

**NUOVI MODELLI  
ORGANIZZATIVI ED  
OPERATIVI PER  
LA TUTELA DELLA SALUTE  
E LA LOTTA AL DOPING**

**PIER LUIGI FIORELLA**

*Commissione Tutela della Salute F.C.I.*

*Membro commissione esperti indipendenti UCI-WADA*



**NUOVI** MODELLI ORGANIZZATIVI ED  
OPERATIVI PER LA TUTELA DELLA  
SALUTE E LA LOTTA AL DOPING



... che possono utilmente  
**affiancarsi** per rafforzare  
l'azione di tutela della salute e  
di prevenzione del doping



**NUOVI MODELLI ORGANIZZATIVI ED  
OPERATIVI PER LA TUTELA DELLA  
SALUTE E LA LOTTA AL DOPING**



... garantire una **efficace** azione  
di tutela della salute della  
popolazione sportivamente  
attiva



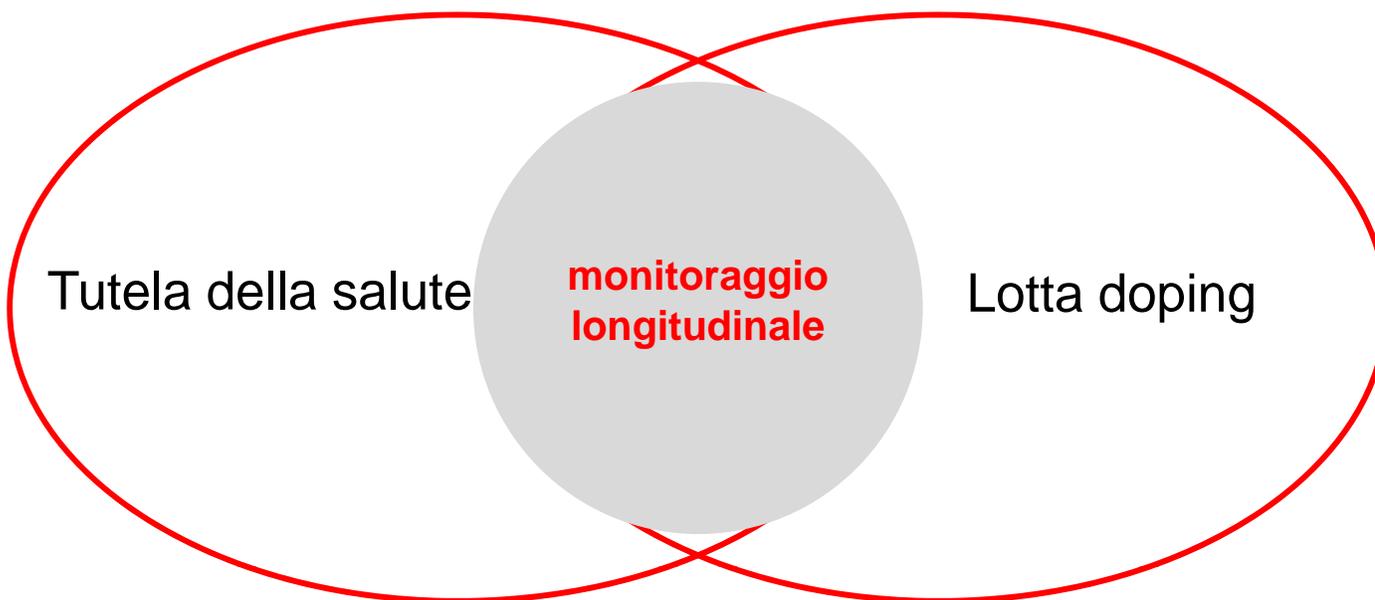
NUOVI MODELLI ORGANIZZATIVI ED  
OPERATIVI PER LA TUTELA DELLA  
SALUTE E LA LOTTA AL DOPING

... rivolti a

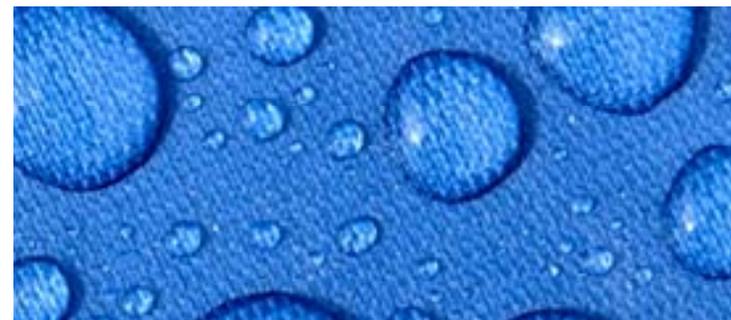
- 
- ✓ atleti delle categorie giovanili
  - ✓ atleti del settore amatoriale



# NUOVI MODELLI ORGANIZZATIVI ED OPERATIVI PER LA TUTELA DELLA SALUTE E LA LOTTA AL DOPING



# Risultati di uno studio epidemiologico ai fini della tutela della salute in giovani ciclisti



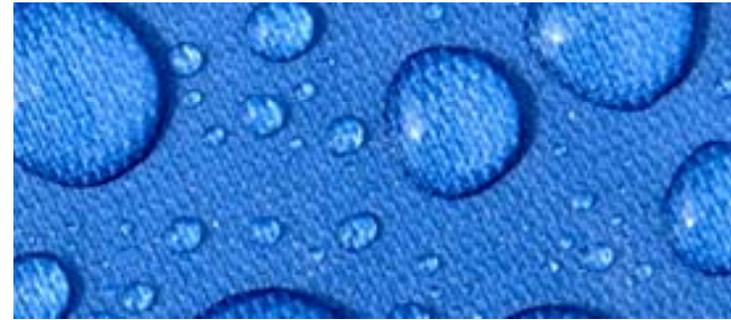
MED SPORT 2001;54:29-36

M. FAINA, P. L. FIORELLA\*, S. BRIGLIA\*, G. MIRRI

TABELLA III. — Atleti che hanno presentato valori al di fuori degli intervalli di riferimento.

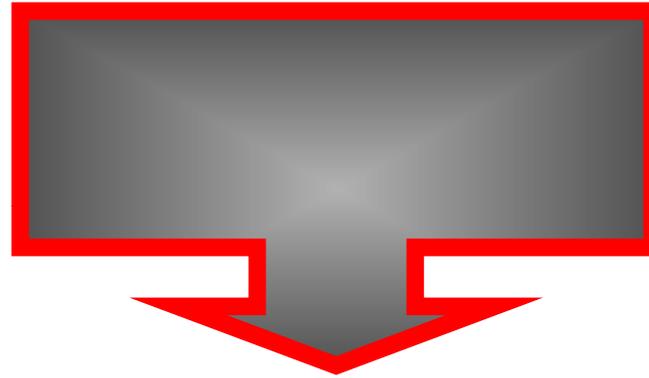
Parametri	Maschi	N. casi	%	Femmine	N. casi	%
Leucopenia	WBC<4	37	1,93	WBC<4	1	0,85
	WBC>12	26	1,36	WBC>12	3	2,56
Leucocitosi	R (N/L)<1	302	15,84	R (N/L)<1	9	7,69
Neutrofili/linfociti	RBC<4	6	0,31	RBC<4	3	2,56
	HB<13	60	3,13	HB<12	3	2,56
Anemia	HCT<39	87	4,55	HCT<36	3	2,56
	RBC>6,0	13	0,68	RBC>5,5	1	0,85
Eritrocitosi	HB>17	17	0,89	HB>16	0	0,00
	HCT>50	14	0,73	HCT>47	1	0,85
Microcitosi	MCV<80	79	4,13	MCV<80	5	4,27
Macroscitosi	MCV>99	6	0,31	MCV>99	0	0,00
Piastrinopenia	PLT<150	47	2,46	PLT<150	1	0,85
Trombocitosi	PLT>400	11	0,57	PLT>400	3	2,56
Reticolopenia	RET<0,4	84	4,84	RET<0,4	2	2,00
	RET#<20	113	6,51	RET#<20	3	3,00
Reticolocitosi	RET>2,0	81	4,67	RET>2,0	7	7,00
	RET#>100	96	5,53	RET#>100	5	5,00

# *Risultati di uno studio epidemiologico ai fini della tutela della salute in giovani ciclisti*



MED SPORT 2001;54:29-36

M. FAINA, P. L. FIORELLA\*, S. BRIGLIA\*, G. MIRRI



**LEUCEMIA MIELOIDE ACUTA**

**Trapianto  
midollo**



# La tutela della salute dell'atleta



**PATOLOGIA EMOLITICA**

# Cyclist's doping associated with cerebral sinus thrombosis



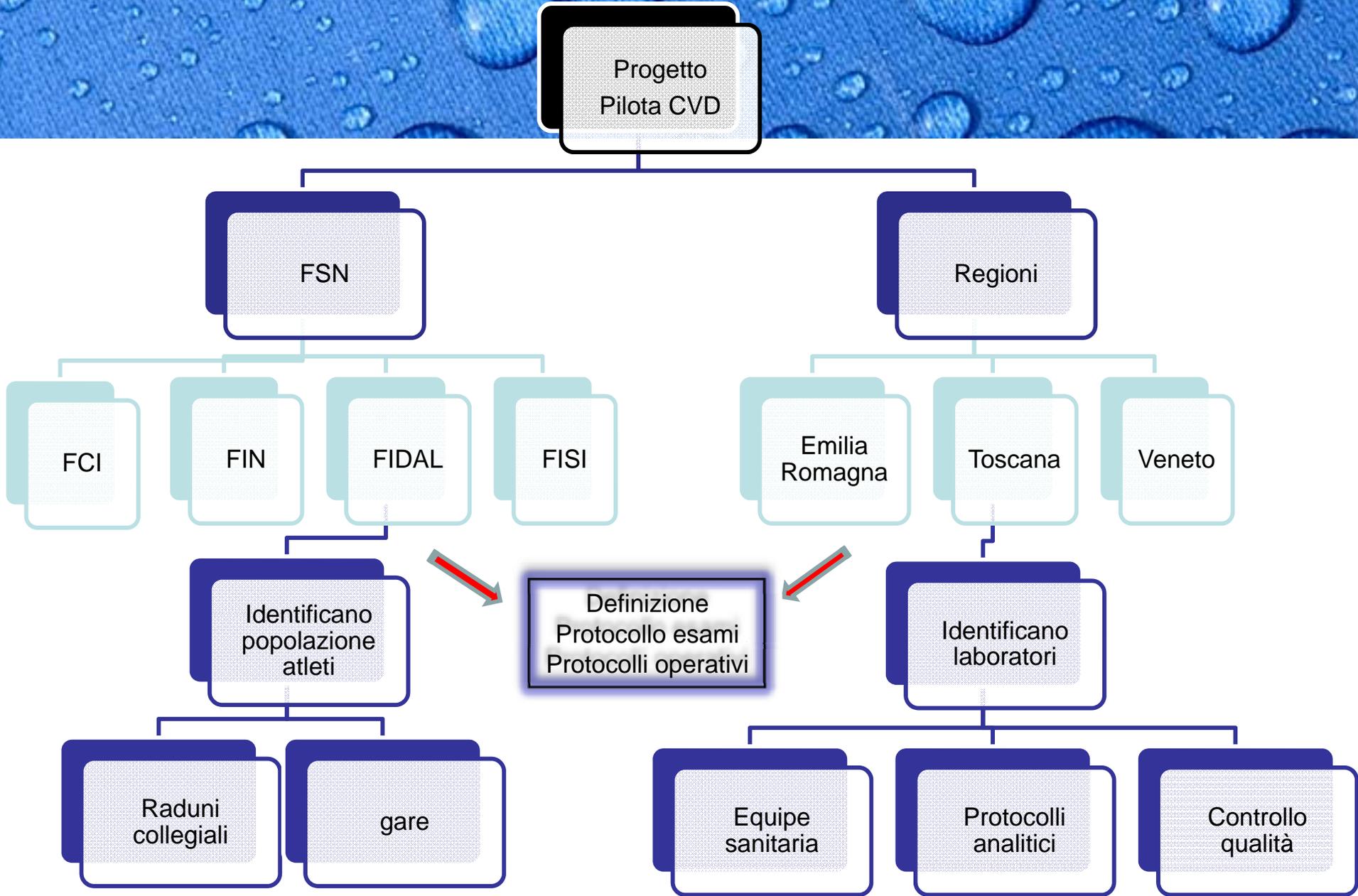
Ciclista di 26 anni,  
sofferente da due mesi di cefalea:  
**RBC 5.4 – Hb 15.0 – Hct 47%**

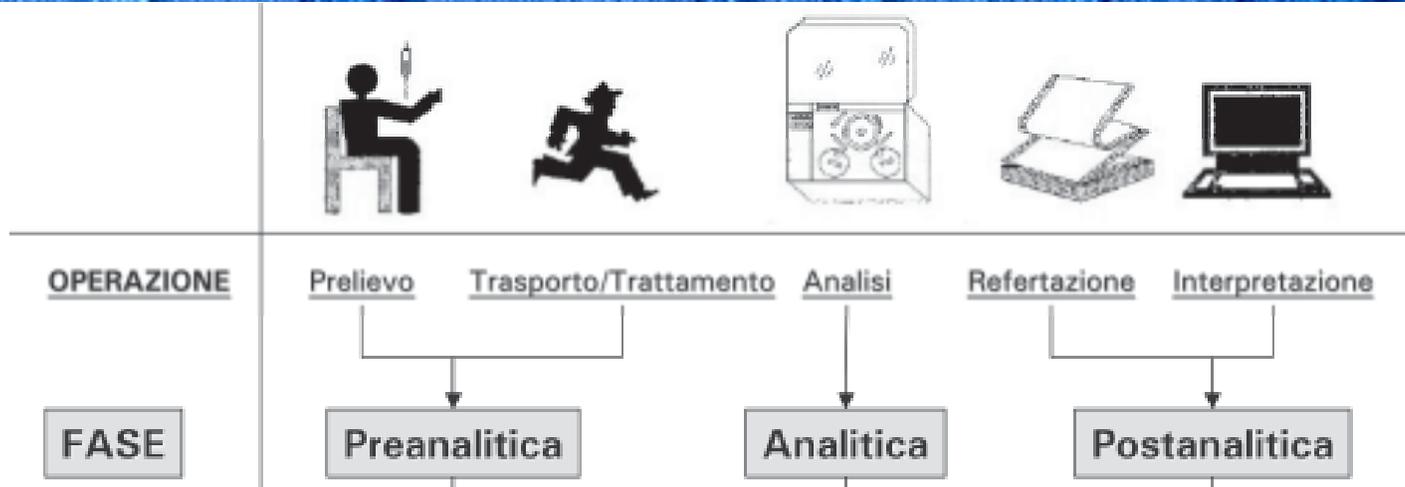
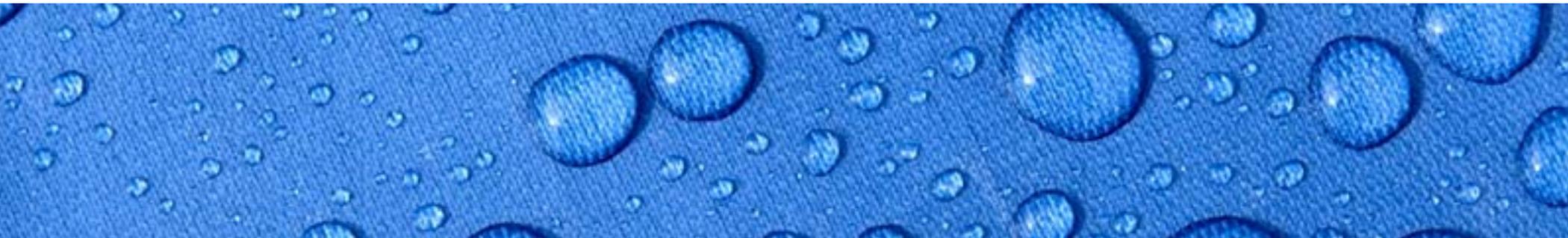
# OBIETTIVI

**MODELLO OPERATIVO  
adattabile alle diverse FSN**

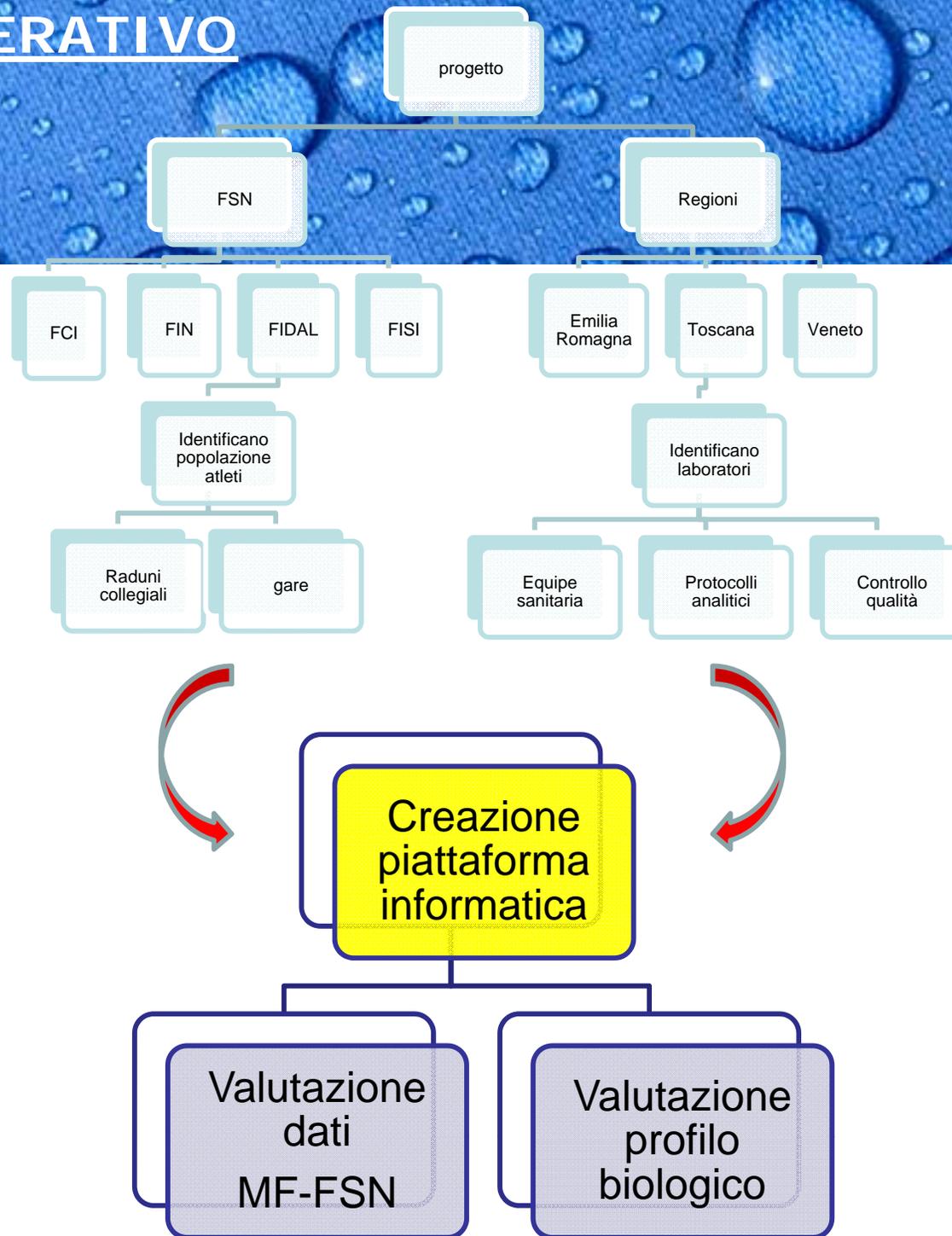
**STRUMENTO SCIENTIFICO  
usufruibile dalle FSN**

# MODELLO OPERATIVO





# MODELLO OPERATIVO



# STRUMENTO SCIENTIFICO

## Esami

Mostra:  Esami programmati  Esami NON programmati  Esami CTS  Tutti gli esami

Periodo: dal 01/01/2011

Protocollo	A	Data	Esame	Protocoll	U.M	Valore	Min	Norm.	Max	N	Eseguito	Pres	Q	A	Data Eser	Controllo
(visualizza tutti)	<input type="checkbox"/>	14/05/2011	MCV	Aprile 2...	fL	88,6		80-94			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	
Agosto 2011	<input type="checkbox"/>	24/09/2011	EMOGLOBINA	Agosto ...	g/dl	13,7		12-16			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
Aprile 2011	<input type="checkbox"/>	24/09/2011	ERITROCITI	Agosto ...	100...	4,53		4,0-5,4			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
Gennaio 2011	<input type="checkbox"/>	24/09/2011	LEUCOCITI	Agosto ...	100...	6,50		4,8-1...			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	MCH	Agosto ...	pg	29,6		27-34			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	MCHC	Agosto ...	g/dl	32,5		31-36			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	MCV	Agosto ...	fL	91,1		80-94			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	MPV	Agosto ...	fL	11,1		7,4-1...			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	PIASTRINE	Agosto ...	100...	287.0...		130-4...			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	RDW	Agosto ...	%	13,4		11,5-...			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	RETICOLOCITI P...	Agosto ...	%	1,23	0,1	0,5-2,0	4,0		Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		24/09/2011	RETICOLOCITI T...	Agosto ...	mili...			30-80			Policlinico Sa...	<input type="checkbox"/>	<input type="checkbox"/>		19/08/...	
		14/05/2011	EMATOCRITO	Aprile 2...	%	42,1		37-47			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	
		14/05/2011	EMOGLOBINA	Aprile 2...	g/dl	13,9		12-16			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	
		14/05/2011	ERITROCITI	Aprile 2...	100...	4,75		4,0-5,4			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	
		14/05/2011	LEUCOCITI	Aprile 2...	100...	7,00		4,8-1...			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	
		14/05/2011	MCH	Aprile 2...	pg	29,3		27-34			Centro Biom...	<input type="checkbox"/>	<input type="checkbox"/>		16/04/...	

 Salva

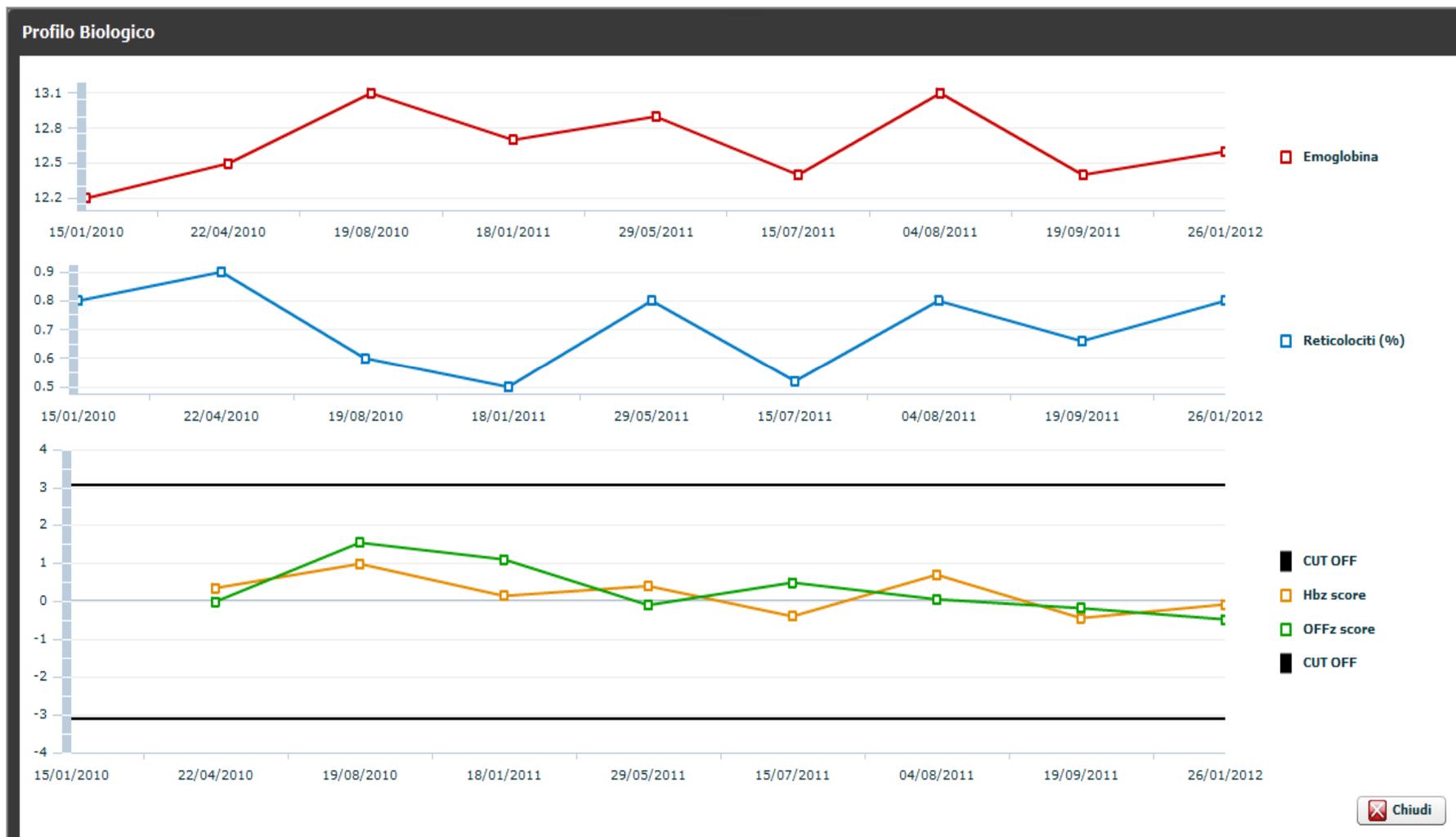
 Help

 Quadri

 Allegati

 Allegati P

# PROFILO BIOLOGICO



# The Athlete Biological Passport

- The fundamental principle of the Athlete Biological Passport is based on the monitoring of an athlete's biological variables over time to facilitate indirect detection of doping on a longitudinal basis, rather than on the traditional direct detection of doping.

# Il Passaporto Biologico dell'Atleta: ...una lunga storia ...



**Haematologica** 2000; 85:564-572  
*original paper*

Red Cells & Iron

## **A novel method utilising markers of altered erythropoiesis for the detection of recombinant human erythropoietin abuse in athletes**

ROBIN PARISOTTO,\* CHRISTOPHER J. GORE,\* KERRY R. EMSLIE,<sup>o</sup> MICHAEL J. ASHENDEN,\*  
CARLO BRUGNARA,<sup>#</sup> CHRIS HOWE,<sup>o</sup> DAVID T MARTIN,\* GRAHAM J. TROUT,<sup>o</sup> ALLAN G. HAHN\*

**haematologica** 2001; 86:128-137

[http://www.haematologica.it/2001\\_02/0128.htm](http://www.haematologica.it/2001_02/0128.htm)

## **Detection of recombinant human erythropoietin abuse in athletes utilizing markers of altered erythropoiesis**

ROBIN PARISOTTO,\* MOUTIAN WU,<sup>o</sup> MICHAEL J. ASHENDEN,\*  
KERRY R. EMSLIE,<sup>#</sup> CHRISTOPHER J. GORE,\* CHRIS HOWE,<sup>#</sup>  
RYMANTAS KAZLAUSKAS,<sup>#</sup> KEN SHARPE,<sup>o</sup> GRAHAM J. TROUT,<sup>#</sup>  
MINHAO XIE,<sup>o</sup> ALLAN G. HAHN\*



## Second-generation blood tests to detect erythropoietin abuse by athletes

CHRISTOPHER J. GORE, ROBIN PARISOTTO, MICHAEL J. ASHENDEN, JIM STRAY-GUNDERSEN, KEN SHARPE, WILL HOPKINS, KERRY R. EMSLIE, CHRIS HOWE, GRAHAM J. TROUT, RYMANTAS KAZLAUSKAS, ALLAN G. HAHN

Haematologica 2003; 88:333-344



## Hematologic passport for athletes competing in endurance sports: a feasibility study

LUCA MALCOVATI, CRISTIANA PASCUTTO, MARIO CAZZOLA

Haematologica 2003; 88:570-81

## A third generation approach to detect erythropoietin abuse in athletes

Ken Sharpe

Michael J. Ashenden

Yorck O. Schumacher

Haematologica 2006; 91:356-363

# A forensic approach to the interpretation of blood doping markers

PIERRE-EDOUARD SOTTAS†, NEIL ROBINSON,  
AND MARTIAL SAUGY

*Swiss Laboratory for Doping Analyses, Institut Universitaire de Médecine Légale,  
Université de Lausanne, Chemin des Croisettes 22, 1066 Epalinges, Switzerland*

**Law Prob Risk 2008;7:191–210**

## Statistical Classification of Abnormal Blood Profiles in Athletes

Pierre-Edouard Sottas, Neil Robinson, Sylvain Giraud, Franco Taroni, Matthias  
Kamber, Patrice Mangin, and Martial Saugy

**International J Biostat 2006;2:1-21**

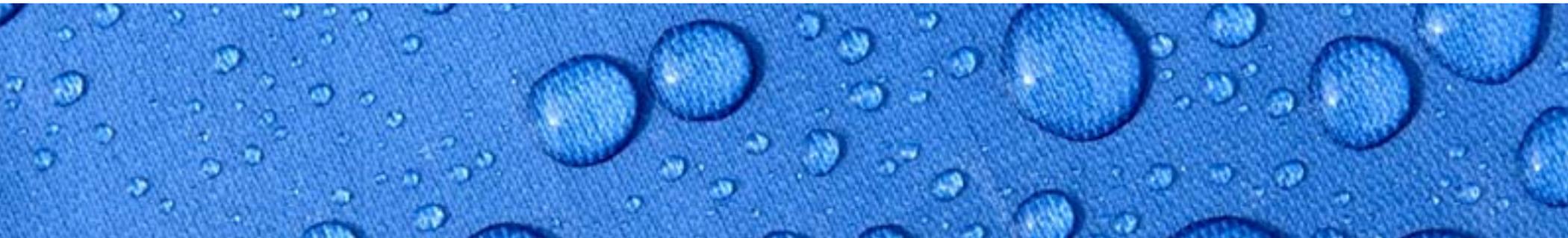
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**Bayesian detection of abnormal hematological  
values to introduce a *no-start* rule for  
heterogeneous populations of athletes**

---

*Neil Robinson, Pierre-Edouard Sottas,  
Patrice Mangin, Martial Saugy*

**Haematologica 2007; 92:1143-1144**



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The World Anti-Doping Code

# ATHLETE BIOLOGICAL PASSPORT

## OPERATING GUIDELINES AND COMPILATION OF REQUIRED ELEMENTS

November 2009

HOME ABOUT WADA WORLD ANTI-DOPING PROGRAM ANTI-DOPING COMMUNITY **SCIENCE & MEDICINE**

Home > Science & Medicine > Athlete Biological Passport

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### Questions & Answers on the Athlete Biological Passport

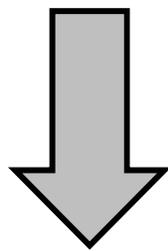
[+ Expand All](#)

- [+ What is the Athlete Biological Passport?](#)
- [+ How was this concept developed?](#)
- [+ When did WADA approve the widespread implementation of the Athlete Biological Passport?](#)
- [+ What is WADA currently doing to further develop the Athlete Biological Passport?](#)
- [+ Will the Athlete Biological Passport replace traditional anti-doping testing?](#)

Last Updated November 2011

[Print](#)

- ✓ Sharing informations and experiences
- ✓ Intelligent athletes targeting



- Increase efficiency
- Decrease costs



# The experience of the International Cycling Union (UCI)

## Positività per ESA

- ✓ 2007: 3 casi
- ✓ 2008: 10 casi
- ✓ 2009: 8 casi
- ✓ 2010: 8 casi

**Correspondence case report**

(wileyonlinelibrary.com) DOI 10.1002/dta.1340

**Case studies on ESA-doping as revealed by the Biological Passport**

Mario Zorzoli<sup>a\*</sup> and Francesca Rossi<sup>b</sup>

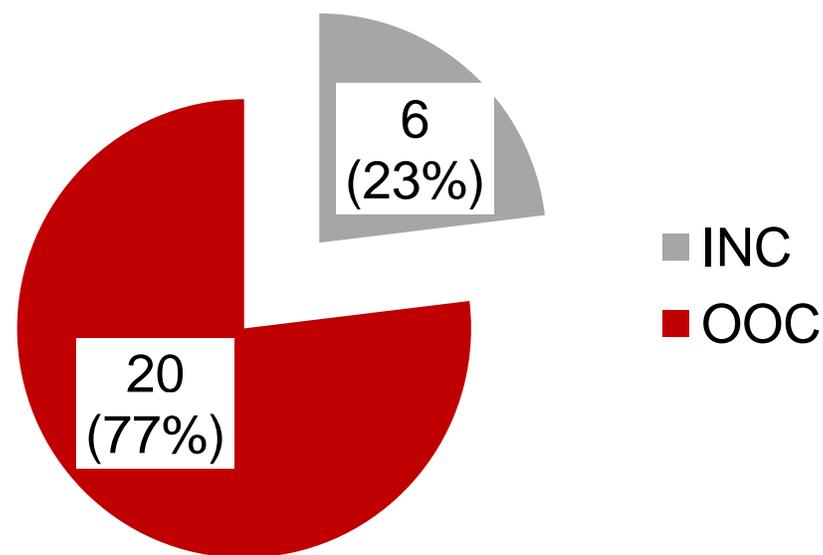
Drug Testing  
and Analysis

Published online in Wiley Online Library

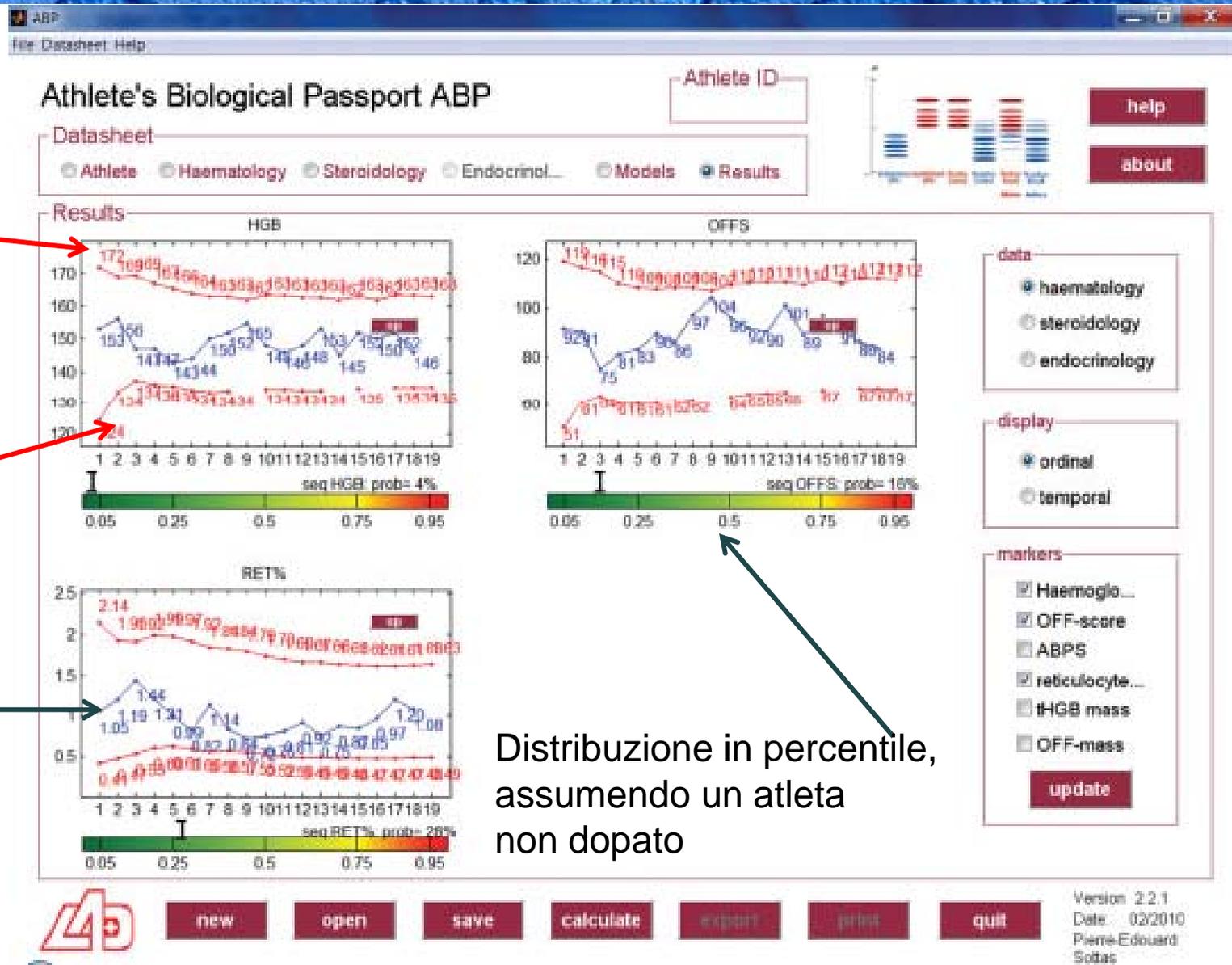
# Case studies on ESA-doping as revealed by the Biological Passport

**Table 1.** Positive cases for ESA between 2008 and 2010 on athlete within the ABP programme.

#	ESA	TEST	REASON FOR TESTING	TESTING STRATEGY	Year	
1	CERA	OOC		INTELLIGENCE	TARGET	2008
2	EPO	IC			RANDOM	2008
3	CERA	IC	HB		TARGET	2008
4	CERA	IC			RANDOM	2008
5	EPO	OOC			RANDOM	2008
6	EPO	OOC			RANDOM	2008
7	EPO	IC	RET		TARGET	2008
8	CERA	IC	HB, RET		TARGET	2008
9	CERA	IC	RET, HB		TARGET	2008
10	CERA	IC	RET, HB		TARGET	2008
11	EPO	OOC			RANDOM	2009
12	EPO	OOC	RET, OFF		TARGET	2009
13	CERA	IC	RET, OFF		TARGET	2009
14	EPO	OOC	RET		TARGET	2009
15	CERA	IC+OOC	RET		TARGET	2009
16	EPO	OOC	RET		TARGET	2009
17	EPO	OOC	RET		TARGET	2009
18	EPO	OOC	RET, HB		TARGET	2009
19	EPO	OOC	HB		TARGET	2010
20	EPO	IC	HB		TARGET	2010
21	EPO	OOC	RET		TARGET	2010
22	EPO	IC	HB, RET		TARGET	2010
23	EPO	IC	RET, OFF		TARGET	2010
24	EPO	OOC	RET, OFF		TARGET	2010
25	EPO	OOC			RANDOM	2010
26	EPO	OOC	HB, OFF, RET		TARGET	2010



# Athlete's Biological Passport



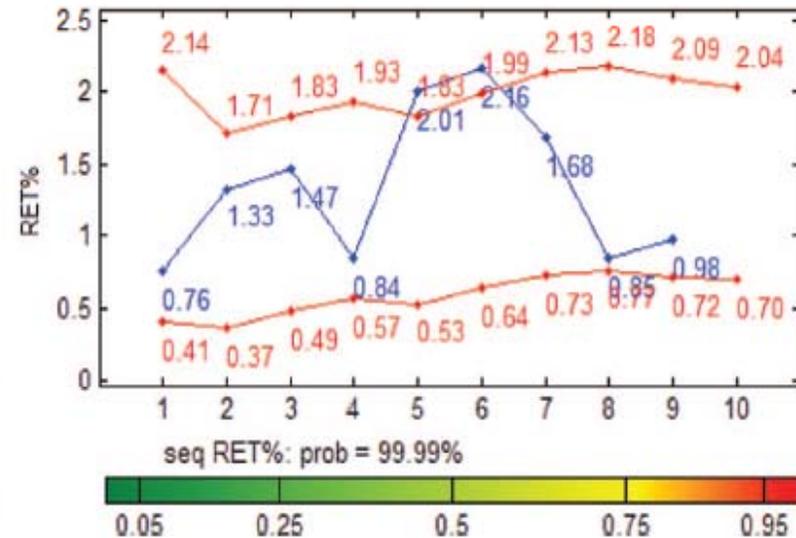
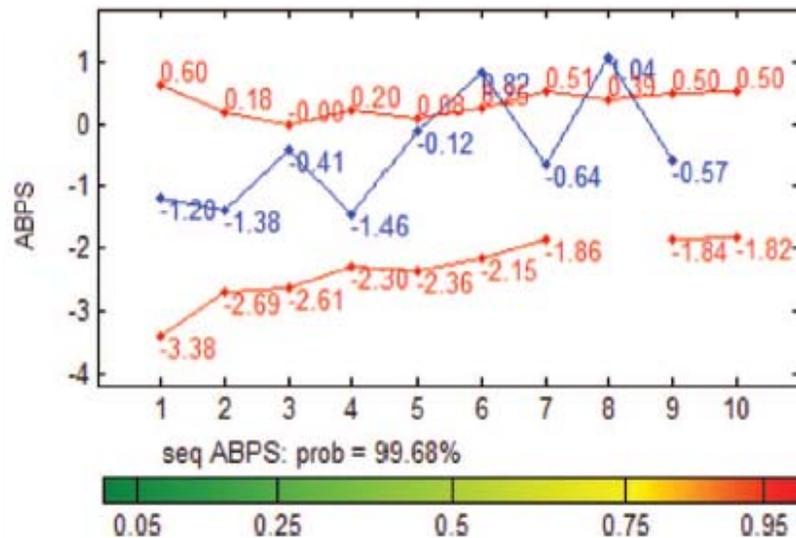
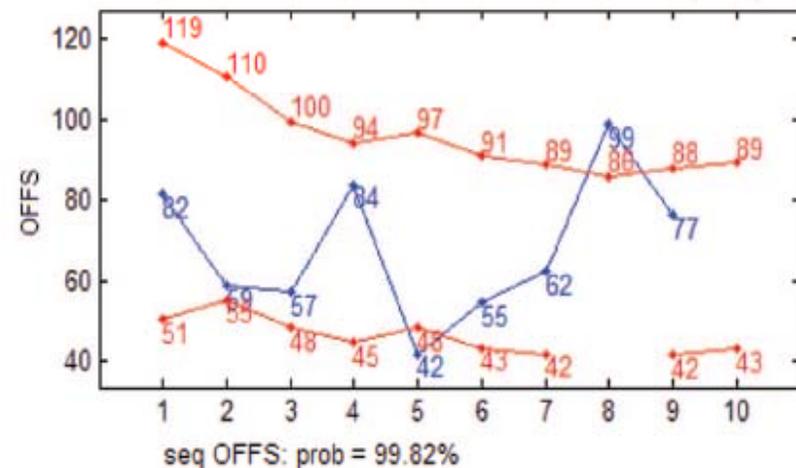
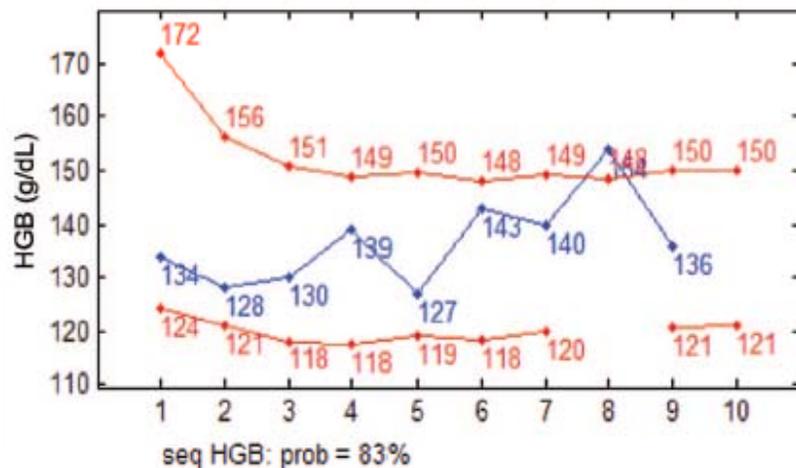
Limiti individuali

Risultati dei test

Distribuzione in percentile, assumendo un atleta non dopato

# Athlete's Biological Passport

## atleta risultato positivo al CERA



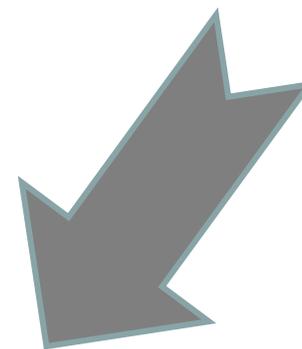
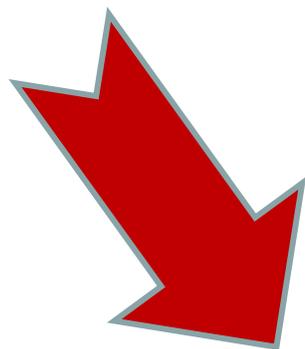
# Valutazione del passaporto biologico da parte degli esperti

Valutazione dell'esperto	Azione dell'APMU
Profilo "normale"	Continua normale attività di controllo
Profilo "sospetto"	Predisposizione di test mirati
Sospetta patologia	Invio ad altri esperti o informativa all'atleta (via NADO)
Profilo "doping"	Invio ad altri 2 esperti

# CONCLUSIONI

MODELLO OPERATIVO  
specifico per le diverse FSN

STRUMENTO SCIENTIFICO  
a disposizione delle FSN



**EFFICACE  
TUTELA DELLA SALUTE  
E PREVENZIONE DEL DOPING**