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Brain study shows cigarette warning labels require powerful images to deter smoking

PHILADELPHIA – A study of smokers’ brain activity has found that graphic anti-smoking warning labels that produce a strong emotional response are effective at deterring the urge to smoke, according to researchers at the Annenberg Public Policy Center and the Perelman School of Medicine at the University of Pennsylvania.

The study, to be published in a forthcoming issue of *Addiction Biology* and now available online, provides experimental biological support for the use of emotionally powerful graphic warning labels on cigarette packs as a way to deter smoking. It shows that the impact of smoking “cues” that grab the attention of a smoker’s brain – such as the image of a lit cigarette – can be significantly reduced when smokers are first shown a strong, graphic anti-smoking warning.

The study is the first to use electroencephalography, or EEG, to evaluate the impact of cigarette warning labels on smoking-related thoughts and behaviors. It finds “the first electrophysiological evidence of the superiority of graphic warning labels with strong emotional content in reducing brain and behavioral correlates of smoking addiction,” the researchers said.

“This study suggests that presenting emotionally powerful images depicting the risks of smoking can reduce the brain activity that underlies an urge to smoke,” said psychiatrist Daniel Langleben, a study co-author, associate professor in the Department of Psychiatry at the Perelman School of Medicine, and Distinguished Research Fellow at the Annenberg Public Policy Center (APPC). “This study is a great example of how advanced medical research methods can help address a pressing question in tobacco control policy.”

The findings come amid a public and legal debate over graphic warning labels using text and images on cigarette packs. The 2009 Family Smoking Prevention and Tobacco Control Act mandated the expanded warnings. But the Food and Drug Administration’s proposal to include strongly evocative images, such as a diseased lung, on cigarette packs was overturned in 2012 by a federal appeals court. The court ruled that the labels infringed on the tobacco companies’ rights to commercial free speech, and that there was insufficient evidence proving that these emotional images would actually help curtail smoking. Similar warning labels have been in use in many countries worldwide, including Canada, the United Kingdom, Belgium, Brazil, Australia and Thailand.

“When a smoker sees a cigarette, there is increased brain activity reflecting the motivational appeal of smoking,” said An-Li Wang, the study’s lead author and an APPC neuroscience researcher. “Cigarette warnings are largely ineffective in reducing that effect if they do not carry enough emotional impact.”

The study was based on data from 24 smokers from 26-to-40 years old who were not seeking treatment for smoking. The smokers were shown pairs of images: first, a graphic warning label with high or low emotional content or a neutral image; then, a smoking or non-smoking related image or “cue.” The graphic warning labels were selected from among 36 that had been considered by the FDA for use on cigarette packs. In a prior survey, the labels had been rated on an “emotional reaction” scale. A label with a man in an “I quit” T-shirt or a cigarette in a toilet bowl, for example, received low ratings; a cancerous lesion on a lip and a man blowing cigarette smoke through a tracheotomy hole in his throat had high scores. The FDA selected labels with stronger emotional ratings.

The study, funded by APPC, the National Institutes of Health and the FDA, looked both at how smokers described their urge to smoke and what the electrical activity of their brains revealed. The brain-wave readings showed that smokers had an “attentional bias” to smoking-related cues, but that attraction to those cues could be significantly reduced by the more powerful of the two groups of graphic warnings they viewed.

The study showed a disparity between what smokers thought they felt and how their brains reacted to smoking cues. Smokers reported that seeing both the stronger and weaker warning label images reduced their desire to smoke after viewing the smoking cues. But that’s not what the brain wave data showed: In fact, only the more emotional images lessened the brain response to smoking cues.

“Smokers may say they want to quit, but their brains are still responding to smoking cues,” said Dan Romer, APPC associate director and a study co-author. “It is hard for them to ignore things that remind them of smoking.”

The **Annenberg Public Policy Center** (www.annenbergpublicpolicycenter.org/) was established in 1994 to educate the public and policy makers about the media’s role in advancing public understanding of political and health issues at the local, state and federal levels.

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