

BLOOD DOPING

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1. WHAT IS BLOOD DOPING?



Blood doping is the misuse of certain techniques and/or substances to increase one's red blood cell mass, which allows the body to transport more oxygen to muscles and therefore increase stamina and performance.

2. WHAT ARE THE MOST WIDELY KNOWN TYPES OF BLOOD DOPING?



There are three widely known substances or methods used for blood doping, namely, erythropoietin (EPO), synthetic oxygen carriers and blood transfusions.

Each is prohibited under WADA's List of Prohibited Substances and Methods.

3. WHAT IS EPO?



EPO is a peptide hormone that is produced naturally by the human body. EPO is released from the kidneys and acts on the bone marrow to stimulate red blood cell production.

An increase in red blood cells improves the amount of oxygen that the blood can carry to the body's muscles. It may also increase the body's capacity to buffer lactic acid.

4. WHAT ARE THE SIDE-EFFECTS OF EPO MISUSE?



While proper use of EPO has an enormous therapeutic benefit in the treatment of anaemia related to kidney disease, its misuse can lead to serious health risks for athletes who use this substance simply to gain a competitive edge. It is well known that EPO, by thickening the blood, leads to an increased risk of several deadly diseases, such as heart disease, stroke, and cerebral or pulmonary embolism. The misuse of recombinant human EPO may also lead to autoimmune diseases with serious health consequences.

5. WHEN WAS A TEST TO DETECT EPO IMPLEMENTED?



A test for EPO was introduced at the 2000 Summer Olympic Games in Sydney (Australia). The test, validated by the International Olympic Committee (IOC), was based on blood and urine matrices. A blood screening was performed first and a urine test was then used to confirm possible use of EPO.

In June 2003, WADA's Executive Committee accepted the results of an independent report stating that urine tests alone can be used to detect the presence of recombinant EPO. This report, requested by WADA's stakeholders and commissioned by the Agency to evaluate the validity of urine and blood tests for detecting the presence of recombinant EPO, concluded that urine testing is the only scientifically validated method for direct detection of recombinant EPO. This report also recommended that

urine testing be used in conjunction with blood screening for a variety of reasons, including the cost savings of performing blood screening prior to testing urine. Some International Federations still use both urine and blood matrices for the detection of EPO. Recently, the urine test used for the detection of some new erythropoiesis stimulating agents was adapted for blood testing.

6. WHAT ARE SYNTHETIC OXYGEN CARRIERS?



Synthetic oxygen carriers, such as haemoglobin based oxygen carriers (HBOCs) or perfluorocarbons (PFCs), are purified proteins or chemicals having the ability to carry oxygen.

Synthetic oxygen carriers appear useful for emergency therapeutic purposes when human blood is not available, the risk of blood infection is high or when there is not enough time to properly cross-match donated blood with a recipient. However, their misuse for doping purposes carries the risk of cardiovascular disease in addition to various serious side effects (e.g., stroke, myocardial infarction, embolism).

7. CAN SYNTHETIC OXYGEN CARRIERS BE DETECTED?



Yes. A test was implemented in 2004.

8. WHAT ARE THE DIFFERENT TYPES OF BLOOD TRANSFUSIONS FOR DOPING?



There are two forms of blood doping: autologous and homologous.

Autologous blood doping is the transfusion of one's own blood, which has been stored (refrigerated or frozen) until needed.

Homologous blood doping is the transfusion of blood that has been taken from another person with the same blood type.

Although the use of blood transfusions for blood doping dates back several decades, its recent resurgence is likely due to the introduction of efficient EPO detection methods.

9. WHICH FORMS OF TRANSFUSIONS CAN BE DETECTED?



A test for homologous blood transfusions (HBT) was implemented at the 2004 Summer Olympic Games in Athens.

WADA is funding research projects aimed at developing a test for autologous transfusions.

In order to further improve detection of abnormal blood profiles, WADA is leading the development of a strategy against doping in sport called the **Athlete Passport** ([//www.wada-ama.org/en/athlete-biological-passport](http://www.wada-ama.org/en/athlete-biological-passport)), which is based on following athlete's biological variables over time. The objective of this strategy, which will be added to other anti-doping strategies including "traditional" testing, is to detect abnormal variations of determined biological variables in order to better target testing and/or sanction those found with abnormal variations.

10. WHAT ARE THE SIDE EFFECTS OF DOPING BY BLOOD TRANSFUSIONS?



Like the other forms of blood doping, transfusions have serious medical consequences. Another person's blood may contain a virus, which is unwittingly passed on during the transfusion. An athlete uses his or her own blood, can put themselves at significant health risks if the procedure is not done properly or if the blood is not handled or stored in a proper manner. In addition, unnaturally high red blood cell levels increase the risk of heart attack, stroke, and pulmonary or cerebral embolism.