



Calcium may do more than build strong teeth. A DMS study showing a possible protective effect against colon polyps was presented at a meeting of the American Association for Cancer Research.

## Tackling the mechanisms of head injuries

In hard-hitting sports like football, helmets don't always protect players from mild traumatic brain injuries, a.k.a. concussions. "Concussions are a major area of concern in all levels of football," says Jeffrey Frechette, Dartmouth's head athletic trainer. They "range from headache to feeling dizzy to being knocked out."

But little is known about what actually causes concussions. This fall, the Dartmouth football team is helping several DMS researchers find some answers.

**Safer:** "If more were understood about exactly how concussions are caused, then there might be better medical care for those with the brain injury," says DMS psychiatrist Thomas McAllister, M.D., one of the researchers on the project. "There might also be better safety equipment, better preventative measures, and safer techniques taught in sports."

Enter Head Impact Telemetry (HIT) helmets, which can keep track of hits that players sustain. The HIT system was conceived in the early 1990s by Richard Greenwald, Ph.D., an adjunct faculty member at Dartmouth's engineering school and founder of Simbex, a Lebanon, N.H.-based R&D firm, and Brown Med-

ical School researcher Trey Crisco, Ph.D. Early on, sensors that measure head acceleration were affixed to the outside of helmets worn by jumpers on the U.S. Ski Team, since they sometimes hit their heads and suffer concussions. Since then, Simbex has developed the HIT system for use on the gridiron—with funding from helmet-maker Riddell and the National Institutes of Health.

In the DMS study, 40 Dartmouth football players are wearing HIT-equipped helmets. Tiny accelerometers, embedded in specialized pads in the helmets, are linked to an encoder that wirelessly transmits data—such as head acceleration and impact magnitude and the number, location, and direction of hits—to a laptop computer on the sidelines. Trainers also wear pagers that sound when players receive potentially concussive hits.

"The system is an extra set of eyes to pick up a kid who we might otherwise have not known about," says Frechette.

**Data:** It's the data that's of most interest to the DMS team: McAllister; surgeon Ann-Christine Duhaime, M.D.; and neuropsychologist Arthur Maerlender, Jr., Ph.D. They will conduct neuropsychological assessments of the players with the HIT helmets—such as functional MRI scans and tests of their working memory—and will compare these findings to the HIT data. For example, they will compare the effects of one major impact to the cumulative effects of many smaller hits.

"The idea is to see whether multiple sub-concussive impacts [affect] cognitive function," says McAllister.

The researchers hope soon to expand the pilot study to include more football players as well as other athletes. Once scientists understand the biomechanics, manufacturers may be able to engineer helmets that will make concussions a distant memory. MARK P. LAWLEY



CHRIS MILLMAN

This season, the helmets of 40 Dartmouth football players are mini mobile neuropsychology labs.

### Picking up parental habits

"Honey, have some smokes," said a 6-year-old boy to a doll. The boy was one of 120 youngsters pretending to grocery shop as DMS researchers observed. Led by Madeline Dalton, Ph.D., the team found that children were more likely to "buy" cigarettes



if their parents smoked and to "buy" alcohol if their parents drank at least monthly. "Our study is the first to demonstrate that preschool children possess social cognitive scripts of adult social life in which the use of alcohol and tobacco play central roles," Dalton et al. wrote in the *Archives of Pediatric and Adolescent Medicine*.

### Reproductive immunity

Hundreds of scientific articles on the immune system of the female reproductive tract were recently summarized by five DMS researchers in the Departments of Physiology and of Microbiology and Immunology. The goal of the summary, published in



*Immunological Reviews*, was "to define the innate immune system in the female reproductive tract and, where possible, to define the regulatory influences that occur during the menstrual cycle." It's essential that the tract's immunological processes be considered "in the design of vaccines for the protection against microbial diseases," concluded the authors. ■