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**STUDY SHOWS GRAPHIC CIGARETTE WARNINGS TRIGGER BRAIN  
AREAS KEY TO QUITTING SMOKING**

**WASHINGTON** (Feb. 16, 2016) — Viewing graphic anti-smoking images on cigarette packs triggers activity in brain areas involved in emotion, decision-making and memory as observed via brain scans. Researchers from Georgetown University Medical Center and Truth Initiative reported their findings online this week in *Addictive Behaviors Reports*.

The brain scanning study, the first to be conducted in young adult smokers, suggest these images could effectively warn smokers about cigarettes' health consequences, says the study's co-lead author, Darren Mays, PhD, MPH, an assistant professor of oncology at Georgetown Lombardi Comprehensive Cancer Center in Washington, DC.

“What we found in this study reinforces findings from previous research where scientists have asked participants to report how they think and feel in response to graphic warnings on cigarettes,” says Mays, a researcher who studies cancer prevention behaviors including tobacco use interventions. “This study offers us new insights on the biological underpinnings for those responses, bolstering evidence for how these warnings can work to motivate a change in behavior.”

When the 19 study participants were shown images such as one of an open mouth, revealing rotted teeth and a tumor on the lower lip, with the text: “WARNING: Cigarettes cause cancer,” key brain areas showed notable responses, says cognitive neuroscientist Adam Green, PhD, the study's other co-lead investigator.

These areas were the amygdala and the medial prefrontal region, says Green, who administered functional magnetic resonance imaging (fMRI) to the volunteers.

“The amygdala responds to emotionally powerful stimuli, especially fear and disgust. And experiences that have a strong emotional impact tend to impact our decision-making,” says Green, an assistant professor in the department of psychology at Georgetown. “The medial prefrontal region that responded to graphic warning labels in this study has been previously associated with self-relevant processing. When we find information to be self-relevant, that may increase how impactful it is for our life decisions.”

Other studies have indicated that activation in both the amygdala and medial prefrontal cortex might impact future health-related decisions and attitudes, Green says.

“Regulators can and should use this research to craft more effective warning labels and messages to smokers that both deliver facts about the negative effects of smoking, and trigger thoughts and actions that move smokers toward quitting,” said Raymond S. Niaura, PhD, senior author of the study and director of Science at the Schroeder Institute for Tobacco Research and Policy Studies at Truth Initiative. “Tobacco is still the leading preventable cause of death in the U.S. and the growing body of research showing the effectiveness of warning labels should energize policymaking.”

Participants were shown 64 images of a cigarette pack for four seconds each. Among the images used were some displaying the graphic warning labels proposed for use by the U.S. Food and Drug Administration that communicate the smoking-associated risks of lung disease, cancer, stroke, heart attack and reduced life longevity.

Some of the test images were not graphic, intended to serve as control stimuli to compare brain response. After each image was shown, the volunteers, smokers who were between 18 and 30 years old, used a push-button control to report how much each image motivated them to quit, from 1 (not at all) to 4 (a lot).

Researchers found that self-reported motivation to quit was significantly greater for graphic warning images than to the control warnings — as was also seen from scanning results. They also found that so called “plain packaging” – packs with no brand names or imagery such as those being used in Australia — did not change participants’ responses.

Similar fMRI results have been reported in brain studies of adolescent smokers and older smokers, says Mays.

“As more evidence like this is published, the case grows stronger that graphic warnings are important and can make a difference in terms of motivating smokers to take steps to quit,” Mays says.

Co-authors include Emily Falk, PhD, from the University of Pennsylvania, Donna Vallone, PhD, David Abrams, PhD from the Truth Initiative, and Natalie Gallagher and Kenneth Tercyak, PhD, from Georgetown University.

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### **About Georgetown Lombardi Comprehensive Cancer Center**

Georgetown Lombardi Comprehensive Cancer Center, part of Georgetown University Medical Center and MedStar Georgetown University Hospital, seeks to improve the diagnosis, treatment, and prevention of cancer through innovative basic and clinical research, patient care, community education and outreach, and the training of cancer specialists of the future. Georgetown Lombardi is one of only 45 comprehensive cancer centers in the nation, as designated by the National Cancer Institute (grant #P30CA051008), and the only one in the Washington, DC area. For more information, go to <http://lombardi.georgetown.edu>.

### **About the Schroeder Institute**

The Steven A. Schroeder Institute for Tobacco Research and Policy Studies conducts tobacco-control research with a focus on the public health impacts achieved by reducing smoking. Using a transdisciplinary “team science” approach, we work with scientists, practitioners, policymakers and other stakeholders to strengthen the science of tobacco-control implementation, dissemination and policy. The Schroeder Institute is a research arm of Truth Initiative, the national public health organization that is inspiring tobacco-free lives and building a culture where all youth and young adults reject tobacco. The Washington D.C.-based organization, formerly known as Legacy, was established and funded through the 1998 Master Settlement Agreement between attorneys general from 46 states, five U.S. territories and the tobacco industry. To learn more about Truth Initiative’s work speaking, seeking and spreading the truth about tobacco, visit [truthinitiative.org](http://truthinitiative.org).

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