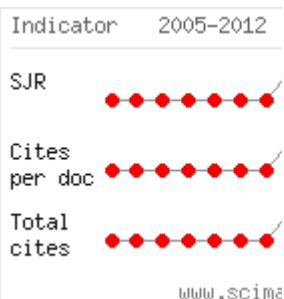


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## Biological passport parameters

*Mario Zorzoli*

### Abstract

For long time anti-doping authorities have tried to find a way to tackle the use of forbidden substances and methods (namely erythropoiesis stimulating agents and blood transfusion) which improve sport performance through an increase of red cells and therefore oxygen transfer. From the end of the '90s scientists have explored two different but complimentary ways to detect these substances/methods: direct detection, aiming to find the forbidden agent in an athlete's biological sample and indirect detection, through the measurement of hematological parameters which are modified by blood doping. The biological

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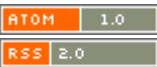
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passport is the most recent and sophisticated tool in regard to indirect doping detection. Its principles rely on the monitoring of relevant biomarkers on a regular basis so as to constitute an individual and longitudinal profile for any given athlete, with the subject becoming his/her own reference.

Standardized procedures in relation to blood sampling, transport and analysis have to be respected in order to decrease pre-analytical and analytical variability. A statistical adaptive model is applied to interpret all the gathered data. The evaluation of this information follows forensic principle, where multiple piece of evidence can be added in order to support the opinion that a doping offence has taken place. Finally, the biological passport experience of the International Cycling Union is presented.

Key words: BIOLOGICAL PASSPORT; BLOOD DOPING; INDIRECT MARKERS

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