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Brain Images Reveal Menstrual Cycle Patterns

For the first time, scientists have pinpointed an area of the brain involved in a woman's menstrual cycle. The research, reported online this week by the *Proceedings of the National Academy of Sciences*, shows contrasts in activity over the course of a month and provides a baseline for understanding the emotional and behavioral changes that 75 percent of all women report experiencing before, during and after their period.

For any woman who has found herself becoming inexplicably angry or sad during her menstrual cycle, the possibility that her "time of the month" may be responsible is not news. But although a great deal of research has looked at the influence of hormones on nerves, very little work has delved into the role a woman's menstrual cycle can play in the emotions.

Now neuroscientist Xenia Protopopescu of the Weill Medical College of Cornell University and her team have used functional magnetic resonance imaging to monitor the activity of a part of the brain called the orbital frontal cortex, which is known to be associated with regulating emotion and controlling behavior.

To capture the activity, Protopopescu examined 12 healthy women between the ages of 22 and 35 while they read a series of negative, neutral and positive words meant to illicit emotional responses. The women were tested before and after their periods and were specifically selected as females who reported having no premenstrual mood symptoms--characterized as irritability, tension, depression, loss of control, sleep-disturbance, fatigue, food cravings, physical symptoms and social withdrawal--in order to provide Protopopescu with a foundation for future studies of women with more severe symptoms.

The scientists found that during the one to five days before menses, the women showed greater activity in the middle-front part of the brain region and less activity on the sides. After menses, more activity occurred on the sides with less activity showing up in the middle-front area. The women reported feeling no mood changes throughout the month, so the researchers offer another explanation for the shift in activity. "Because of what's known about these regions, we speculate that the increase in activity is in some way modulatory," says team member David Silbersweig, vice chairman for research in Cornell's Department of Psychiatry.

According to the report, the allocation of activity from one part of the brain region to another may reflect the organ's ability to compensate for hormonal changes and help a woman maintain a consistent emotional state. The scientists are now working to compare these results with imaging work on subjects that experience more severe premenstrual mood symptoms.