Medical Xpress

Erotic images elicit strong response from brain

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This brain map shows differences in reactions to erotic and neutral visual materials. Red zones represent the largest differences, suggesting that circuits in the frontal parts of the brain are particularly sensitive to erotic content and the fastest to detect the difference.

A new study suggests the brain is quickly turned on and "tuned in" when a person views erotic images.

Researchers at Washington University School of Medicine in St. Louis measured brainwave activity of 264 women as they viewed a series of 55 color slides that contained various scenes from water skiers to snarling dogs to partially-clad couples in sensual poses.

What they found may seem like a "no brainer." When study volunteers

viewed erotic pictures, their brains produced electrical responses that were stronger than those elicited by other material that was viewed, no matter how pleasant or disturbing the other material may have been. This difference in brainwave response emerged very quickly, suggesting that different neural circuits may be involved in the processing of erotic images.

"That surprised us," says first author Andrey P. Anokhin, Ph.D., research assistant professor of psychiatry. "We believed both pleasant and disturbing images would evoke a rapid response, but erotic scenes always elicited the strongest response."

As subjects looked at the slides, electrodes on their scalps measured changes in the brain's electrical activity called event-related potentials (ERPs). The researchers learned that regardless of a picture's content, the brain acts very quickly to classify the visual image. The ERPs begin firing in the brain's cortex long before a person is conscious of whether they are seeing a picture that is pleasant, unpleasant or neutral.

But when the picture is erotic, ERPs begin firing within 160 milliseconds, about 20 percent faster than occurred with any of the other pictures. Soon after, the ERPs begin to diverge, with processing taking place in different brain structures for erotic pictures than those that process the other images.

"When we present a stimulus to a subject — for example, when a picture appears on a screen — it changes ongoing brain activity in certain ways, and we can detect those changes," Anokhin says.

Pictures appeared on a screen at 12 to 18 second intervals, and each picture remained on the screen for about 6 seconds. The subjects were instructed to do nothing other than look at the pictures.

A great deal of past research has suggested that men are more visual creatures than women and get more aroused by erotic images than women. Anokhin says the fact that the women's brains in this study exhibited such a quick response to erotic pictures suggests that, perhaps for evolutionary reasons, our brains are programmed to preferentially respond to erotic material.

"Usually men subjectively rate erotic material much higher than women," he says. "So based on those data we would expect lower responses in women, but that was not the case. Women have responses as strong as those seen in men."

Because the electroencephalogram (EEG) technology cannot pinpoint specific brain structures involved in this visual processing, Anokhin says it's not clear exactly which circuits are reacting to these visual scenes. Recent studies in primates recorded the electrical activity of single neural cells within the brain and have shown that the frontal cortex contains neurons that can discriminate between different categories of visual objects such as dogs versus cats. Whether or not the human prefrontal cortex contains special neurons that are "tuned" for sex remains a subject for future studies.

"The newer and more advanced technologies such as MRI and PET provide much better spatial resolution," he says. "Those methods can better localize areas of brain activity, but ERPs have a much better temporal resolution. The EEG can record neuronal activity in real time. When measuring activity in milliseconds, any delay is undesirable."

Most of Anokhin's research is centered on the genetic and neurobiological bases of behavioral traits that might be associated with increased vulnerability to alcoholism and addictive disorders. He believes this study could contribute to that work by detecting differences between responses to images with different emotional significance.

Because many psychiatric disorders also are associated with poor processing of signals associated with reward and pleasure, as well as sexual disturbances, he believes the way the brain processes emotional pictures, including erotic materials, might help scientists better understand some forms of mental illness.

Source: Washington University School of Medicine in St. Louis