

# APMU and IRMS cases management

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Catalonian Antidoping Laboratory, IMIM, Barcelona

2<sup>nd</sup> IRMS Workshop, London, United Kingdom, September 2023



Institut Hospital del Mar  
d'Investigacions Mèdiques

# Outline of the presentation

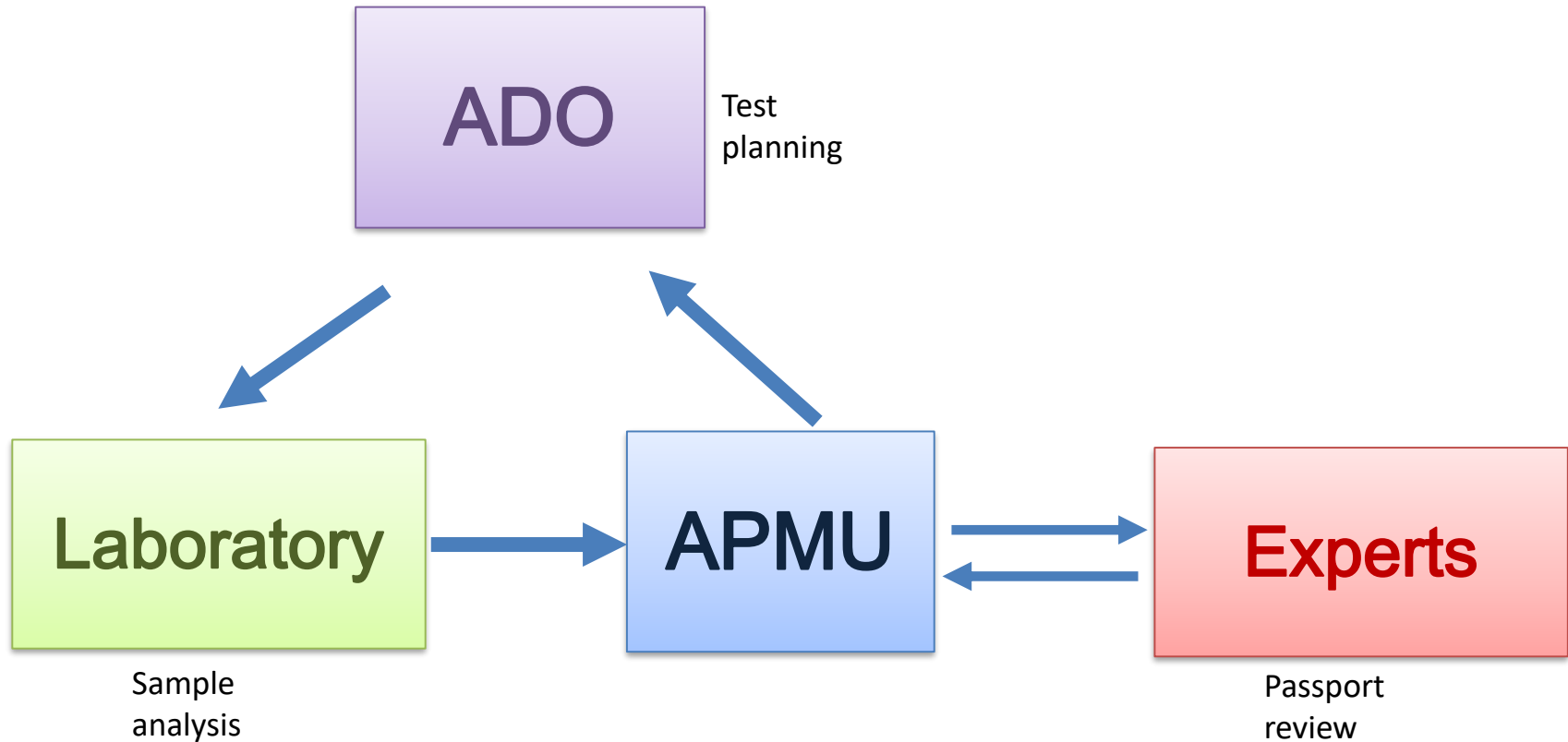
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**1. APMU inner workings**

**2. Management of IRMS cases**



# Athlete Biological Passport



**APMU (Athlete Passport Management Unit)**  
Administration and management of the ABP program



# APMU


## TD2023APMU

WADA Technical Document - Athlete Passport Management Units. Requirements and Procedures.

### ➤ Harmonize the effective management of Passports:

- APMU roles and responsibilities
- APMU requirements (hosting, personnel, confidentiality, security, experts panel)
- APMU approval process
- Maintaining WADA approval
- Passport management

### ➤ SOP BL059 : Catalonian Antidoping Laboratory APMU

			
WADA Technical Document – TD2023APMU			
Document number:	TD2023APMU	Version number:	1.0
Written by:	WADA	Approved by:	WADA Executive Committee
Date:	November 2022	Effective date:	1 January 2023
<b>ATHLETE PASSPORT MANAGEMENT UNIT REQUIREMENTS AND PROCEDURES</b>			
<b>1.0 Introduction</b>			
<p>This <i>Technical Document (TD)</i> has been established to harmonize effective management of <i>Athlete Passports</i> by providing specific requirements that an <i>Athlete Passport Management Unit (APMU)</i> shall meet in order to be a <i>WADA-approved APMU</i>.</p>			
<b>2.0 APMU Roles and Responsibilities</b>			
<p>2.1 The <i>APMU</i> is the dedicated unit that is responsible for the timely management of <i>Passports</i> in the <i>Anti-Doping Administration and Management System (ADAMS)</i> on behalf of the <i>Passport Custodian</i>. <i>Passport</i> management by the <i>APMU</i> involves:</p> <ul style="list-style-type: none"><li>• Performing <i>Passport</i> assessments to make timely <i>Target Testing</i> recommendations to the <i>Passport Custodian</i> via the <i>APMU Report</i> in <i>ADAMS</i> when appropriate, and</li><li>• Managing the review of atypical <i>Passports</i> according to Annex C of the <i>International Standard for Results Management (ISRM)</i><sup>(1)</sup>, including, but not limited to, the following:<ul style="list-style-type: none"><li>◦ Issuing and updating <i>APMU Reports</i> in <i>ADAMS</i>,</li><li>◦ In case of an <i>Atypical Passport Finding (ATPF)</i>, or when a review is otherwise justified, assigning and liaising with the <i>Expert</i> panel as required,</li><li>◦ Compiling all necessary information to establish an <i>Athlete Biological Passport (ABP)</i> Documentation Package, and</li><li>◦ Declaring <i>Adverse Passport Findings (APFs)</i> to the <i>Passport Custodian</i> and <i>WADA</i>.</li></ul></li></ul>			
<p>2.2 The <i>APMU</i> shall assess and manage <i>Passport</i> Sample validity in <i>ADAMS</i>, in consultation with the <i>Experts</i> or <i>Laboratories</i> when necessary, per Article 8.2 of this <i>TD</i>.</p>			
<p>2.3 The <i>APMU</i> shall provide support to the <i>Passport Custodian</i> in defining priorities in order to optimize the efficiency of their <i>ABP</i> program. These priorities may include, but are not limited to, cost efficiency, special analyses, <i>Test Distribution Plans (TDP)</i>, and <i>Target Testing</i>.</p>			
<small>TD2023APMU - Version 1.0 - 1 January 2023</small>			
<small>Page 1/20</small>			



# Catalonian APMU inner workings

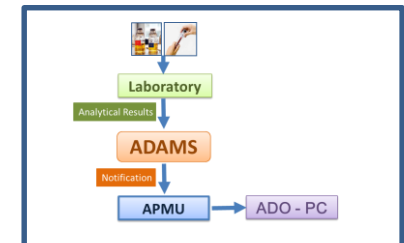
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1. Personnel
2. Confidentiality and security
3. Expert panel
4. ADO – Passport custodian
5. Passport management



Experts

ADO



# Catalonian APMU inner workings

## 1. Personnel

## 2. Confidentiality and security

## 3. Expert panel

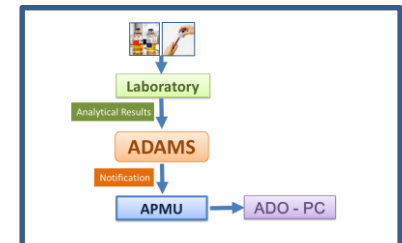
## 4. ADO – Passport custodian

## 5. Passport management



**Experts**

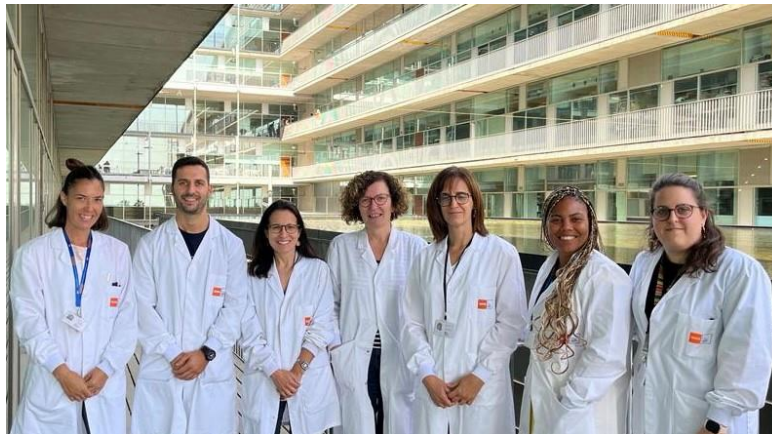
**ADO**



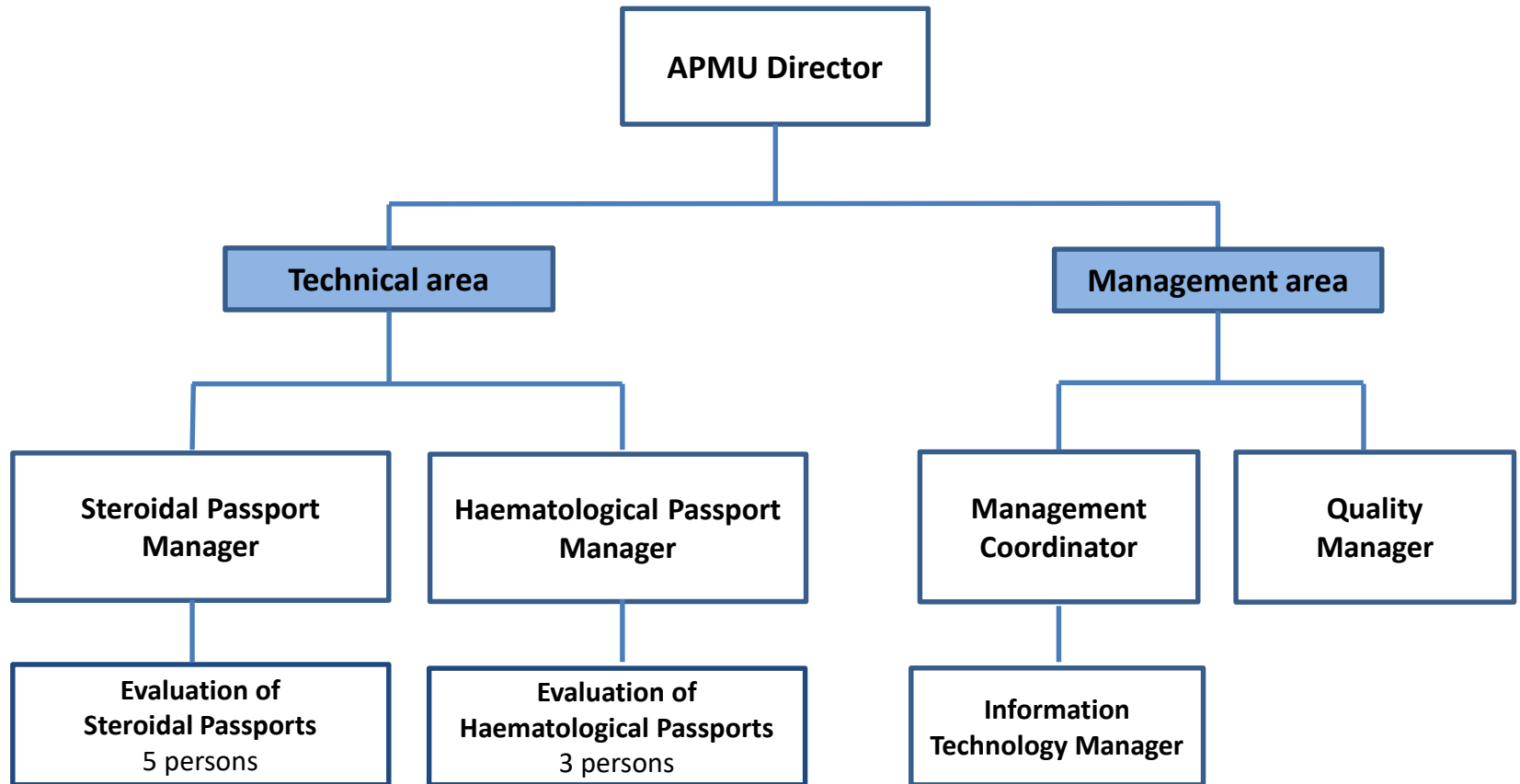
# APMU Personnel

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- Personnel is **the key** in the APMU work:
  - Highly trained individuals
  - Knowledge of analytical methods
  - Scientific expertise relevant to passport review
  - Research activity relevant for ABP
  - Experience in QA/QC programs
  - Knowledge retention: long-term stability of APMU quality



# APMU personnel - Organization Chart





# APMU Personnel – internal qualification

## Candidates for qualification

- Expertise in WADA accreditation, ISO17025 accreditation
- Minimum experience of 2-3 years in anti-doping science
- Good understanding of the objectives of the ABP
- Knowledge of analytical methods:
  - **Steroidal module: analysis of steroid profile, GC/C/IRMS**
  - Haematological module: analysis of haematological parameters, analysis of ESAs, detection of homologous blood transfusions
  - Endocrine module: GH Biomarkers test, GH Isoforms method
- Participation in research projects relevant for ABP:
  - Detection of endogenous anabolic steroids use
  - Metabolism of anabolic steroids
  - Confounding factors of steroidal or haematological passports




### RESEARCH ARTICLE

WILEY


### RESEARCH ARTICLE

WILEY

#### Effect of glucocorticoid administration on the steroid profile

Sergi Coll<sup>1,2</sup>  | Xavier Matabosch<sup>1</sup> | Lorena Garrostras<sup>1</sup> | Clara Perez-Mañá<sup>3,4</sup> | Rosa Ventura<sup>1,2</sup>

#### The effect of tea consumption on the steroid profile

Sergi Coll<sup>1,2</sup>  | Xavier Matabosch<sup>1</sup> | Lorena Garrostras<sup>1</sup> | Nuria Monfort<sup>1</sup> | Clara Perez-Mañá<sup>3,4</sup> | Nieves Pizarro<sup>3,4</sup> | Julián A. Mateus<sup>3</sup> | Mohammed Ezzel<sup>3</sup> | Rafael de la Torre<sup>2,3,5</sup> | Rosa Ventura<sup>1,2</sup>

<sup>1</sup>Catalonian Anti-Doping Laboratory, Doping Control Research Group, IMIM, Hospital del Mar, Barcelona, Spain

#### Abstract

The steroid profile (SP) is a powerful tool to detect the misuse of endogenous anabolic andro-

<sup>1</sup>Catalonian Anti-Doping Laboratory, Doping Control Research Group, IMIM, Hospital del Mar, Barcelona, Spain

#### Abstract

Green tea (GT), along with its flavonol epigallocatechin-3-gallate (EGCG), has shown

# APMU Personnel – internal qualification

## Step 1: Demonstration

- Documentation: SOPs BL059, TD2021APMU, (TD2021EAAS), ADEL ABP Guide, ABP Operating Guidelines
- Theoretical sessions on ABP and ABP modules
- The Manager shows the candidate how to evaluate the passports:
  - ADAMS system access
  - Demonstration of the passport evaluation in ADAMS
  - Criteria of evaluation



## Step 2: Training

- The candidate performs the evaluation of passports under the supervision on the manager.
- The candidate prepares the APMU reports that are, then, submitted by the manager after review.



## Step 3: Evaluation of the candidate

- Test: evaluation of passports of different complexity.
- If the evaluation is correct -> **qualification to evaluate passports.**

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Laboratori Antidopatge de Catalunya. Fundació Institut Mar d'Investigacions Mèdiques (IIMM) c/ Doctor Aiguader, 88. E-08003 Barcelona. Tel.: (+34) 93 316 04 50 / (+34) 93 316 04 00. Fax: (+34) 93 316 04 99. Web: www.iimm.cat/antidopatge			
<b>FORMULARIO DE CUALIFICACIÓ INTERNA DE PERSONAL</b>			
Nº FCI: <u>1337</u>			
Nombre: <span style="background-color: black; color: black;">XXXXXXXXXX</span>			
Tarea: <b>T4-08: APMU Hematológico</b>			
<b>Etapa 1: DEMOSTRACIÓN.</b> (Durante esta etapa se posee el nivel de cualificación 1 (aprendiz))			
Fecha:		Nombre Experto:	LEW
Firma persona:		Firma Experto:	
Observaciones:			
<span style="background-color: black; color: black;">XXXXXXXXXX</span> = 6/03/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 11/12/20 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 24/04/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 25/02/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 05/03/21 Días: - 24/03/21 - 25/03/21 - 15/04/21 - 16/05/21			
<b>Etapa 2: VERIFICACIÓN.</b> (Durante esta etapa se posee el nivel de cualificación 1 (aprendiz))			
Fecha:		Nombre Experto:	LEW
Firma persona:		Firma Experto:	
Observaciones:			
<span style="background-color: black; color: black;">XXXXXXXXXX</span> = 22/10/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 16/10/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 24/10/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 02/12/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 15/10/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 02/11/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 16/12/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 21/10/21 <span style="background-color: black; color: black;">XXXXXXXXXX</span> = 12/11/21			
<b>Etapa 3: EXAMEN.</b> (Finalizada esta etapa se obtiene el nivel de cualificación 2 (usuario))			
Fecha:	16/04/22	Nombre Examinador:	LEW
Firma persona:		Firma Examinador:	
Observaciones:			
- Examen APMU hematológico			
FI051v03 (FI aprobado: 28/11/2018)			
p. 1 de 2			

- INFORMACIÓN CONFIDENCIAL -



# APMU Personnel – additional training

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- WADA training
- ADEL training (webminars and courses)
- APMU Newsletters (WADA)
- Training in other APMUs
- ABP Symposiums
- Conferences
- Scientific literature



# Catalonian APMU inner workings

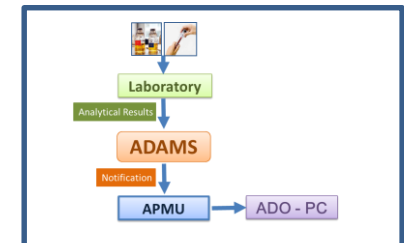
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4. ADO – Passport custodian
5. Passport management



**Experts**

**ADO**



# APMU Confidentiality and Security

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## ➤ Confidentiality:

- Signature of the WADA APMU Code of Ethics
- Signature of Code of Ethics for Laboratories



## ➤ Security:

- APMU located in the **facilities** of the Laboratory  
Access restricted to laboratory personnel (electronic control)
- APMU data: stored in an **APMU specific folder** of the data server of the Laboratory  
Access restricted to APMU personnel
- Access to the APMU specific folder through a remote desktop using username and password for identification.



# Catalonian APMU inner workings

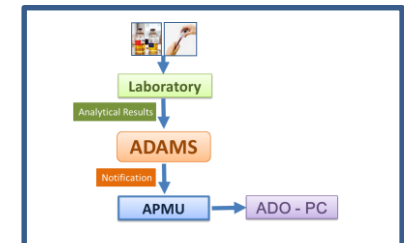
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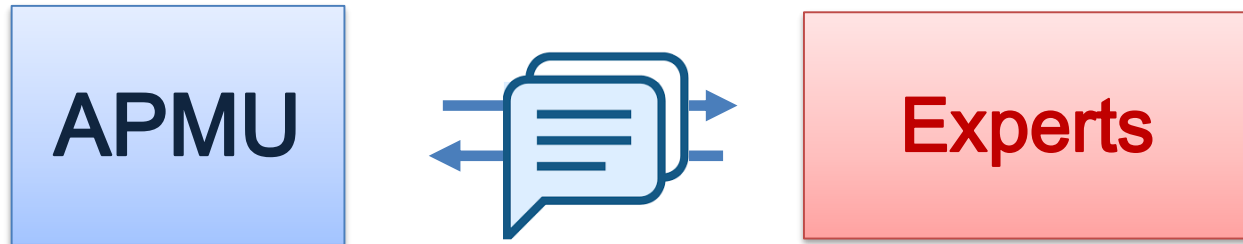
**Experts**

**ADO**



# APMU Expert Panel

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- APMU dedicated email account: [catalonianapmu@imim.es](mailto:catalonianapmu@imim.es)
- **Ensure timely evaluation** (1-2 days):
  - The Experts inform of the periods they will be unavailable (holidays,...)
  - Communication via email of new passports review requests
- Review of passports:
  - Equitable allocation of passports between Experts
  - Expert review of suspicious and also normal passports
- **Fluid communication** with experts is important:
  - During the whole process: review of passports, preparation ABP Doc Pack, ...
  - APMU doubts in Expert reports, validity of samples,...



# Catalonian APMU inner workings

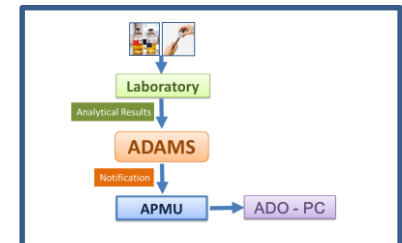
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**Experts**

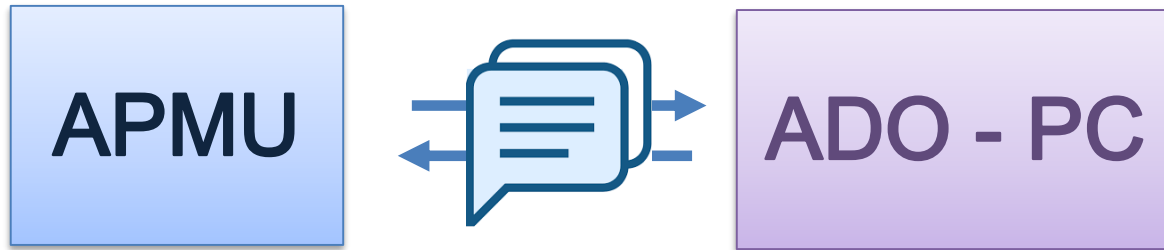
**ADO**





# Passport custodian

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- APMU dedicated email account: [catalonianapmu@imim.es](mailto:catalonianapmu@imim.es)
- APMU -> PC:
  - APMU inner workings
  - Changes in TD (APMU, EAAS,...)
  - Doubts in APMU reports
  - Invalid samples
  - Additional information (competition schedule, altitude schedule,TUE...)
  - Possible typing errors in results,...
- PC-> APMU:
  - Information relevant for the evaluation of the Passport (investigation)



# Catalonian APMU inner workings

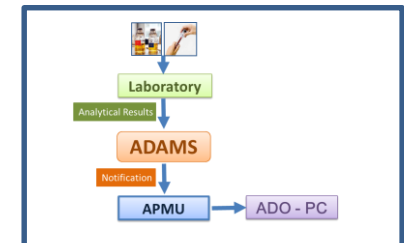
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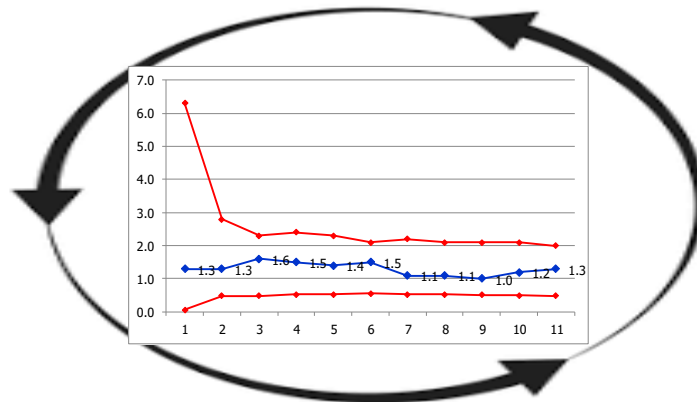
**Experts**

**ADO**



# Passport management

- a. Evaluation of Passports
- b. APMU report
- c. Follow-up of Passports with recommended actions



# Passport management

## a. Evaluation of passports

### ➤ Evaluation of passports: **Guarantee timely evaluation**

#### ➤ **Daily evaluation** (response in 1-3 days)

Every day one person performs evaluation; normally, 2 persons involved/week per module

#### ➤ **Personalized ADAMS accounts**

#### ➤ **Control of passports** evaluated (e.g. notifications per day, per PC)

#### ➤ Evaluation of **all Passports** (normal and atypical)

#### ➤ APMU reports of suspicious Passports always submitted by Manager

### ➤ **Periodical meetings** (weekly) with Managers and Director:

- Difficult cases: suspicious samples and Adverse Passport Findings
- New patterns: agreed evaluation; wordings for APMU report
- Number of passports evaluated
- Organization of work (e.g. increase the number of evaluators)
- Improvements in the process of evaluation/management of passports
- External news: updates in TDs, ...



# Passport management

## b. APMU report

Format and wordings Catalonian APMU:

- Homogeneous within our APMU
- Format: *Date. Sample code. Recommendation Wording.*

05/05/2023 Sample 8888888                      Normal

26/07/2023 Sample 9999999: Because of high T/E, SP confirmation is required including IRMS analyses.

- Wordings:

Type of sample		APMU comment
Suspicious	T/E	Because of high T/E, SP confirmation is required including IRMS analyses. Please, keep this sample until further evaluation of the profile.
	T/E	BPID with high T/E. Since IRMS analyses have not been performed since 20XX, IRMS analysis on sample XXXXXX is recommended in order to demonstrate that the elevated T/E is physiologically normal.
	T	Because of T concentration higher than X ng/mL, SP confirmation is required including IRMS analyses. Please, keep this sample until further evaluation of the profile.
	A and/or Etio	Because of (A/Etio) concentration higher than 10000 ng/mL, SP confirmation is required including IRMS analyses. Please, keep this sample until further evaluation of the profile.
	5aAdiol	Because of 5aAdiol concentration higher than X ng/mL, SP confirmation is required including IRMS analyses. Please, keep this sample until further evaluation of the profile.
Negative	Confirmed	SP confirmation and IRMS results do not confirm the exogenous origin. Data are included in the physiological variability. The BPID is now considered normal
Others	SG	LR specific gravity (X) deviates from DCF value (Y). Please, confirm laboratory specific gravity.
	degradation	Sample has been automatically invalidated because of microbial degradation.
	Conf factors	Presence of confounding factors (ethylglucoronide, finasteride, ketoconazole or similar, 'others') that may alter the SP.
	5a-reduct inh	Presence of 5a reductase inhibitors which are altering the alpha pathway of the endogenous steroids metabolism. This athlete should be tested on a regular basis. A/Etio and 5aAdiol/5bAdiol are coherent with 5a-reductase since (...). However, this confounding factor has not been reported by the lab.

# Passport management

## c. Follow-up of passports

- Excel sheet to follow-up the Passports with recommended actions
- Follow-up of Steroidal Passports:

	Núm passaport BPID	Codi mostra	Motiu del seguiment	Persona 1a revisió	Data 1a revisió	Seguiment 1	Seguiment 2
<input checked="" type="checkbox"/>	XXXXXXXX	YYYYYY	28/06/2022 Sample yyyyyy : Because of high T/E, SP confirmation is required including IRMS analyses.	SCC	28/06/2022	29/07/2022 Sample yyyyyy: SP confirmation and IRMS results do not confirm the exogenous origin. Data are included in the physiological variability. The BPID is now considered normal	
<input checked="" type="checkbox"/>	XXXXXXXX	YYYYYY	28/06/2022 Sample yyyyyy: Because of high T/E, SP confirmation is required including IRMS analyses.	SCC	28/06/2022	29/07/2022 Sample yyyyyy: SP confirmation and IRMS results do not confirm the exogenous origin. Data are included in the physiological variability. The BPID is now considered normal	
<input type="checkbox"/>	XXXXXXXX	YYYYYY	30/06/2022 Sample yyyyyy: Because of high T/E, SP confirmation is required including IRMS analyses.	SCC	30/06/2022		
<input checked="" type="checkbox"/>	XXXXXXXX	YYYYYY	01/07/2022 Sample yyyyyy: Because of A concentration higher than 10000 ng/mL, SP confirmation is required including IRMS analyses	SCC	01/07/2022	29/07/2022 Sample yyyyyy: SP confirmation and IRMS results do not confirm the exogenous origin. Data are included in the physiological variability. The BPID is now considered normal	
<input checked="" type="checkbox"/>	XXXXXXXX	YYYYYY	01/07/2022 Sample yyyyyy: Because of high T/E, SP confirmation is required including IRMS analyses.	SCC	01/07/2022	29/07/2022 Sample yyyyyy: SP confirmation and IRMS results do not confirm the exogenous origin. Data are included in the physiological variability. The BPID is now considered normal	



# Outline of the presentation

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1. APMU inner workings

2. Management of IRMS cases



# IRMS cases management

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## ➤ Catalonian APMU activity

	2021	2022	2023 (1st semester)
<b>IRMS confirmations requested</b>	<b>230</b>	<b>205</b>	<b>113</b>



# IRMS cases management

## ➤ Catalonian APMU activity

	2021	2022	2023 (1st semester)
<b>IRMS confirmations requested</b>	<b>230</b>	<b>205</b>	<b>113</b>
<b>IRMS confirmations performed</b>	<b>85 (37 %)</b>	<b>84 (41 %)</b>	<b>51 (45 %)</b>
SSP-CPR (1st sample)	43	32	38
Atypical BPID	42	52	13
<b>IRMS AAFs</b>	<b>7 (8.2 %)</b>	<b>3 (3.5 %)</b>	<b>2 (3.9 %)</b>
SSP-CPR (1st sample)	6	1	1
Atypical BPID	1	2	1

# IRMS cases management

## ➤ Catalonian APMU activity

	2021	2022	2023 (1st semester)
<b>IRMS confirmations requested</b>	<b>230</b>	<b>205</b>	<b>113</b>
<b>IRMS confirmations performed</b>	<b>85 (37 %)</b>	<b>84 (41 %)</b>	<b>51 (45 %)</b>
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SSP-CPR (1st sample)	6	1	1
Atypical BPID	1	2	1

## ➤ Catalonian anti-doping lab IRMS activity

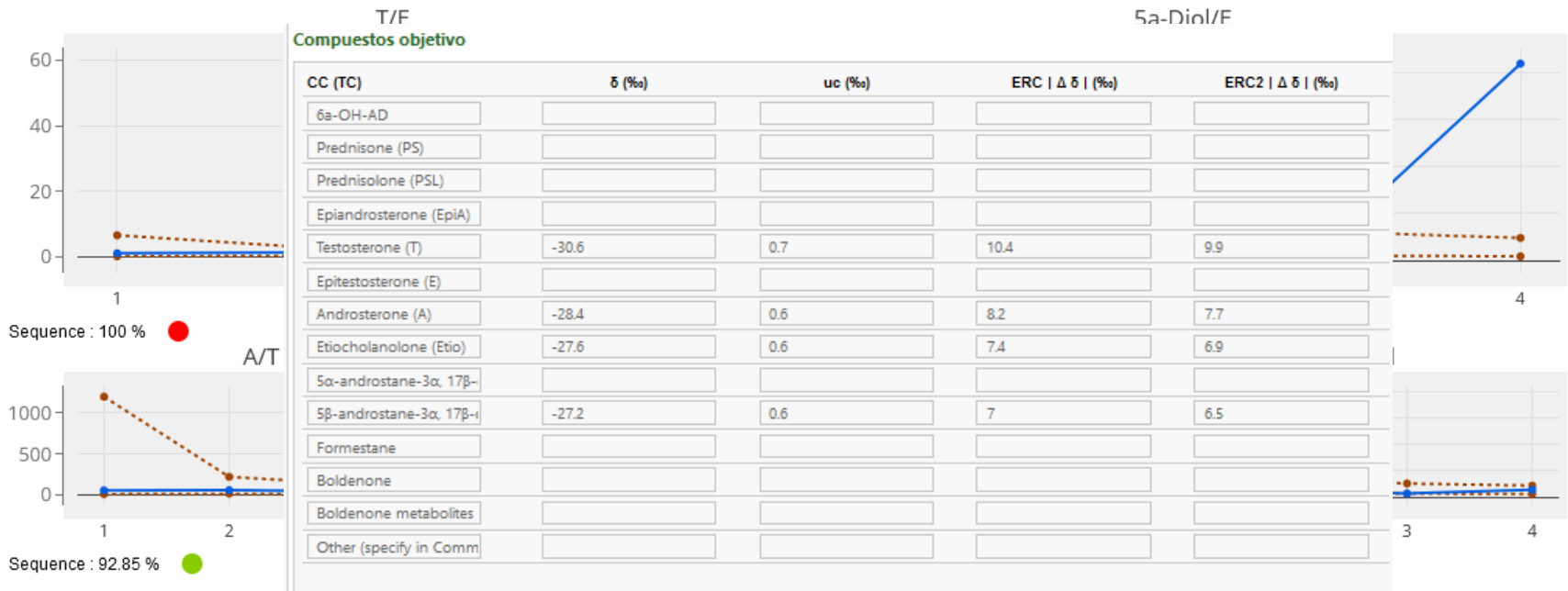
	2021	2022	2023 (1st semester)
<b>IRMS tests (T and metabolites) conducted in our lab</b>	<b>192</b>	<b>141</b>	<b>104</b>
<b>IRMS AAFs</b>	<b>5 (2.6 %)</b>	<b>4 (2.8 %)</b>	<b>3 (2.9 %)</b>

# IRMS cases management: Examples

## Case 1: AAF

Gender: Male, 27 y/o

Sport/discipline: Powerlifting



Sample	T/E	5α	CRE *	δ (%) *	uc (%) *	A	Etio					
4	59	2	Pregnanediol (PD)	-20.2	0.7	2500	4000					
3	1.5	0.8	ERC2 (para AAF / ATF) *	11-ketoetiocholanolone (11-O-Etio)	-20.7	0.6	1600	2900				
2	1.5	1.5		0.65	0.15	57	46	41	61	420	2600	4000
1	0.9	0.9		0.70	0.15	55	21	24	21	140	1100	1600

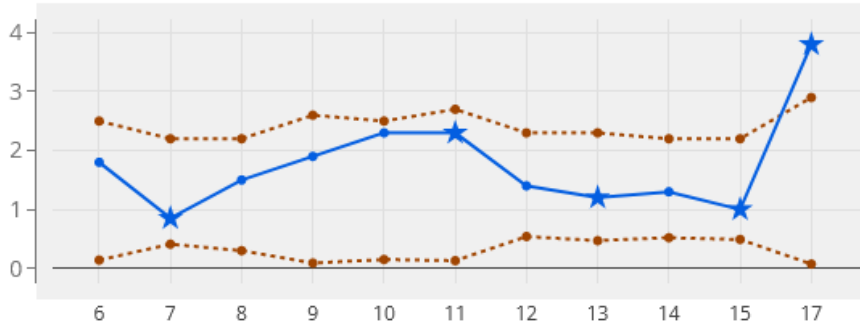
# IRMS cases management: Examples

## Case 2: AAF

Gender: Male, 38 y/o

Sport/discipline: Athletics/Jumps

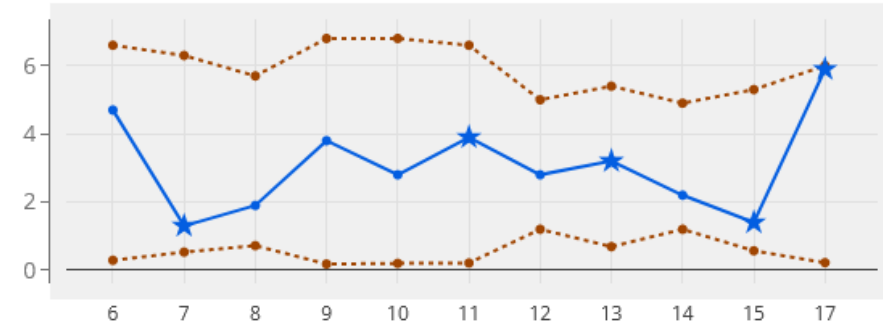
T/E



Sequence : 99.46 %



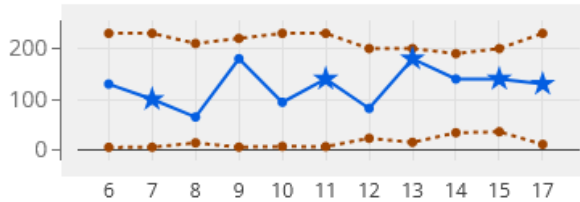
5a-Diol/E



Sequence : 93.25 %



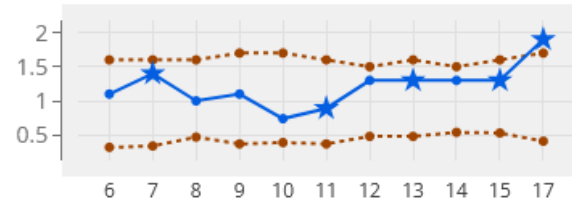
A/T



Sequence : 82.14 %



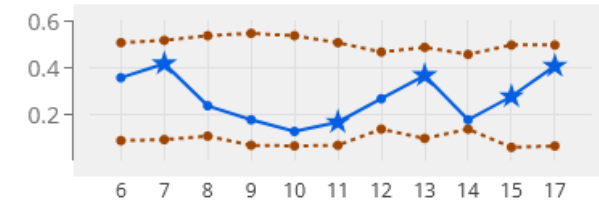
A/Etio



Sequence : 99.59 %



5a-Diol/5b-Diol



Sequence : 80.73 %



Sample	T/E	5a/E	A/Etio	5a/5b	A/T	T	E	5a	5b	A	Etio
17	3.8	5.9	1.9	0.41	130	11	3.0	18	42	1500	760
15	1.0	1.4	1.3	0.28	140	9.9	9.5	13	47	1400	1100
11	1.4	2.8	1.3	0.27	82	45	32	91	340	3700	2900
8	1.5	1.9	1.0	0.24	65	29	20	37	150	2200	2100
6	1.8	4.7	1.1	0.36	130	6.2	3.2	15	41	780	680

# IRMS cases management: Examples

## ➤ Case 2: AAF

Gender: Male, 38 y/o

Sport/discipline: Athletics/Jumps

Variables del perfil esteroideo			
	Valores iniciales	Valores confirmados	uc
Densidad relativa		1.008	
5a-androstanediol	37 ng/ml		
5b-androstanediol	153 ng/ml		
androsterone	2160 ng/ml		
epitestosterone	19 ng/ml	20 ng/ml	3 ng/ml
etiocholanolone	2144 ng/ml		
T/E	2.1	1.5	0.2
testosterone	33 ng/ml	29 ng/ml	4 ng/ml

Compuestos objetivo			
CC (TC)	δ (%)	uc (%)	Δ δ (%)
Testosterone (T)	-20.7	0.4	1
Epitestosterone (E)			
Androsterone (A)	-20.2	0.3	0.5
Etiocholanolone (Etio)	-21.1	0.2	1.4
5α-androstane-3α, 17β--	-22.1	0.4	2.4
5β-androstane-3α, 17β--	-21.4	0.5	1.7
Formestane			
Boldenone			
Boldenone metabolites			
Other (specify in Comm)			
boldenone			
19-NA			

Compuesto de referencia endógena		
CRE	δ (%)	uc (%)
Pregnanediol (PD)	-19.7	0.5

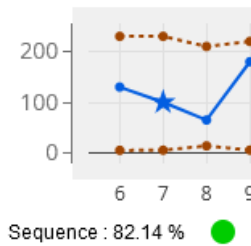
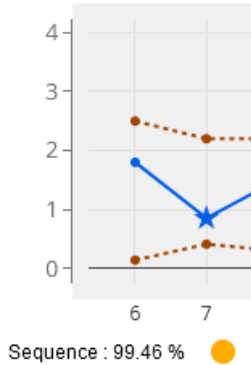
Sample	T/E	5a/E	A/Etio	5a/5b	A/T	T	E	5a	5b	A	Etio
17	3.8	5.9	1.9	0.41	130	11	3.0	18	42	1500	760
15	1.0	1.4	1.3	0.28	140	9.9	9.5	13	47	1400	1100
11	1.4	2.8	1.3	0.27	82	45	32	91	340	3700	2900
8	1.5	1.9	1.0	0.24	65	29	20	37	150	2200	2100
6	1.8	4.7	1.1	0.36	130	6.2	3.2	15	41	780	680

# IRMS cases management: Examples

Case 2. A A E Candem Male 2016 Sport/disciplines: Athletic/Jumps

Compuestos objetivo

CC (TC)	$\delta$ (‰)	uc (‰)	$\Delta \delta$ (‰)
Testosterone (T)	-25.9	0.7	5.2
Epitestosterone (E)			
Androsterone (A)	-22.1	0.3	1.4
Etiocholanolone (Etio)	-21.8	0.4	1.1
5 $\alpha$ -androstane-3 $\alpha$ , 17 $\beta$ -	-25.6	0.7	4.9
5 $\beta$ -androstane-3 $\alpha$ , 17 $\beta$ -	-22.3	0.6	
Formestane			
Boldenone			
Boldenone metabolites			
Other (specify in Comm)			
19-NA			



Compuesto de referencia endógena

CRE	$\delta$ (‰)	uc (‰)
Pregnanediol (PD)	-20.7	0.7

Comentarios sobre la IRMS

CER : 11ketoetiocholanolone : -20.1 ‰, uc 0.3 ‰

Sample	T/E	Comentarios sobre la IRMS										Etio
17	3.8											760
15	1.0	1.4	1.3	0.28	140	9.9	9.5	13	47	1400	1100	
11	1.4	2.8	1.3	0.27	82	45	32	91	340	3700	2900	
8	1.5	1.9	1.0	0.24	65	29	20	37	150	2200	2100	
6	1.8	4.7	1.1	0.36	130	6.2	3.2	15	41	780	680	

# IRMS cases management: Examples

## Case **Compuestos objetivo**

Sequence : 98.69 %

CC (TC)	$\delta$ (%)	uc (%)	ERC   $\Delta \delta$   (%)	ERC2   $\Delta \delta$   (%)
6 $\alpha$ -OH-AD				
Prednisone (PS)				
Prednisolone (PSL)				
Epiandrosterone (EpiA)				
Testosterone (T)	-18.7	0.3	0.3	
Epitestosterone (E)				
Androsterone (A)	-17.7	0.6	0.7	
Etiocbolanolone (Etio)	-19.4	0.4	1	
5 $\alpha$ -androstane-3 $\alpha$ , 17 $\beta$ - $\alpha$	-19.9	0.6	1.5	
5 $\beta$ -androstane-3 $\alpha$ , 17 $\beta$ - $\alpha$	-21.1	0.7	2.7	
Formestane				
Boldenone				
Boldenone metabolites				
Other (specify in Comm)				

Sequence : 42.99 %

## Compuesto de referencia endógena

CRE	$\delta$ (%)	uc (%)
Pregnanediol (PD)	-18.4	0.6

Etio
2600
3600
4000
2200

Sample	T/E	11	0.92	0.70	240	10	3.0	32	46	2400
4	4.0	11	0.92	0.70	240	10	3.0	32	46	2400
3	1.4	3.0	0.82	0.30	220	14	10	31	100	3000
2	1.8	4.1	0.71	0.17	180	15	8.7	36	220	2800
1	2.1	2.8	0.48	0.10	130	8.3	3.9	11	110	1100

# IRMS cases management: Examples

## Case 4: Negative (Long dist) /Long dist

Compuestos objetivo

CC (TC)	$\delta$ (‰)	uc (‰)	ERC   $\Delta \delta$   (‰)	ERC2   $\Delta \delta$   (‰)
6a-OH-AD				
Prednisone (PS)				
Prednisolone (PSL)				
Epiandrosterone (EpiA)				
Testosterone (T)	-23.2	0.3	0.9	
Epitestosterone (E)				
Androsterone (A)	-21.9	0.6	0.4	
Etiocholanolone (Etio)	-23	0.4	0.7	
5 $\alpha$ -androstane-3 $\alpha$ , 17 $\beta$ -	-24	0.6	1.7	
5 $\beta$ -androstane-3 $\alpha$ , 17 $\beta$ -	-23.7	0.7	1.4	
Formestane				
Boldenone				
Boldenone metabolites				
Other (specify in Comm)				

Sequence : 99.18 %

### Compuesto de referencia endógena

CRE	$\delta$ (‰)	uc (‰)
Pregnanediol (PD)	-22.3	0.6

Sample	T/E	5a/E	A/Etio	5a/5b	A/T	T	E	5a	5b	A	Etio
1	7,2	4,0	0.68	0.24	34	18	2,5	10	41	610	900



# Conclusions

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- Timely evaluation of passports requires good organization within APMU
- Guarantee expertise of staff and training
- Knowledge retention
- Good communication with Experts and Passport Custodians
- TA should always follow APMU recommendations



# Thanks for your attention!

## Catalonian Antidoping Laboratory **APMU**



Institut Hospital del Mar  
d'Investigacions Mèdiques

