

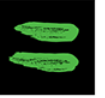
play true

10 years of the ABP

Launch, limitations and lessons



Prevalence of blood doping in the 2000's



	n	Prevalence M1, n (%)	Prevalence M2, n (%)		n	Prevalence M1, n (%)	Prevalence M2, n (%)
Males	4028	12 (10–15)	12 (10–15)	Females	3261	18 (15–21)	18 (15–21)
Country A	205	48 (35–63)	78 (54–99)	Country A	445	46 (35–58)	50 (35–68)
Country B	352	3 (1–11)	1 (0–2)	Country B	130	8 (4–34)	2 (0–11)
Country C	257	23 (15–30)	28 (17–36)	Country C	147	12 (4–20)	14 (1–28)
Country D	208	6 (3–19)	5 (0–17)	Country D	103	1 (0–11)	0 (0–3)
Country E	160	18 (11–30)	18 (7–28)	Country E	106	11 (7–20)	8 (1–14)
Country F	148	6 (1–25)	2 (0–22)	Country F	110	6 (3–19)	0 (0–13)
Country H	160	39 (20–54)	51 (21–87)	Country H	65	36 (13–62)	36 (5–66)
All	7289	14 (12–16)	14 (12–16)				
All nonendurance	1329	3 (0–8)	1 (0–3)				
All endurance	4999	18 (15–22)	19 (16–22)				

Track & Field Athletics

P.-E. Sottas *et al.*, *Clinical Chemistry*. **57**, 762–769 (2011).

The Science in the 2000's



Hematopathology / STANDARDIZATION OF RETICULOCYTE VALUES

Standardization of Reticulocyte Values Context

Michael J. Ashenden, PhD,¹ Ken Sharpe, PhD,² Rasmus Damsgaard



EUROPEAN HEMATOLOGY ASSOCIATION



Journal of the European Hematology Association
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d tests; Dopin

A strategy to deter blood doping in sport

Blood doping is unacceptable on many levels. If practised naively it endangers the life of the athlete,

Editorial, comments & views

haematologica 2002; 87:225-234

http://www.haematologica.ws/2002_03/225.htm



Blood Doping • Decision Making and Problem Solving

A third generation approach to detect erythropoietin abuse in athletes

Ken Sharpe
Michael J. Ashenden
York O. Schumacher

Background and Objectives. Information derived from blood analyses can assist in the detection and/or deterrence of blood doping in sport. We investigated whether comparing an athlete's hematologic values against his or her own historical baseline rather than population-derived thresholds enhanced the ability to detect blood doping.

Design and Methods. We developed an approach whereby an athlete's true baseline value could be estimated with just one prior blood test. We also estimated a universal value for within-subject variability for key hematologic parameters using the highest value obtained among four separate cohorts of male athletes including 80 elite rowers, 124 endurance-trained or team-sport subjects, 288 professional football players and 630 athletes competing at national or international level. The (individual) baseline and (universal) variability were then incorporated so as to define expected thresholds for subsequent blood tests. The sensitivity of our approach was obtained by analyzing data from 49 recreational athletes administered either recombinant human erythropoietin (n=37) or placebo (n=12).

Removing within-subject variability by comparing new results against heightened the capacity to detect blood doping. It was possible to identify changes in either hemoglobin (Hb) or the OFF-Hr model score (an and percent reticulocytes) caused by recombinant human erythropoietin. The natural biological fluctuations found in subjects treated with

Our objective data supported the intuitive belief that long-term blood profiles will help detect blood doping. This information target-testing of suspicious athletes, or even warrant the use of athletes with aberrant variations in key hematologic values.

passport, rHuEPO, athletes, blood doping.
1:356-363
undation

A forensic approach to the interpretation of blood doping markers

Pierre-Edouard Sottas, Neil Robinson, Martial Saugy, Olivier Niggli

Journal of Forensic Medicine and Risk, Volume 7, Issue 3, 1 September 2008, Pages 191-210,

doi:10.1093/fpr/mgm042

11 January 2008

Article history

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Hematologic Passport For Athletes Competing In Endurance Sports: Feasibility Study

L. Malcovati, C. Pascutto, M. Cazzola
Haematologica January 2003 88: 570-581; Doi:

Doping: a paradigm shift has taken place in testing

I Saugy

Bayesian detection of abnormal values in longitudinal biomarkers with an application to T/E ratio

Pierre-Edouard Sottas, Norbert Baume, Christophe Saudan, Carine Schweizer,

Medicine & Science in Sports & Exercise. 31(5):639-645, MAY 1999

PMID: 10331981

Issn Print: 0195-9131

Publication Date: 1999/05/01

Detection and Utilization



Volume 8, Issue 2
April 2007

R Parisotto, M Wu, M...
Haematologica January

Effects of erythropoietin administration in training athletes and possible indirect detection in doping control

MICHEL AUDRAN; RAYNALD GAREAU; STEPHANE MATECKI; FABIENNE DURAND; CLAIRE CHENARD; MARIE-THERESE SICART; BENEDICTE MARION; FRANÇOISE BRESSOLLE



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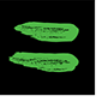
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Tests To Detect Erythropoietin Abuse By

Andersen, K Sharpe, W Hopkins, KR Emslie, C Howe, GJ Trout, R Kazlauskas,

Autumn 2007



- *“Annus horribilis: Cheating has dogged cycling for years, but this year more than most.”*
- **05-Sep-2007: decision by the UCI to launch the ABP**
- **First ABP tests on 26-Oct-2007**
- **Out-of-competition testing in place**



The World Anti-Doping Code

I ATHLETE BIOLOGICAL PASSPORT OPERATING GUIDELINES AND COMPILATION OF REQUIRED ELEMENTS

December 2009

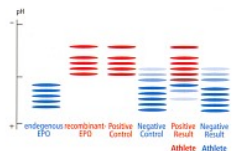
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Athlete's Biological Passport ABP

Athlete ID



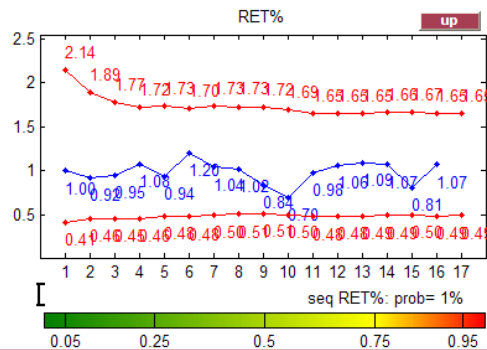
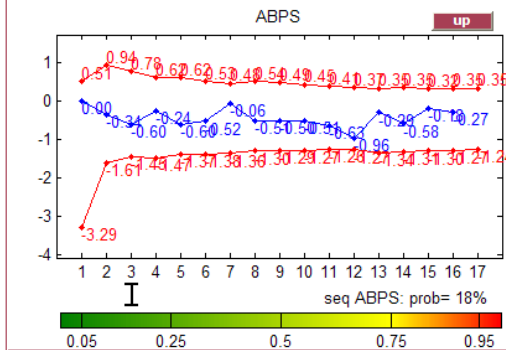
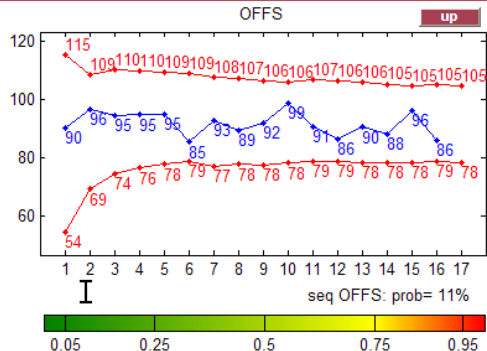
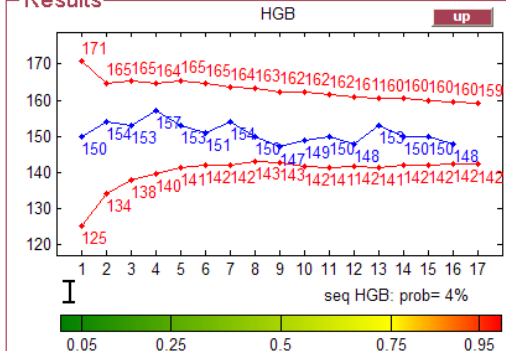
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- Steroidology
- Endocrinology
- Models
- Results

Results



- data
- haematology
 - steroidology
 - endocrinology

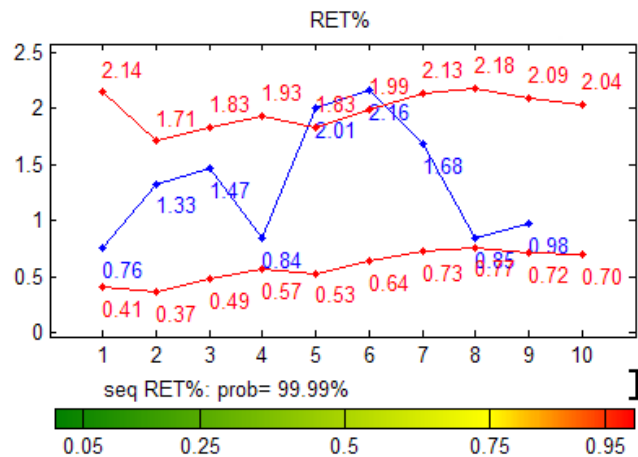
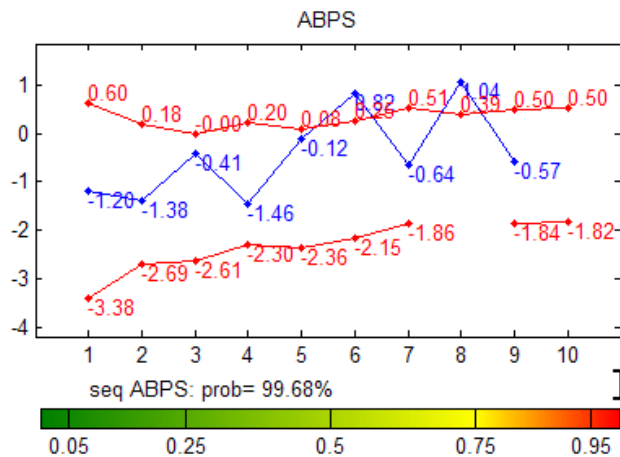
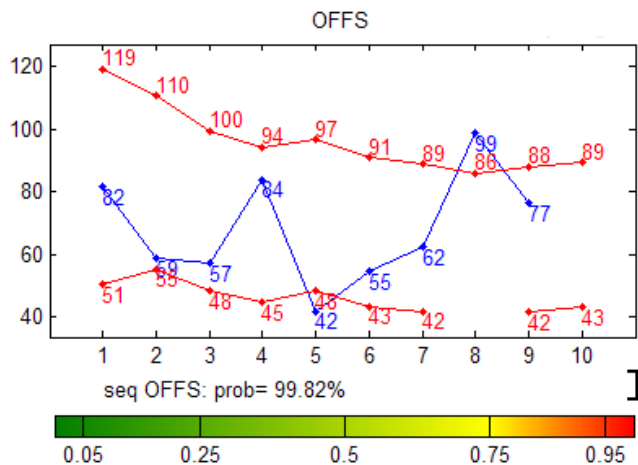
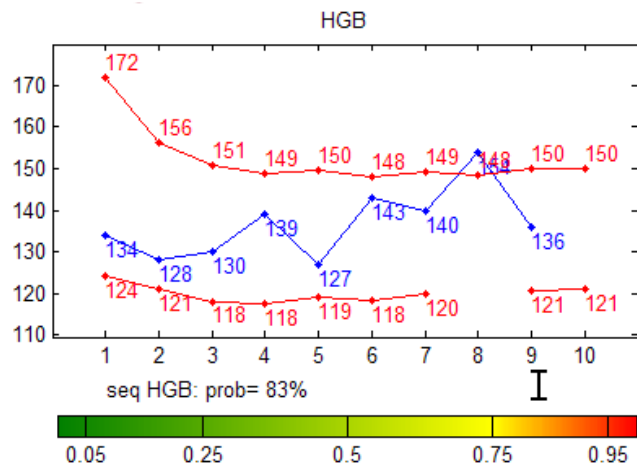
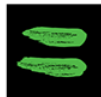
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- markers
- Haemoglobin
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 - ABPS
 - reticulocytes %
 - tHGB mass
 - OFF-mass
- update**



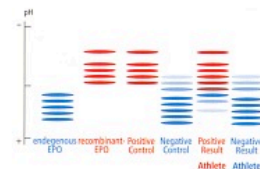
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 Date: 03/2011
 Pierre-Eduard Sottas



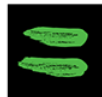
Athlete's Biological Passport ABP

Athlete ID



help

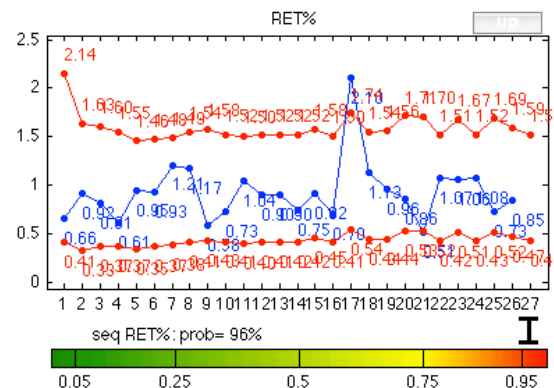
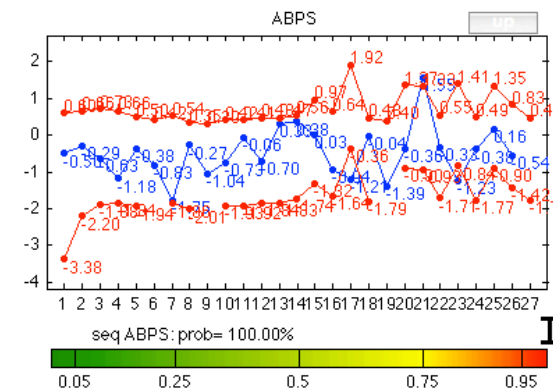
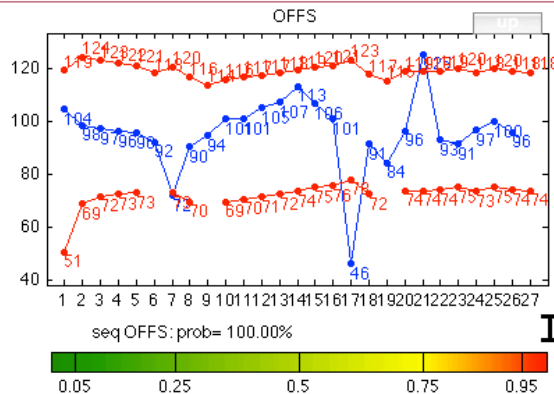
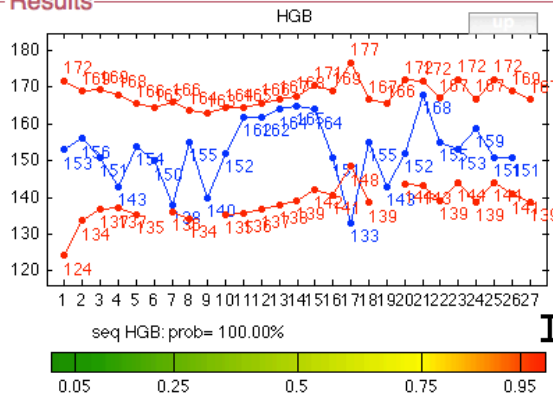
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Datasheet

- Athlete
- Haematology
- Steroidology
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Results



data

- haematology
- steroidology
- endocrinology

display

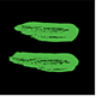
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- temporal

markers

- Haemoglobin
- OFF-score
- ABPS
- reticulocytes %
- tHGB mass
- OFF-mass

update

CAS AWARDS: Jurisprudence for the ABP



53. In summary the CAS Panel finds that:

- (i) there were no defects in the process of analysis or breaches in the chain of custody such as would make the results of the critical tests unreliable;
- (ii) those tests on 19 April and 29 August 2009 revealed abnormalities in the context of the Athlete's ABP such as to create the need for explanation;
- (iii) the explanation of their evidence preferred by the Athlete because of its consistency with the ABP model;
- (iv) in any event, the measure of the ABP was disingenuous and alarming because of the pattern of the ABP; not least, because of the coincidence of the blood manipulation a calendar was striking;

“Therefore, following a consideration of the written and oral testimonies of the Parties’ experts, the Panel is convinced that the ABP model is a reliable and valid mean of establishing an ADRV.”



Court of Arbitration for Sport

de, la Formation conclut que l’Athlète a commis une violation des règles qui interdisent l’usage d’une méthode interdite (21.2 RAD) et, en particulier, la méthode M.1 (“amélioration du transport d’oxygène”) de la liste des

the CAS award in the ABP: “WADA

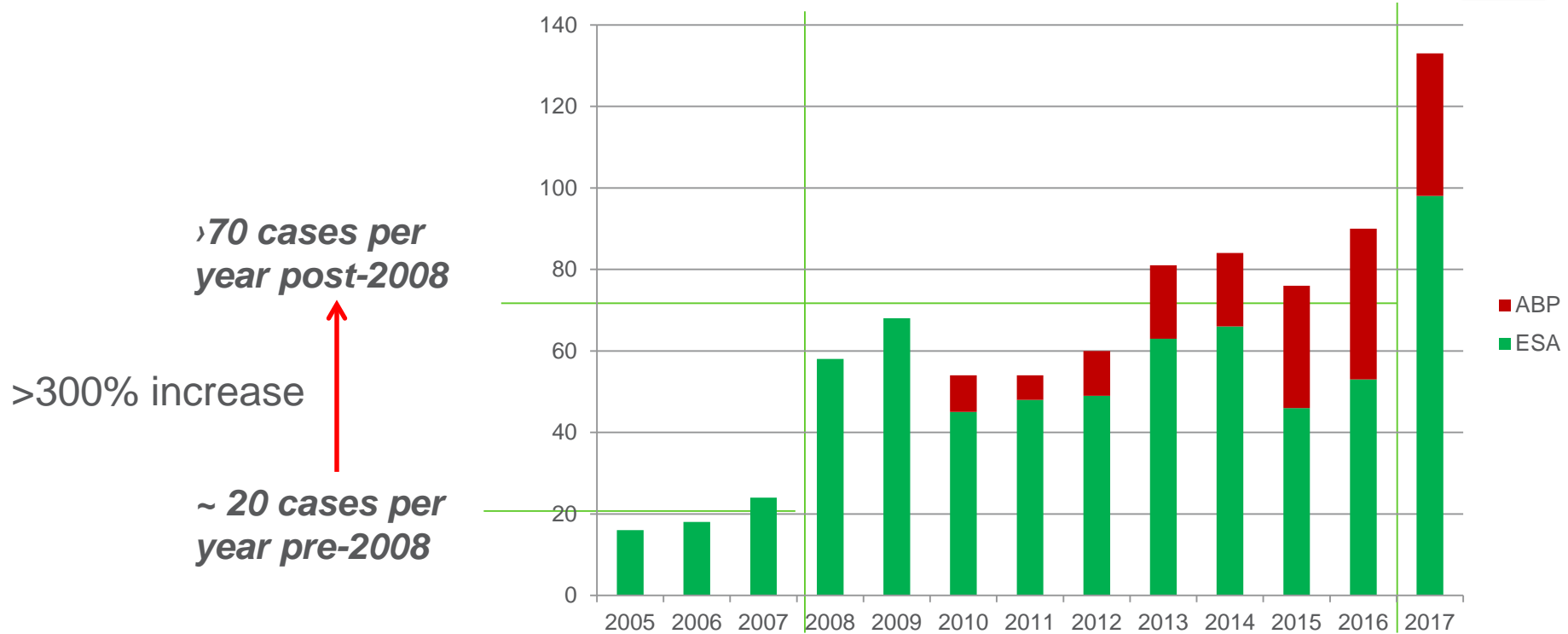
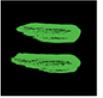
has approved the use of the ABP and this has been codified”⁹⁵. In any event, the Panel rigorously reviewed all the experts’ written and oral testimonies.

- 276. First, although the Panel acknowledges the comprehensiveness of the First Respondent’s Belda-Peña Report (142 pages), the Panel notes that the First Respondent’s criticism of the ABP’s reliability was largely based on the testimony of Dr. Sottas, the entire discussion of which does not address the OFF-score as appropriate.
- 277. Second, the Panel is satisfied that the First Respondent’s challenge in the Vidal Report⁹⁶ is unavailing.
- 278. Finally, the Panel appreciates the First Respondent’s criticism of the ABP’s reliability⁹⁷.
- 279. Therefore, following a consideration of the written and oral testimonies of the Parties’ experts, the Panel is convinced that the ABP model is a reliable and valid mean of establishing an ADRV.

“The Panel recalls the CAS award in the case CAS 2010/A/2235 which confirmed the validity and reliability of the ABP”

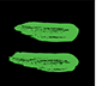
Tribunal Arbitral du Sport

Number of Blood Doping Cases (ADRVs all sports)



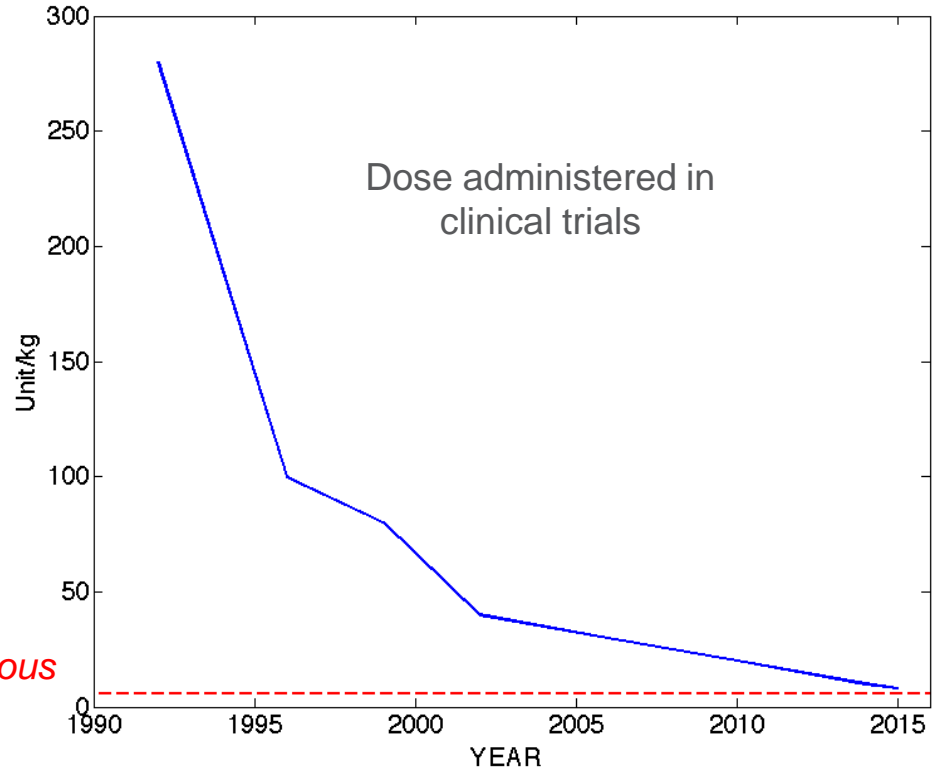
>800 athletes sanctioned since introduction of the ABP

EPO microdosing: how much?

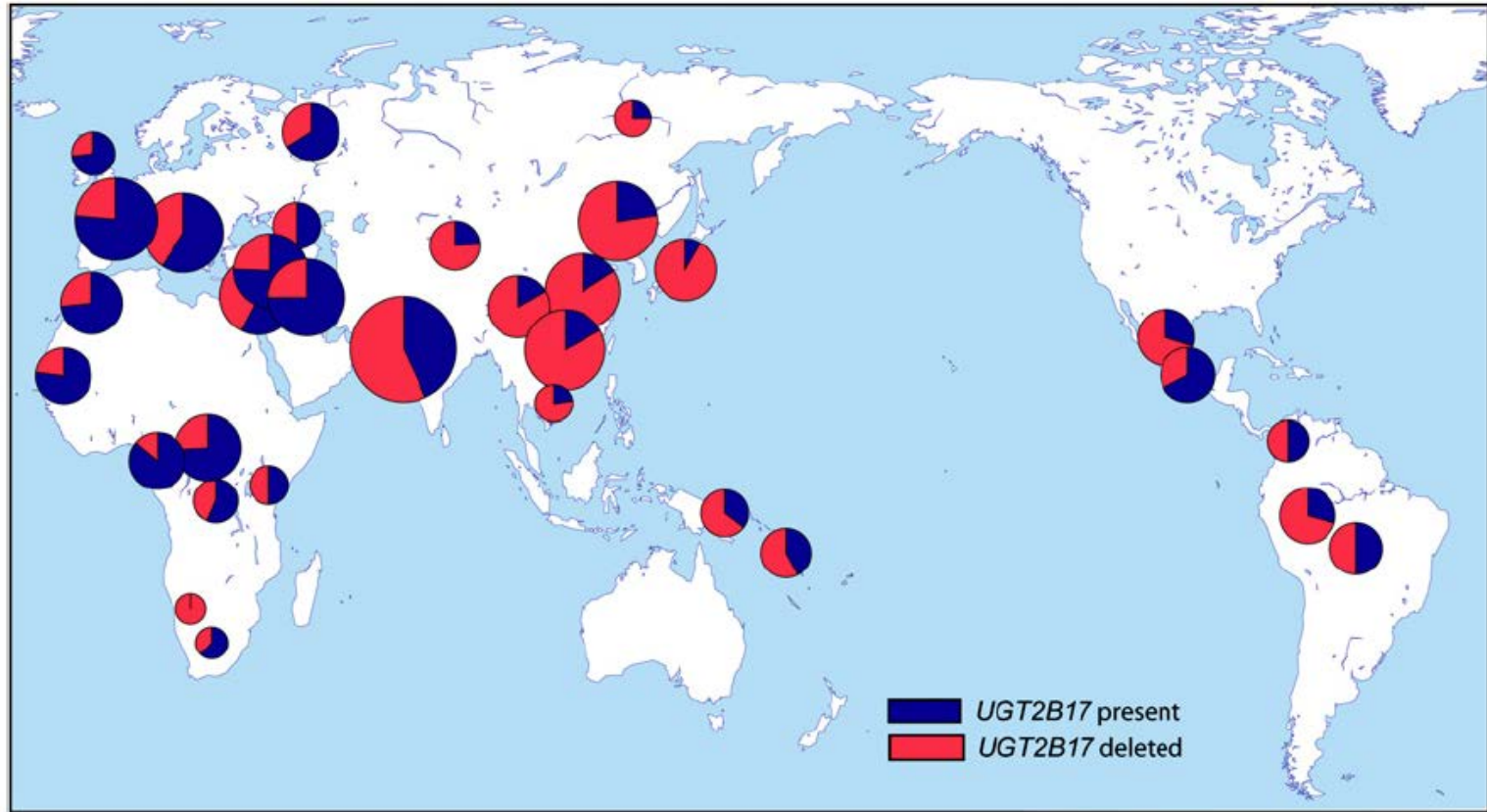
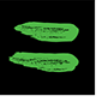


- Evolution of doses administered in clinical trials follows advances in detection methods
- Term “EPO microdosing” introduced in early 2000’s (40 UI/kg IV EOD)
- Rider caught for EPO admitted doping with 8 UI/kg IV EOD

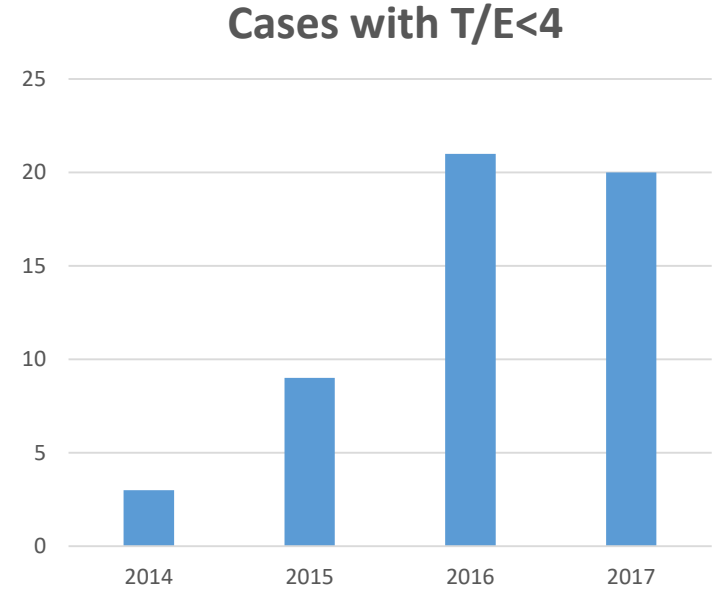
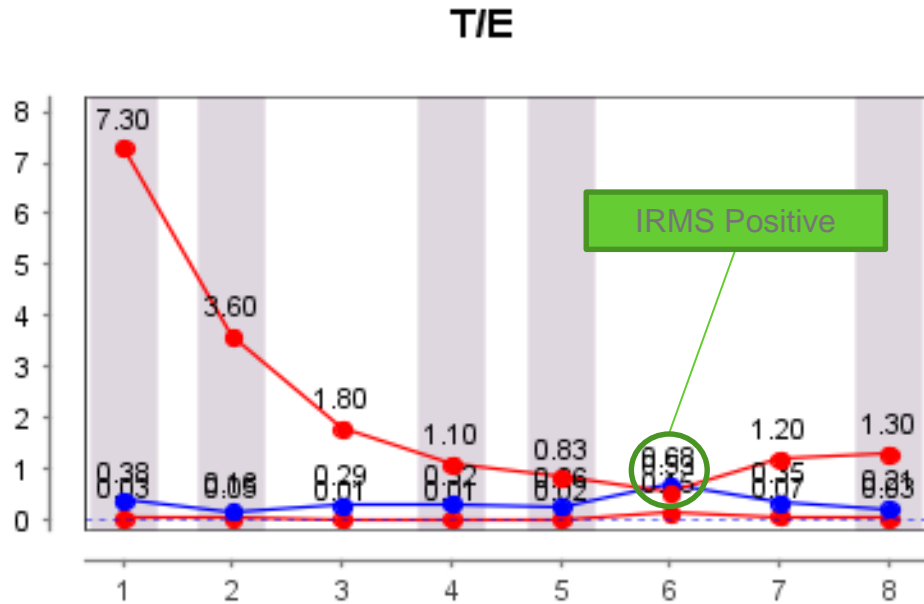
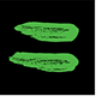
Normal endogenous production



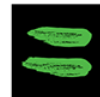
Worldwide variations in testosterone metabolism



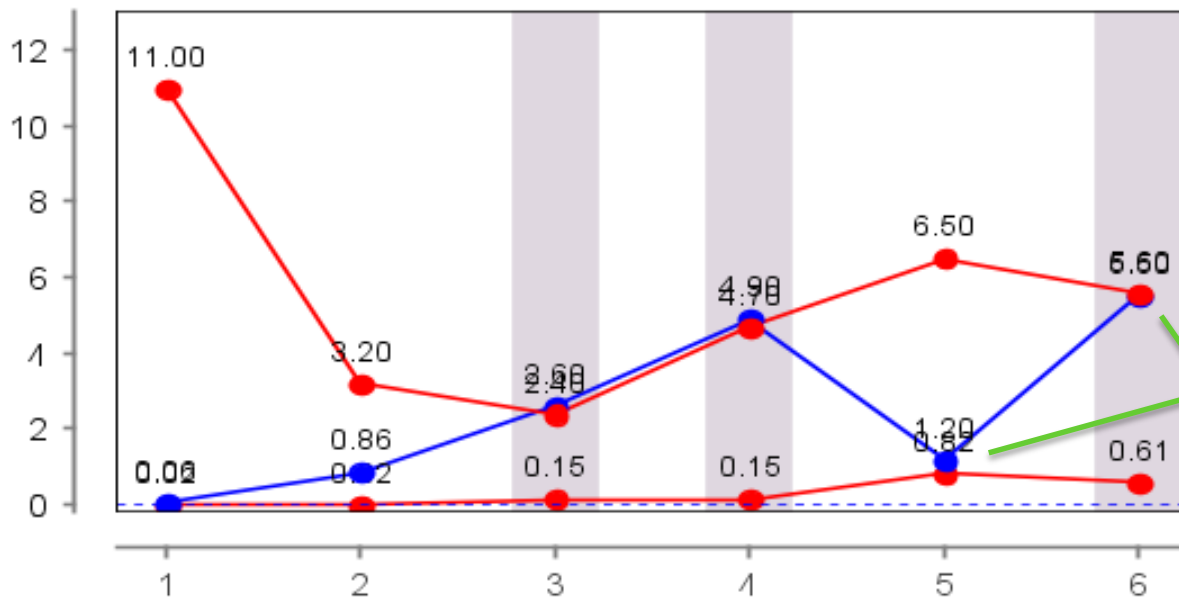
Increase in IRMS positives below T/E of 4



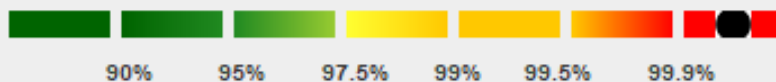
Sample swapping



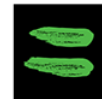
T/E



Different persons



Outcomes of current ABP modules

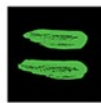


	Drug testing Article 2.1	Passport case Article 2.2	Investigations Articles 2.5-2.10
Haematological Module	++	++	++
Steroidal Module	++	-	++

Deterrence?



play true



WORLD
ANTI-DOPING
AGENCY