



DMS pediatrician David Goodman, M.D., in a Web exclusive for the journal *Health Affairs*, concluded that the evidence supporting claims of a physician workforce shortage is questionable.

Steroids may have elevated effect on teens

The recent Congressional hearings on anabolic steroid abuse by professional athletes helped to shed light on the dangers of performance-enhancing drugs. And ongoing research at Dartmouth is helping to illuminate how prolonged use of steroids may trigger irreversible molecular changes in the brain, especially in adolescent females.

Abuse: Anabolic-androgenic steroids (AAS), synthetic derivatives of testosterone, are controlled substances used by some athletes to build muscle and increase body size. “These are increasingly used drugs of abuse,” says Leslie Henderson, Ph.D., a professor of physiology and of biochemistry at DMS. “In particular, the use among junior high and high school kids has been escalating.” The Centers for Disease Control and Prevention reported in 2001 that 5% of all high schoolers had used steroids without a prescription.

“The most common side effects associated with chronic steroid abuse,” Henderson says, “are changes in aggression, anxiety, and sexual behaviors.” These changes have been known for some time, but there has “not been a lot done to try and understand the underlying basis” for them.

Henderson, in collaboration with Ann

Clark, Ph.D., a professor of psychological and brain sciences at Dartmouth College, has reported that AAS use affects behavior and interferes with the expression of signaling molecules in the brain. Henderson’s lab looks at how these steroids affect a neurotransmitter receptor, the gamma-aminobutyric acid type A (GABA_A) receptor. The GABA_A receptor, an ion channel in the brain, allows negatively charged chloride ions to flow rapidly into neurons. The inward flow of chloride ions inhibits nerve-cell activity by preventing the generation of electrical signals that travel along neurons.

In the short term, AAS use exploits this natural process by allowing GABA_A receptors to remain open longer. The increased chloride ion flow dampens activity in the central nervous system and may contribute to the antianxiety effect that is reported with initial AAS use.

But long-term AAS use can produce very different effects, including increased anxiety or aggression. In mice, chronic steroid exposure alters the expression of some GABA_A receptor subunit genes. One kind of steroid decreased expression of these genes in areas of the brain important in reproduction and aggression in female but not male mice; it also had more effect on adolescents than adults.

Awareness: Henderson and Clark hope their work will heighten public awareness of the risks of AAS use among adolescents, girls in particular. They also hope a better understanding of the underlying mechanisms may lead to new therapies. For example, DMS’s Hillary White, Ph.D., has shown that androgens may ameliorate symptoms of fibromyalgia.

Henderson says their own work is far from the clinical stage, but that “overall understanding of how these drugs affect transmission in the brain could have broad repercussions.” SION E. ROGERS



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Henderson studies steroids’ basic mechanisms.

Sedation scale

A new tool for assessing pediatric sedation practices has been developed and validated by a team of Dartmouth anesthesiologists. In a recent issue of *Anesthesia and Analgesia*, the researchers, led by Joseph Cravero, M.D., explained that the Dartmouth Operative Conditions Scale (DOCS) “will allow a more detailed analysis of sedation techniques.” For example, they wrote, “two techniques for bone marrow biopsy . . . could be compared not only for ‘was the procedure completed?’ but also for what the child’s behavior, degree of movement, and pain was like during the procedure.”



Burden of proof

Two researchers who headed a recent international clinical trial on a vaccine that could prevent 70% of cervical cancers are cautioning policy-makers “to avoid scaling back” the use of Pap smears. In a paper published in *Vaccine*, Dartmouth’s Diane Harper, M.D., M.P.H., and her coauthor detailed the cervical cancer burden worldwide—especially in developing countries—as well as the potential of the vaccine. “Any premature relaxation of cervical cancer control measures already in place,” they concluded, “will bring a resurgence of the disease to the unacceptable levels of the not-too-distant past.”

