Foul play?

Drug testing in sports is a serious matter. Athletes train hard to build muscle and body strength. Some may even resort to cheating. They can do this by abusing drugs called steroids to build extra muscle. This practice is not only unhealthy, but it also gives an athlete an unfair advantage. That's why most professional sports test for it.

Now, scientists say that to keep the game fair, teams may want to test athletes' genes, as well. Depending on what genes they have, some athletes can beat drug tests, even if they're cheating. Others who play fair might be unjustly accused of cheating.

Some athletes who use body-enhancing drugs may have a gene variation that allows them to beat drug tests. Scientists now suggest testing athletes' genes as well.

Photodisc

Genes provide a chemical blueprint for making proteins. Proteins not only build the cells in your body, but they also carry out all the different jobs that cells do. People generally have two copies of each gene in their bodies—one copy comes from the mother and the other comes from the father. Sometimes, one or even both copies of the gene are defective or missing. In such cases, a person may produce far less of the protein than the average person does.

That's what happens in this case. Scientists in Sweden found that some people completely lack the gene that produces the protein UGT2B17. It's an enzyme that prepares testosterone to be flushed from the body in the urine. They then showed how this genetic variation could affect the outcome of doping tests.

Testosterone is naturally made in the body by both men and women, though it is primarily known as a male sex hormone. In addition to causing puberty changes in boys, like hair growth and a deeper voice, testosterone can spur muscle growth. Most steroids abused by athletes (called anabolic steroids) are made

of testosterone.

In order to distinguish between the natural testosterone that the body produces and synthetic testosterone from illegal steroid use, drug tests measure a ratio of two chemicals present in urine. One, epitestosterone, is a naturally occurring hormone. The other chemical, called TG, is created when testosterone is processed by the body.

Most people have a 1:1 ratio of the chemicals, or equal amounts of each. A ratio showing higher levels of TG, or testosterone, is deemed potentially positive and requires more testing.

In the study, the scientists found about 15 percent of 145 healthy males lacked the UGT2B17 enzyme entirely. Just over half the men (52 percent) had one copy of the gene that makes the enzyme, and one-third of them had two copies.

The men were given a single shot of testosterone, enough to show up in doping tests. The researchers then monitored the production of TG in the men's urine for the next 15 days.

About 40 percent of the men who lacked the enzyme never secreted enough TG to raise warning flags in the standard test, even after getting the testosterone shot. The study suggests that people with this genetic makeup could easily beat drug tests, even if they cheated by taking steroids.

"There is a risk that many such individuals have escaped detection," says Anders Rane of the Karolinska Institute in Stockholm, Sweden, and one of the authors of the study.

The study also showed that 14 percent of people with two copies of the gene made so much TG that the current test would flag them as cheaters even if they never got testosterone shots.

Scientists say the study makes a case for combining genetic testing with standard drug tests to track athletes over time. The combination of tests may level the playing field, they say.

Power Words

From *The American Heritage® Student Science Dictionary*, *The American Heritage® Children's Science Dictionary*, and other sources.

enzyme Any of the proteins produced in living cells that act as catalysts in the metabolic process of an organism.

genetics The scientific study of the principles of heredity and the variation of inherited traits among related organisms.

sex hormone A steroid hormone that regulates the sexual development of an organism and is needed for reproduction. Testosterone and estrogen are sex hormones.

steroids Any of a class of organic compounds having as a basis 17 carbon atoms arranged in four rings. Steroids include the sex hormones, such as testosterone, and hormones produced by the adrenal glands.

testosterone A steroid hormone that regulates the development of the male reproductive system and male secondary sex characteristics.

dictionaries

Going Deeper:

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