Cannabis abuse alters activity of brain regions linked to negative emotion

New study in Biological Psychiatry: Cognitive Neuroscience and Neuroimaging looks at the effects of heavy cannabis use on brain function and behavior

Philadelphia, January 16, 2018 – Young people with cannabis dependence have altered brain function that may be the source of emotional disturbances and increased psychosis risk that are associated with cannabis abuse, according to a new study published in Biological Psychiatry: Cognitive Neuroscience and Neuroimaging. The alterations were most pronounced in people who started using cannabis at a young age. The findings reveal potential negative long-term effects of heavy cannabis use on brain function and behavior, which remain largely unknown despite the drug's wide use and efforts to legalize the substance.

The study, by Drs. Peter Manza, Dardo Tomasi, and Nora Volkow of the National Institute on Alcohol Abuse and Alcoholism, Bethesda, Maryland, assessed resting brain activity data from the Human Connectome Project of 441 young adults, and compared a smaller set of 30 people who met criteria for cannabis abuse with 30 controls. People with heavy cannabis use had abnormally high connectivity in brain regions important for reward processing and habit formation. The same regions have also been pegged in the development of psychosis in previous research.

“These brain imaging data provide a link between changes in brain systems involved in reward and psychopathology and chronic cannabis abuse, suggesting a mechanism by which heavy use of this popular drug may lead to depression and other even more severe forms of mental illness,” said Dr. Cameron Carter, Editor of Biological Psychiatry: Cognitive Neuroscience and Neuroimaging.

The brain alterations were also associated with heightened feelings of negative emotionality, especially alienation, where one feels a sense of hostility or rejection from others. The link points to a potential biological mechanism for why feelings of alienation are often profoundly increased in people with cannabis dependence.

“Interestingly, the hyperconnectivity was strongest in the individuals who began using cannabis in early adolescence,” said Dr. Manza, which lines up with reports of a higher risk of psychiatric problems when cannabis use begins early in life. Adolescence is a critical period of brain development, making early use of cannabis particularly detrimental. According to Dr. Manza, the measurement of resting brain activity is a relatively easy and non-invasive procedure, so the approach could be a useful measure for tracking the development of psychiatric symptoms with cannabis use.

---
Notes for editors

Copies of this paper are available to credentialed journalists upon request; please contact Rhiannon Bugno at BPCNNI@UTSouthwestern.edu or +1 214 648 0880. Journalists wishing to interview the authors may contact Peter Manza, Ph.D., at peter.manza@nih.gov.

The authors’ affiliations and disclosures of financial and conflicts of interests are available in the article.

Cameron S. Carter, M.D., is Professor of Psychiatry and Psychology and Director of the Center for Neuroscience at the University of California, Davis. His disclosures of financial and conflicts of interests are available here.

About Biological Psychiatry: Cognitive Neuroscience and Neuroimaging
Biological Psychiatry: Cognitive Neuroscience and Neuroimaging is an official journal of the Society of Biological Psychiatry, whose purpose is to promote excellence in scientific research and education in fields that investigate the nature, causes, mechanisms and treatments of disorders of thought, emotion, or behavior. In accord with this mission, this peer-reviewed, rapid-publication, international journal focuses on studies using the tools and constructs of cognitive neuroscience, including the full range of non-invasive neuroimaging and human extra- and intracranial physiological recording methodologies. It publishes both basic and clinical studies, including those that incorporate genetic data, pharmacological challenges, and computational modeling approaches.

About Elsevier
Elsevier is a global information analytics business that helps institutions and professionals progress science, advance healthcare and improve performance for the benefit of humanity. Elsevier provides digital solutions and tools in the areas of strategic research management, R&D performance, clinical decision support, and professional education; including ScienceDirect, Scopus, Scival, ClinicalKey and Sherpath. Elsevier publishes over 2,500 digitized journals, including The Lancet and Cell, more than 35,000 e-book titles and many iconic reference works, including Gray’s Anatomy. Elsevier is part of RELX Group, a global provider of information and analytics for professionals and business customers across industries. www.elsevier.com

Media contact
Rhiannon Bugno
Editorial Office, Biological Psychiatry: Cognitive Neuroscience and Neuroimaging
+1 214 648 0880
BPCNNI@UTSouthwestern.edu