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Study Reveals Differences in Patients' Response to Ritalin

- A new brain-imaging study offers insight into why individual patients respond differently to standard doses of Ritalin, a drug used to treat millions of children with Attention Deficit Hyperactivity Disorder (ADHD) each year.
- "Methylphenidate [Ritalin] is very effective for the treatment of ADHD," said psychiatrist Nora Volkow, lead author on the study, "but the doses required to achieve clinical responses vary significantly from patient to patient. The new study suggests that this variation may be due, in part, to individual variation in the release of dopamine, a neurotransmitter associated with feelings of reward and pleasure."
- More dopamine yields a stronger reward signal, and more enjoyment of and motivation to perform certain tasks. Ritalin blocks reuptake of dopamine by nerve cells, thereby reinforcing the reward signal. However, if patients don't produce enough dopamine in the first place, Ritalin may not be as effective.
- The study, one more step in understanding how Ritalin works, may help doctors find other ways to treat patients who do not respond to the drug.

Atmospheric Aerosols Found to Brighten Clouds

- Atmospheric scientists have long suspected that microscopic aerosol particles from industrial processes increase the brightness of clouds, resulting in greater reflection of sunlight and cooling of Earth's climate. However, this supposition is based on model calculations rather than observations, and these model calculations are very uncertain.
- Now, scientists at the U.S. Department of Energy's Brookhaven National Laboratory and Purdue University have combined satellite measurements of cloud brightness, water content, and other variables with model calculations of atmospheric aerosols to demonstrate that the brightening effect does occur, and to develop a means to quantify it.
- "We're not saying that aerosols can counteract the greenhouse effect," said lead scientist Stephen Schwartz, an atmospheric chemist at Brookhaven, "but rather that we need to know how much of a cooling effect they have so we have a clearer picture of the greenhouse effect. To whatever extent aerosols are offsetting greenhouse warming, then the offset is the unseen part of the greenhouse 'iceberg,'" he said.



Stephen Schwartz

(over)

Women in Science High School Career Day



- The Brookhaven Women in Science High School Career Day held on February 12 featured panel presentations and tours of the Relativistic Heavy Ion Collider (RHIC) and the Scanning Transmission Electron Microscope (STEM).
- Physicist Fulvia Pilat explained the research at RHIC to students from Long Island high schools including (starting second from left): Sarah Pillai from Mattituck High School; Taylor Manalili, Riverhead High School; Emily Delorme, Greenport High School; and Elena Skorodumova, from the Hewlitt School.

New Spin on High-Temperature Superconductors

- Understanding what holds electron pairs together in high-temperature (high- T_c) superconductors is "one of the biggest problems in condensed matter physics," says Peter Johnson, a Brookhaven physicist who is searching for the explanation.
- Johnson presented his group's latest findings, which indicate that electron "spin" plays an important role, at the American Physical Society meeting in Indianapolis, Indiana last month.
- Like traditional superconductors, high- T_c superconductors can carry electrical current with no resistance, or loss. But to do so, traditional superconductors must be kept at temperatures just above absolute zero (0 kelvin, or $-273\text{ }^\circ\text{C}$) by surrounding them with expensive liquid helium.
- High- T_c superconductors, however, operate at temperatures around 90 kelvins ($-183\text{ }^\circ\text{C}$), where less-expensive liquid nitrogen can do the cooling. "This difference would decrease the cost of using superconducting materials and open up a wide range of potential applications," says Johnson, including, possibly, power lines that lose no power during transmission. "The role of spin has the potential to revolutionize our thinking about the transfer of electrical current," said Johnson.

Lab Hosts Earth Day Run, April 20

- The Lab will host a four-mile run/walk at 3 p.m. on Saturday, April 20. A free one-half mile Fun Run for children 12 and under will be held at 4 p.m. Race day registration/check-in will begin at 1 p.m. in Berkner Hall.
- Register before April 12 and the entry fee is \$15, which is discounted to \$12 if you bring a nonperishable food item for the local food bank. The fee will be \$18, or \$15 with a nonperishable food item, for applications postmarked after April 12. Checks should be made payable to BSA and application forms and checks should be sent to: Peter Pohlot, Brookhaven National Laboratory, P.O. Box 5000, Bldg. 130, Upton, NY 11973-5000. All entry fees from the four-mile event will benefit Long Island Cares, Inc., a regional food bank.
- All visitors to the Laboratory age 15 and older are required to bring a photo ID to be admitted on site. The public is invited to both events.
- For applications and more information, visit www.bnl.gov/eday, or call 631-344-5660.

Upcoming Events Open to the Public

Stony Brook Opera, April 17, Noon, Berkner Hall. A preview of Monteverdi's exquisite "L'Incoronazione di Poppea" with accompaniment on period instruments. Free

Eric Sun, May 1, Noon, Berkner Hall. The first BSA Noon Recital in 1999 featured then 11-year old Eric Sun. He returns with a program for piano solo that exhibits his maturing romanticism and pianism. Free

Due to heightened security, everyone who enters the Laboratory site must have a photo ID.