

GENETICS

A NEW ANALYSIS METHOD FOR BLOOD DOPING

18.12.2006

I have been deeply disappointed this summer when I heard that Jan Ullrich will not participate at the Tour de France 2006 (although there are many more athletes that I am watching – I wish him all the best for the next year). Later on that year I heard a presentation in Bern about blood banking – how cells struggle to survive after leaving the body – and of course we did first gene expression experiments back in 2002.

So here is my idea how to identify autologous blood transfusion: Blood separated from the body will develop a unique RNA expression pattern that can be measured by conventional cDNA chips. Identifying this pattern – possibly only 10 upregulated RNAs – in the blood of an athlete could indicate autologous blood transfusion.

I guess that there will be only a minor chance to re-identify this pattern after retransfusion into the body as blood is being diluted around 1:30 and RNA being immediately degraded.

However, some retransfused cells will probably maintain their death struggle program for some time leaving a good chance to profile them even after a couple of days if they have visited a freezer or not. [Wikipedia](#) is correct

In the case of detecting blood transfusions, a test for detecting homologous blood transfusions (from a donor to a doping athlete) has been in use since 2000. The test method is based on a technique known as fluorescent-activated cell sorting. By examining markers on the surface of blood cells, the method can determine whether blood from more than one person is present in an athlete's circulation.

...

At present there is no accepted way of detecting autologous transfusions (using the athlete's own RBCs) but research is in progress and the World Anti-Doping Agency (WADA) has promised that a test will eventually be introduced. The test method and its introduction date are to be kept secret in order to avoid tipping off doping athletes..

A potential example application may be found in the [literature](#) – no need to keep this idea

secret as it will be nearly impossible to modify a particular gene expression pattern of a particular cell type.

Addendum 5/2/2010

Finally, the WADA recognizes the value of gene signatures in a new [Science editorial](#).

CC-BY-NC Science Surf accessed 20.12.2025 
