

## Healthcare industry BW

# Gene doping detectable with a simple blood test

**Scientists at the universities of Tübingen and Mainz have developed a blood test that is able to provide conclusive proof of gene doping. The test is still effective even if the actual doping took place some time before the test. The new test is based on a procedure developed in Tübingen in 2006 that enables transgenic DNA to be detected in the blood. The efficiency of this procedure has now been proven for the first time in laboratory mice.**

Scientists at the universities of Tübingen and Mainz have developed a blood test that can provide conclusive proof of gene doping "For the first time ever, a direct method that uses conventional blood samples to detect doping via gene transfer is now available. What's more, the method is still effective if the actual doping took place quite some time before the test is carried out," explained Prof. Dr. Perikles Simon from the University of Mainz. "This test enables the relatively low-cost detection of the most common doping genes, including EPO," said Simon during the presentation of the new test. It was previously impossible to prove that an athlete had undergone gene doping. "The process of inserting individual genes in specific body cells is based on the idea to use the new technology for curing severe illnesses. It was previously thought that it would only be possible to detect gene doping via gene transfer using extremely costly indirect procedures from the field of molecular medicine," explained gene therapist Prof. Dr. Michael Bitzer from the University Hospital of Tübingen.

Transgenic DNA is still detectable quite a long time after actual gene doping.

The gene doping study conducted by the scientists from Tübingen and Mainz was published in the online edition of the internationally renowned scientific journal "Gene Therapy" on Thursday. According to the study, the test provides clear "yes-or-no" answers based on whether or not transgenic DNA is present in blood samples. Rather than stemming from the person being tested, transgenic DNA or tDNA has been transferred into the person's body (often using viruses) in order to create performance-enhancing substances such as erythropoietin (EPO) that form red blood cells. "The body of a gene-doped athlete then produces the performance-enhancing hormones itself; there is no need to introduce any foreign substances. Over time, the body becomes its own doping supplier," explained Simon. In 2006, when he was working at the University Hospital in Tübingen, Simon developed a procedure that enables even the tiniest traces of transgenic DNA to be detected in the blood. The efficiency of this procedure has now been proven for the first time in laboratory mice. A key component of the animal procedure was a sophisticated process that was used to insert the foreign genetic material extremely specifically into the muscles around a small puncture area.

The insertion of foreign genetic material triggered the excess production of a particular hormone, which prompts the generation of new blood vessels. As long as two months after the genes had been injected into the muscles, the researchers were still able to clearly differentiate between the mice that were subjected to gene doping and those that were not. "The development of a reliable method for detecting misuse of gene transfer will be used to ensure that this new technology, whose side effects are only partially known, is used exclusively in the treatment of severe diseases," said Bitzer. Over the next few months, the University Hospital in Tübingen is planning a therapy study for advanced tumour patients.

### World Anti Doping Agency (WADA) supports study

The safe, sensitive and accurate detection procedure developed by the scientists in Mainz and Tübingen was also proven in a so-called specificity test on 327 blood samples taken from professional and recreational athletes. The researchers now believe that athletes will no longer be able to benefit from the misuse of gene therapy for doping purposes. "At the very least, the risk of being discovered months after the gene transfer has taken place should deter even the most determined dopers," Simon believes. The World Anti Doping Agency (WADA) has financed this research over the past four years with a total of 980,000 US dollars.

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#### **Press release**

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