



## Teen Scientists Win \$1.8 Million at Virtual Regeneron Science Talent Search 2020 for Exemplary Research on Predicting Crop Yield, Machine Learning Algorithms and Reducing Emissions in Industrial Gas Burners

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*\$250,000 top award goes to Lillian Petersen of New Mexico in nation's oldest and most prestigious STEM competition for high school seniors*

[Regeneron Pharmaceuticals, Inc.](#) (NASDAQ: REGN) and [Society for Science & the Public](#) announced that **Lillian Petersen**, 17, of **Los Alamos, New Mexico** won the **\$250,000 top award** in the [Regeneron Science Talent Search](#) 2020, the nation's oldest and most prestigious science and math competition for high school seniors. For the first time in its 78-year history, the competition took place virtually, in order to keep finalists and their families safe during the ongoing coronavirus pandemic. Forty finalists, including Lillian, were honored tonight during a virtual award ceremony. More than \$1.8 million was awarded to the finalists, who were evaluated based on the scientific rigor of their projects, their exceptional problem-solving abilities and their potential to become scientific leaders.

First place winner **Lillian Petersen** invented a simple tool for predicting harvests early in the growing season, which helps to improve food distribution planning and offers a promising resource to those working to address global food insecurity. Lillian first validated her tool, which analyzes daily satellite imagery using accepted measures of vegetation health, on known domestic crop data. She then tested it for countries in Africa and successfully predicted harvests with high accuracy against reported yields.

Second place and **\$175,000** went to **Jagdeep Bhatia**, 18, of **Green Brook, New Jersey** for developing two fast and simple machine learning algorithms for computer programs that are attempting to learn new concepts under the tutelage of an instructor, either a computer or human. His algorithms do not only ask random questions but, like a savvy detective, ask just the right ones. His AI algorithms could help train robots and other automated devices faster and easier.

Third place and **\$150,000** went to **Brendan Crotty**, 18, of **Muskogee, Oklahoma** for his project where he designed and built an efficient hybrid gas burner that could help reduce the ecological impact of industries like power generation and materials manufacturing. His specialized burner system operates at higher temperatures than current industrial burners yet emits 19 percent less polluting nitrogen dioxide gas. To build his model, Brendan had to become proficient in computer design software, metal casting and machining.

"Congratulations to the Regeneron Science Talent Search 2020 winners," said Maya Ajmera, President and CEO of Society for Science & the Public, Publisher of *Science News* and 1985 Science Talent Search alumna. "Students like Lillian Petersen are the stewards of our future. The current pandemic has made it clear how important science is to our wellbeing. With these finalists at the forefront of scientific and engineering discovery, I know we are in good hands. They will be solving the world's most intractable problems."

The Regeneron Science Talent Search provides a national stage for the best and brightest young minds to present their original research ideas to leading scientists. The competition celebrates the hard work and creativity of students who are using research as activism to spark conversation, effect change and lead many of society's most pressing issues.

"I'm amazed by the tenacity of this year's Regeneron Science Talent Search finalists, many of whom are seeking solutions to our greatest global challenges, and who rolled with the punches while competing during an unprecedented global pandemic," said Leonard S. Schleifer, M.D., Ph.D., Co-Founder, President and Chief Executive Officer of Regeneron. "Congratulations to the winners, and welcome to the community of Science Talent Search alumni who have displayed remarkable scientific curiosity and leveraged their experience to make a difference in the sciences and beyond."

Other top honors from the competition include:

**Fourth Place:** Rupert Li of Portland, Oregon received a \$100,000 award for his math theory project that resolved an abstract algebra question concerning the "abelian sandpile model" to explore the underlying algebraic structure of a group. His creative approach to a specific type of mathematical model defined on graphs suggests a new approach that other mathematicians studying similar problems may find useful.

**Fifth Place:** Anaiah Thomas of Teaneck, New Jersey received a \$90,000 award for her investigation on how the natural killer (NK) immune cells, CD56bright and CD56dim, are influenced by cancer cells – research that could one day lead to new cancer

therapies. CD56bright NK cells stop CD56dim NK cells from attacking healthy tissue. When Anaiah cultured these NK cells together with cancer-derived fibroblast cells that can stimulate changes in their function, she found that NK cells can switch type based on their microenvironment.

**Sixth Place:** Katherine St George of Merrick, New York received an \$80,000 award for her study of the impact of diet and caffeine on seizures using fruit flies. A high-fat, low-carbohydrate ketogenic diet can lessen seizures caused by imbalances in certain neurotransmitters, while caffeine can increase them. Katherine fed her fruit flies different diets and exposed them to caffeine. She observed that flies fed a ketogenic diet were not as susceptible to caffeine-induced seizures, which may inform diet counseling for human seizure patients.

**Seventh Place:** Alek Westover of Belmont, Massachusetts received a \$70,000 award for his creation of a new parallel partition algorithm that he demonstrated can improve the speed of certain computations. He compared the performance of his algorithm to four others previously developed, and his algorithm performed better than each of them in at least one respect. Theoretical work such as this can be used to improve many computer applications, like those that facilitate database queries, by simultaneously providing speed and robustness.

**Eighth Place:** Adriane Thompson of Westerville, Ohio received a \$60,000 award for her project that identified new regulatory pathways in corn plants that may help to determine growth factors and predict yields for this vital crop. By noting where levels of gene expression changed in the main pathway that uses enzymes to turn off certain genes, she deduced which genes do not need the enzyme to maintain repression, thus indicating that they use novel pathways to regulate gene expression.

**Ninth Place:** Rohan Wagh of Portland, Oregon received a \$50,000 award for his development of a bacteria-powered sensor system that can send farmers up-to-date measurements of soil moisture and nutrient conditions, which could reduce the amount of irrigation water wasted. His design includes microbial fuel cell modules as sensors and an algorithm he wrote to interpret the data and generate a map of soil conditions. He believes his system could improve water use and increase crop yields for around \$100 per acre.

**Tenth Place:** Arjun Neervannan of Irvine, California received a \$40,000 award for his development of an AI software designed to identify hateful or toxic content, often a form of cyberbullying, online with less bias than current programs. Algorithms with built-in biases that associate toxicity with racial, gender and other such identity terms can result in inappropriate censoring of productive discussions. Arjun believes his scalable, automated debiasing process produces a more accurate and fair AI model.

The remaining 30 finalists each received \$25,000. These students will join the ranks of other Science Talent Search alumni, many of whom have gone on to have world-changing careers in STEM fields, and some of whom have earned the most esteemed honors in science and math, including the Nobel Prize, National Medal of Science and MacArthur Foundation Fellowships. In total, Regeneron awarded \$3.1 million in prizes through the Regeneron Science Talent Search 2020, including \$2,000 to each of the top scholars and their schools.

### **About the Regeneron Science Talent Search**

The Regeneron Science Talent Search, a program of Society for Science & the Public since 1942, is the nation's oldest and most prestigious science and math competition for high school seniors. Each year, around 2,000 student entrants submit original research in critically important scientific fields of study and are judged by leading experts in their fields. Unique among high school competitions in the U.S. and around the world, the Regeneron Science Talent Search focuses on identifying, inspiring and engaging the nation's most promising young scientists who are creating the ideas that could solve society's most urgent challenges.

In 2017, [Regeneron](#) became only the third sponsor of the Science Talent Search (following Westinghouse and Intel) as a way to help reward and celebrate the best and brightest young minds and encourage them to pursue careers in STEM as a way to positively impact the world. Through its 10-year, \$100 million commitment, Regeneron nearly doubled the overall award distribution to \$3.1 million annually, increasing the top award to \$250,000 and doubling the awards for the top 300 scholars and their schools to \$2,000 each to inspire more young people to engage in science.

Program alumni include recipients of the world's most coveted science and math honors, including 11 National Medals of Science, five Breakthrough Prizes, 21 MacArthur Foundation Fellowships, two Fields Medals and 13 Nobel Prizes.

Learn more at <https://www.societyforscience.org/regeneron-sts/>

### **About Society for Science & the Public**

Society for Science & the Public is dedicated to the achievement of young scientists in independent research and to public engagement in science. Established in 1921, the Society is a nonprofit whose vision is to promote the understanding and appreciation of science and the vital role it plays in human advancement. Through its world-class competitions, including the Regeneron Science Talent Search, the Regeneron International Science and Engineering Fair, the Broadcom MASTERS, and its award-winning magazine, *Science News* and *Science News for Students*, Society for Science & the Public is committed to inform, educate, and inspire. Learn more at [www.societyforscience.org](http://www.societyforscience.org) and follow us on [Facebook](#), [Twitter](#), [Instagram](#) and Snapchat (Society4Science).

### **About Regeneron**

Regeneron (NASDAQ: REGN) is a leading biotechnology company that invents life-transforming medicines for people with serious

diseases. Founded and led for over 30 years by physician-scientists, our unique ability to repeatedly and consistently translate science into medicine has led to seven FDA-approved treatments and numerous product candidates in development, all of which were homegrown in our laboratories. Our medicines and pipeline are designed to help patients with eye diseases, allergic and inflammatory diseases, cancer, cardiovascular and metabolic diseases, pain, infectious diseases and rare diseases.

Regeneron believes that operating as a good corporate citizen is crucial to delivering on our mission. We approach corporate responsibility with three goals in mind: to improve the lives of people with serious diseases, to foster a culture of integrity and excellence and to build sustainable communities. Regeneron is proud to be included on the Dow Jones Sustainability World Index and the Civic 50 list of the most "community-minded" companies in the United States. Regeneron empowers and supports employees to give back through our volunteering, pro-bono and matching gift programs. Our most significant philanthropic commitments are in the area of science education, including the [Regeneron Science Talent Search](#) and [Regeneron International Science and Engineering Fair](#).

For additional information about the company, please visit [www.regeneron.com](http://www.regeneron.com) or follow @Regeneron on Twitter.

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