fMRI scans reveal why pain tolerance goes up during female orgasm and shows brain does not turn off

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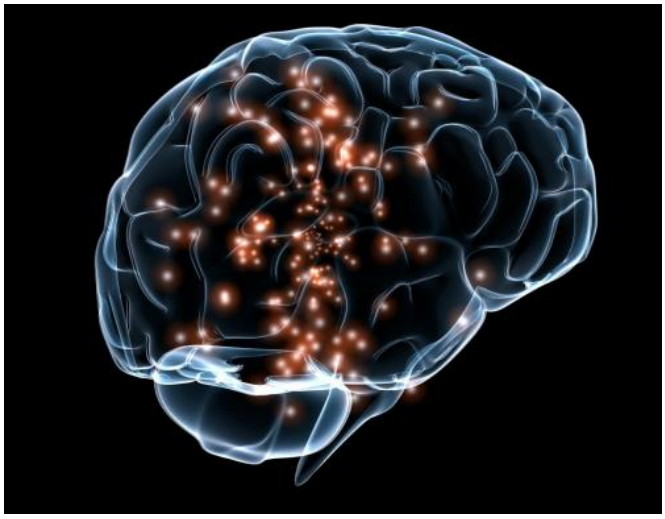

Credit: Wikimedia Commons

(Medical Xpress)—A team of researchers at Rutgers University has determined why women are able to tolerate more pain during the time leading up to and during orgasm. In their paper published in the *Journal of Sexual Medicine*, the group also showed that the female brain does not shut down just prior to or during orgasm.

Much research has been done regarding the physicality of male and female orgasm, but much less is known about what goes on in the brain during sexual climax, especially for women. This has been attributed to the environment used for such studies—most involve asking volunteers to throw aside their inhibitions while they masturbate inside of an fMRI machine. The cold, noisy and mechanical setting is not exactly conducive to arousal. Nonetheless, the researchers with this new effort undertook just such a challenge, enlisting 10 women of various ages and asking them to stimulate themselves as the researchers watched their brains at work from a control room. The women were asked to attempt to reach orgasm twice if they could. The experiments were all repeated a second time with male partners providing the stimulation. The volunteer women were all also fitted with a special device to prevent their heads from moving, preventing blurring of the readings.

The researchers report that despite the clinical environment, most of the volunteers were able to reach an orgasm, allowing the research team to see what happened in the brains of the volunteers as it happened. They report that they found that on the precipice of orgasm, the dorsal raphe nucleus became more active. Prior research has shown that it plays a major role in controlling the release of serotonin, which in addition to making people feel good, also serves as an analgesic. That, the team notes, explains why women report feeling less sensitivity to pain just prior to and during orgasm.

But the researchers also found something else—rather than shutting down, most of the brain regions actually became more active during stimulation and orgasm. This finding contradicts that of a team back in 1985 who conducted similar experiments using a PET scanner and reported finding evidence of multiple brain regions essentially going to sleep during orgasm, which led to claims by others that women require a worry, distraction-free environment if they are to have an orgasm. Using fMRI, the team notes is much more accurate.

More information: Nan J. Wise et al. Brain Activity Unique to Orgasm in Women: An fMRI Analysis, *The Journal of Sexual Medicine* (2017). DOI: 10.1016/j.jsxm.2017.08.014

Abstract

Background
Although the literature on imaging of regional brain activity during sexual arousal in women and men is extensive and largely consistent, that on orgasm is relatively limited and variable, owing in part to the methodologic challenges posed by variability in latency to orgasm in participants and head movement.

Aim
To compare brain activity at orgasm (self- and partner-induced) with that at the onset of genital stimulation, immediately before the onset of orgasm, and immediately after the cessation of orgasm and to upgrade the methodology for obtaining and analyzing functional magnetic resonance imaging (fMRI) findings.

Methods
Using fMRI, we sampled equivalent time points across female participants' variable durations of stimulation and orgasm in response to self- and partner-induced clitoral stimulation. The first 20-second epoch of orgasm was contrasted with the 20-second epochs at the beginning of stimulation and immediately before and after orgasm. Separate analyses were conducted for whole-brain and brainstem regions of interest. For a finer-grained analysis of the peri-orgasm phase, we conducted a time-course analysis on regions of interest. Head movement was minimized to a mean less than 1.3 mm using a custom-fitted thermoplastic whole-head and neck brace stabilizer.

Outcomes
Ten women experienced orgasm elicited by self- and partner-induced genital stimulation in a Siemens 3-T Trio fMRI scanner.

Results
Brain activity gradually increased leading up to orgasm, peaked at orgasm, and then decreased. We found no evidence of deactivation of brain regions leading up to or during orgasm. The activated brain regions included sensory, motor, reward, frontal cortical, and brainstem regions (eg, nucleus accumbens, insula, anterior cingulate cortex, orbitofrontal cortex, operculum, right angular gyrus, paracentral lobule, cerebellum, hippocampus, amygdala, hypothalamus, ventral tegmental area, and dorsal raphe).

Clinical Translation
Insight gained from the present findings could provide guidance toward a rational basis for treatment of orgasmic disorders, including anorgasmia.

Strengths and Limitations
This is evidently the first fMRI study of orgasm elicited by self- and partner-induced genital stimulation in women. Methodologic solutions to the technical issues posed by excessive head movement and variable latencies to orgasm were successfully applied in the present study, enabling identification of brain regions involved in orgasm. Limitations include the small sample (N = 10), which combined self- and partner-induced stimulation datasets for analysis and which qualify the generalization of our conclusions.

Conclusion
Extensive cortical, subcortical, and brainstem regions reach peak levels of activity at orgasm.