes linked to the improper regulation of stress hormones and prolactin may lead to postpartum depression.

Medical scientists can further this research by studying whether the LRF protein is also important for regulating glucocorticoid and prolactin levels in human new mothers, and by investigating whether this protein may be involved in postpartum depression or birth-related post traumatic stress disorder.

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