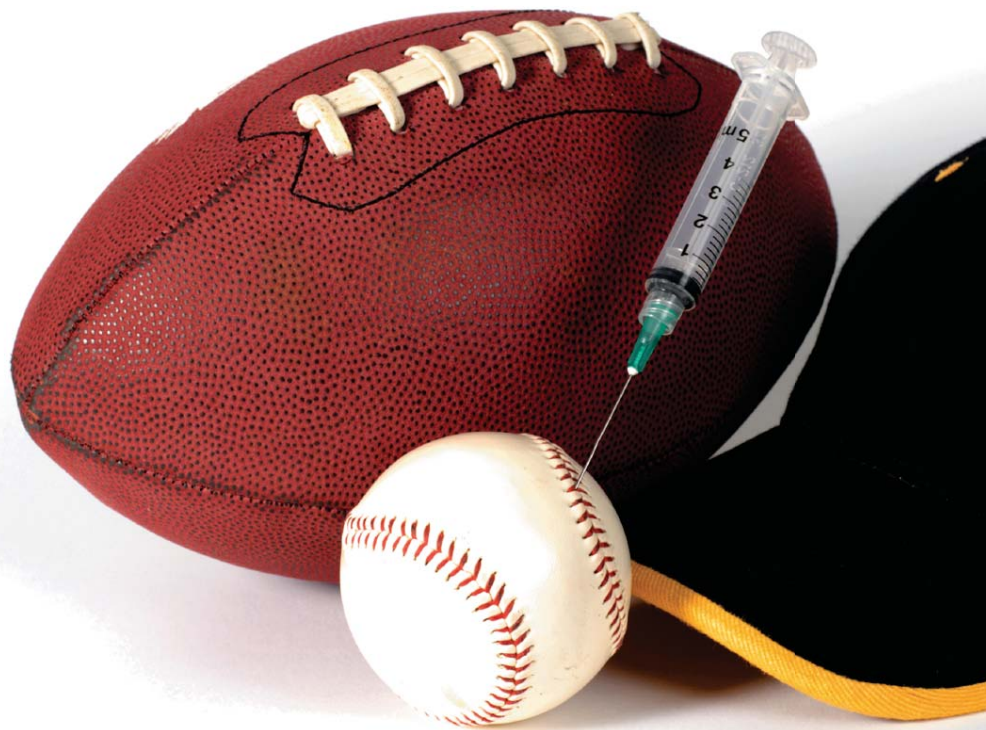


Just say no . . . to genes?



UF, French researchers seek ways to detect athletes who use genes to boost performance

By Ann Griswold

Gene doping has the potential to spawn athletes capable of out-running, out-jumping and out-cycling the strongest of champions. But research under way at UF could help level the playing field by detecting the first cases of gene doping in professional athletes before the practice enters the mainstream.

In the wake of recent Tour de France drug violations — and with the 2008 Olympics looming — the need to stay ahead of the game has never been more evident. That’s why the Montreal-based World Anti-Doping Agency, or WADA, charged with monitoring the conduct of athletes, is working with investigators around the globe to develop a test that would bust competitors for injecting themselves with genetic material capable of enhancing muscle mass or heightening endurance.

“If an athlete injects himself in the muscle with DNA, would we be able to detect that?” asked Philippe Moullier, M.D., Ph.D., an adjunct professor of microbiology and molecular genetics at UF and director of the Gene Therapy Laboratory at the Université de Nantes in France.

Right now the answer is no, he said. But the UF scientists are among several groups collaborating with national and global anti-doping organizations to develop a test that could detect evidence of “doped” DNA.

“WADA has had a research program in place for some years now, to try to develop tests for gene-based doping,” said Theodore Friedmann, M.D., head of the agency’s panel on genetic doping and director of the gene therapy program at the University of California, San Diego.

It sounds futuristic, but experts say it’s only a matter of time. Unscrupulous athletes began showing an interest in gene doping in

2004, when University of Pennsylvania researchers published the first reports of muscle-boosting therapies in mice.

Since then, several potential targets of gene doping have emerged, including the gene for erythropoietin, or EPO. A bioengineered version of the hormone currently on the market increases red blood cell production in patients with anemia and boosts oxygen delivery to the body. In athletes, this translates to enhanced stamina and a competitive edge.

But because WADA prohibits synthetic hormones such as EPO and drug tests detect them, performance-driven athletes have begun searching for stealthier and more powerful alternatives.

“The next variation of boosting red blood cell production is to actually inject the EPO gene itself, which would cause increases in red blood cells,” said Richard Snyder, Ph.D., an assistant professor of microbiology and molecular genetics in the UF College of Medicine and director of UF’s Center of Excellence for Regenerative Health Biotechnology. “So the idea is to develop a test that could detect the gene that’s administered.”

The task isn’t easy — the researchers are faced with a myriad of uncertainties, such as which tissues in the body to sample and how to distinguish a “doped” gene from a naturally occurring one. Ultimately, the test will compare how many copies of the EPO gene are found in an athlete’s body to levels found in the average person who has not been doping.

Gene therapy has progressed in leaps and bounds over the years, but the field has proved anything but predictable. Scientists say gene doping will be no different. Current technologies could prove ineffective — or even lethal — in humans. When the EPO gene was first introduced into macaques, for example, the animals produced so many red blood cells that their veins clogged, and many eventually died after developing massive allergic responses to the therapy.


“I think many athletes know of the technology,” Friedmann said. “They’re aware and they’re concerned. WADA’s aware and concerned. One can overestimate the urgency, or one can be sort of blind to it. But the technology is relatively straightforward and people involved in gene therapy studies could very well see how it could be applied to sport doping.” 



PHOTO BY SARAH KIEWEL

RICHARD SNYDER, Ph.D.

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