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Project to deter opioid tampering wins top Addiction Science Award
NIDA announces awardees at the 2019 Intel International Science and Engineering Fair

A 14-year-old's innovative approach to prevent tampering and misuse of opioid pills won a first place Addiction Science Award at the 2019 Intel International Science and Engineering Fair (ISEF)—the world's largest science competition for high school students. The awards are coordinated by the National Institute on Drug Abuse (NIDA), part of the National Institutes of Health, and Friends of NIDA, a coalition that supports NIDA's mission. The Intel ISEF Addiction Science Awards were presented at a ceremony Thursday night at the Phoenix Convention Center in Phoenix, Arizona.

L to R: Addiction Science Award Winners Nikita Rohila (3rd place), Aditya Tummala (1st place), Sid Thakker (2nd place)

The first place distinction was awarded to high school freshman Aditya Tummala from Brookings High School in Brookings, South Dakota, for his project "Tampr-X: A Novel Technology to Combat Prescription Opioid Abuse." The young scientist recognized the need for an improved tamper-proof opioid pill to reduce potential for misuse and developed a gummy-like substance that could not be crushed or melted for snorting or injecting. Calling it Tampr-X, the substance is a protein matrix-based technology with a unique combination of ingredients that discourages product tampering and could be mixed with a medication. The protein matrix prevents crushing, while other components enable this product to successfully resist eight other known tampering and misuse possibilities. The product has a provisional patent. Brookings High School has produced several other Addiction Science Award winners since the program began 12 years ago.

"The judges were impressed with the young scientist's understanding of the complex technology related to the development of tamper resistant medications," said NIDA Director Nora D. Volkow, M.D. "While there have been attempts to develop tamper-resistant pills, there is a critical need for more innovation and new ideas in this field. We are delighted to be able to amplify his idea to scientists working on this challenge."

The second place award went to high school sophomore Sid Thakker from James Madison High School in Vienna, Virginia, for his project "The Role of ALPHA5 Single Nucleotide Polymorphism on Nicotine Dependence." Using an in vitro model, the 15-year-old manipulated and edited the gene expression of the ALPHA5 nicotinic receptor, which has been linked to nicotine addiction. Specifically, he used the sophisticated gene-editing platform CRISPR to remove a small genetic component from the receptor, and then studied the changes in function and gene expression. His hope is that one day we can discover how to conduct this genetic editing in animals, leading to new therapies in humans.

Nikita Rohila from Stuttgart High School in Stuttgart, Arkansas, was awarded the third place distinction, for her project "Trends and Factors for Risky Behavior Among Adolescents." The 15-year-old sophomore developed a survey to identify trends and factors in the risk-taking behaviors and decision-making skills of nearly 100 teens 14-18 years old. She asked about a variety of factors that could represent or trigger stress, including alcohol use in multiple contexts, physical fighting and gun violence, excuses for failures, reckless driving and not wearing seatbelts, poor nutrition, and social environments. Results revealed three significant contributing factors to risky behaviors: unhealthy amounts of smartphone and social media use, sleep deprivation and bullying victimization.

"The first place winner innovatively used technology to develop formulations that will make it harder for opioid drugs to be diverted, the second place winner applied state-of-the-art genetic technologies to advance basic knowledge on how a gene influences vulnerability to nicotine addiction, and the third place awardee identified factors leading to risky behaviors in adolescents that can be used to help tailor targeted prevention interventions," added Volkow. "Together, they represent the breadth and depth of scientific investigation related to drug use and addiction."

The Friends of NIDA provides funding for the awards through financial donations from scientists in the field as part of the coalition's support of NIDA's research.

"We were astonished at both the quality and quantity of ISEF finalists who qualified for the Addiction Science Award this year," said William Dewey, Ph.D., president and chair of the Executive Committee, Friends of NIDA, as well as the Louis S. and Ruth S. Harris Professor and chair, Department of Pharmacology and Toxicology, Virginia Commonwealth University, Richmond. "We are pleased to support these exemplary high school students and encourage them to consider a career in the field of addiction science."

The judges offered honorable mention distinctions to three impressive projects, two from international students. The awards went to:
- Nikhiya Shamsher, 16, from Greenwood High International School Bangalore in Bangalore, Karnataka, India for "QuitPuff: A Point of Care Diagnostic for Early Risk Detection of Oral Pre-Cancer and Cancer in Chronic Smokers."
- Tinotenda Zimhunga, 18, and Rufaro Mutogo, 17, Chisipite Senior School, Harare, Zimbabwe for "Alcohol Sensor."
- Zakwan Khan, 18, from Woodstock High School in Woodstock, Georgia, for "Investigating the Role of the Cat-2 Gene in Substance Dependence."

Judges for this year's Addiction Science Awards included three researchers from NIDA grantee Arizona State University: Drs. Janet Neisewander, Cassandra Gipson-Reichardt and Jonna Jackson, as well as Dr. Michelle Jobes from NIDA's Intramural Research Program.

This year, about 1,800 students from more than 75 countries, regions and territories participated in the Intel ISEF competition, coordinated by the Society for Science and the Public. The nonprofit organization partners with Intel—along with dozens of other corporate, academic, government and science-focused sponsors—to provide support and awards each year. Addiction Science Winners receive cash awards provided by Friends of NIDA, with a $2,500 scholarship

for the first-place honoree, $1,500 for second place and $1,000 for the third place distinction. NIDA has developed a special section on its NIDA for Teens website, to highlight the winning projects. In 2017, the 10th anniversary of the Addiction Science Awards, NIDA launched new web pages following the careers of these young scientists over the past decade.

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About the National Institute on Drug Abuse (NIDA): The National Institute on Drug Abuse (NIDA) is a component of the National Institutes of Health, U.S. Department of Health and Human Services. NIDA supports most of the world's research on the health aspects of drug use and addiction. The Institute carries out a large variety of programs to inform policy, improve practice, and advance addiction science. Fact sheets on the health effects of drugs and information on NIDA research and other activities can be found at www.drugabuse.gov, which is now compatible with your smartphone, iPad or tablet. To order publications in English or Spanish, call NIDA's DrugPubs research dissemination center at 1-877-NIDA-NIH or 240-645-0228 (TDD) or email requests to drugpubs@nida.nih.gov. Online ordering is available at drugpubs.drugabuse.gov. NIDA's media guide can be found at www.drugabuse.gov/publications/media-guide/dear-journalist, and its easy-to-read website can be found at www.easyread.drugabuse.gov. You can follow NIDA on Twitter and Facebook.

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