PROFILAGE PHYSIOLOGIQUE

Protocole 41


la vie
le séminaire Upside Strength
TOI

Sean Seale, Préparateur Physique


concept 2
BikeERG

La réalité actuelle


LES FOOTBALLEURS
LES CROSSFITTEURS
LES FORCEUX
LA ZONE 2
imgflip.com


prendre
une
semaine off
OR
draw
25
le calendrier
sportif
imgflip.com


LE PRÉPA
LE HIIT
EST-CE LA RÉPONSE À TOUS MES PROBLÈMES?


un
profilage
physiologique vélo
un test
spécifique en
course à pied


LE PRÉPA PHYSIQUE
EN FOOTBALL
JAKE-CLARK.TUMBLR
imgflip.com

Mon objectif du jour


La PPG
Le profilage
L'entraînement en endurance
imgflip.com


Le Sport
La PPG
Le prépa
physique informé
@Petircp
imgflip.com
JAKE-CLARK.TUMBLR


la zone 2 n'a
jamais tué personne
CHANGE MY MIND
imgflip.com

Optimiser la préparation physique du sportif grâce à une approche holistique de l'endurance

✅ Avec un protocole simple et sans matériel coûteux

✅ Adapté à tous les niveaux et facile à mettre en place

Objectifs Pédagogiques

✅ Savoir mettre en place un profilage physiologique sur vélo

✅ Être capable de déterminer le profil individuel du sportif

✅ Savoir planifier le travail d'endurance en fonction des besoins

✅ Comprendre l'importance et la place de la PPG pour le sportif

Ce Matin

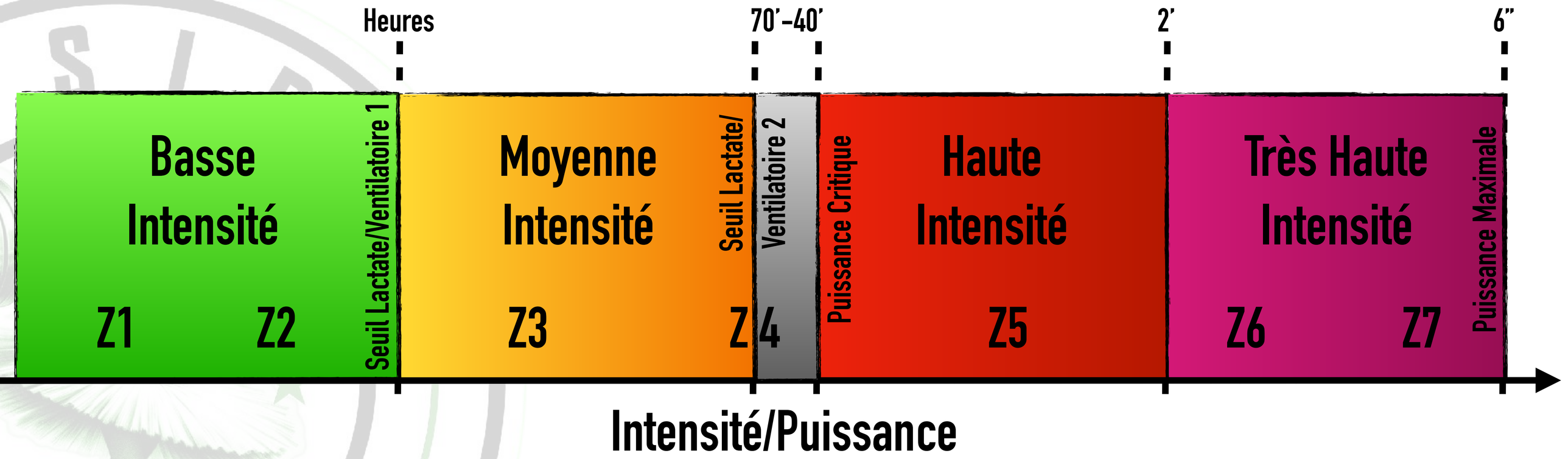
 La physiologie de l'endurance

 Typologie musculaire & facteurs de performance

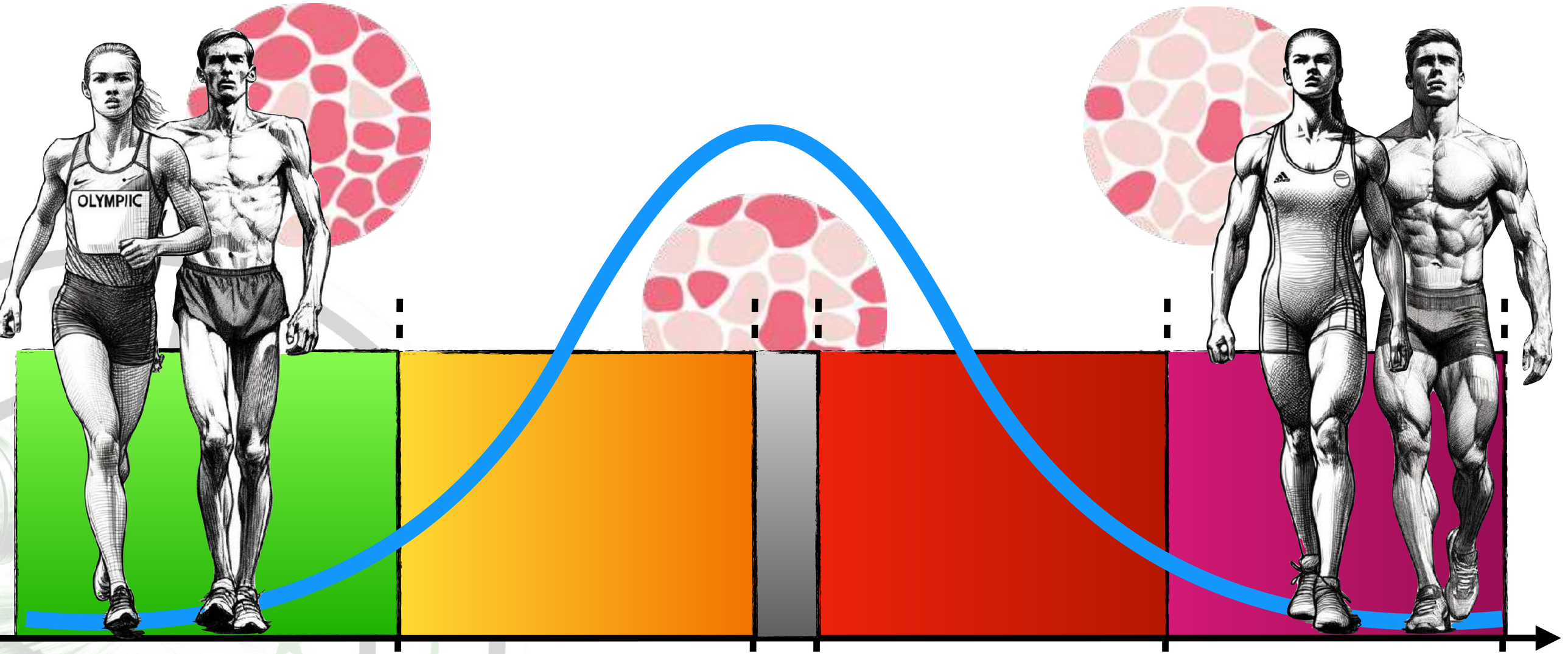
 Protocole d'évaluation + mesures pratiques

Rappel des Fondamentaux

Le Spectre d'Intensité

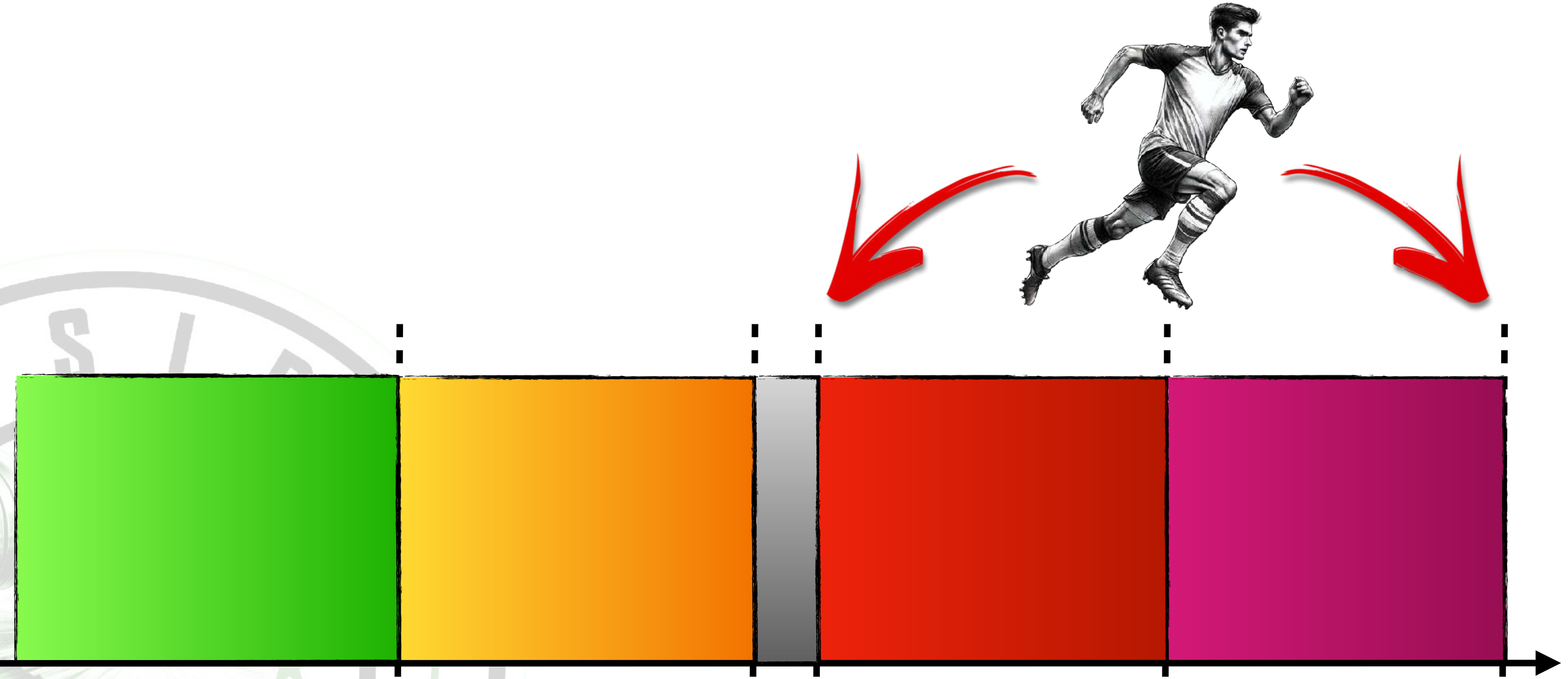


La Typologie Musculaire



La Préparation Sportive

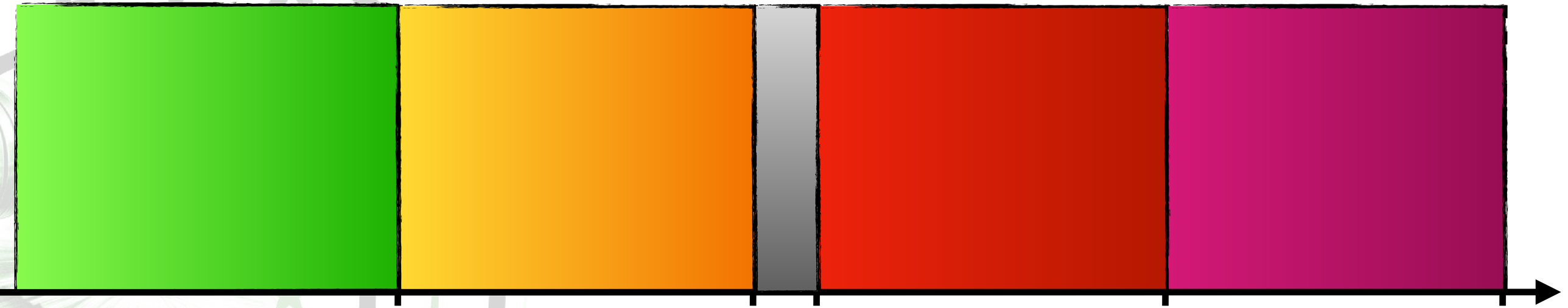
RSA – Facteurs de Performance



Général VS Spécifique

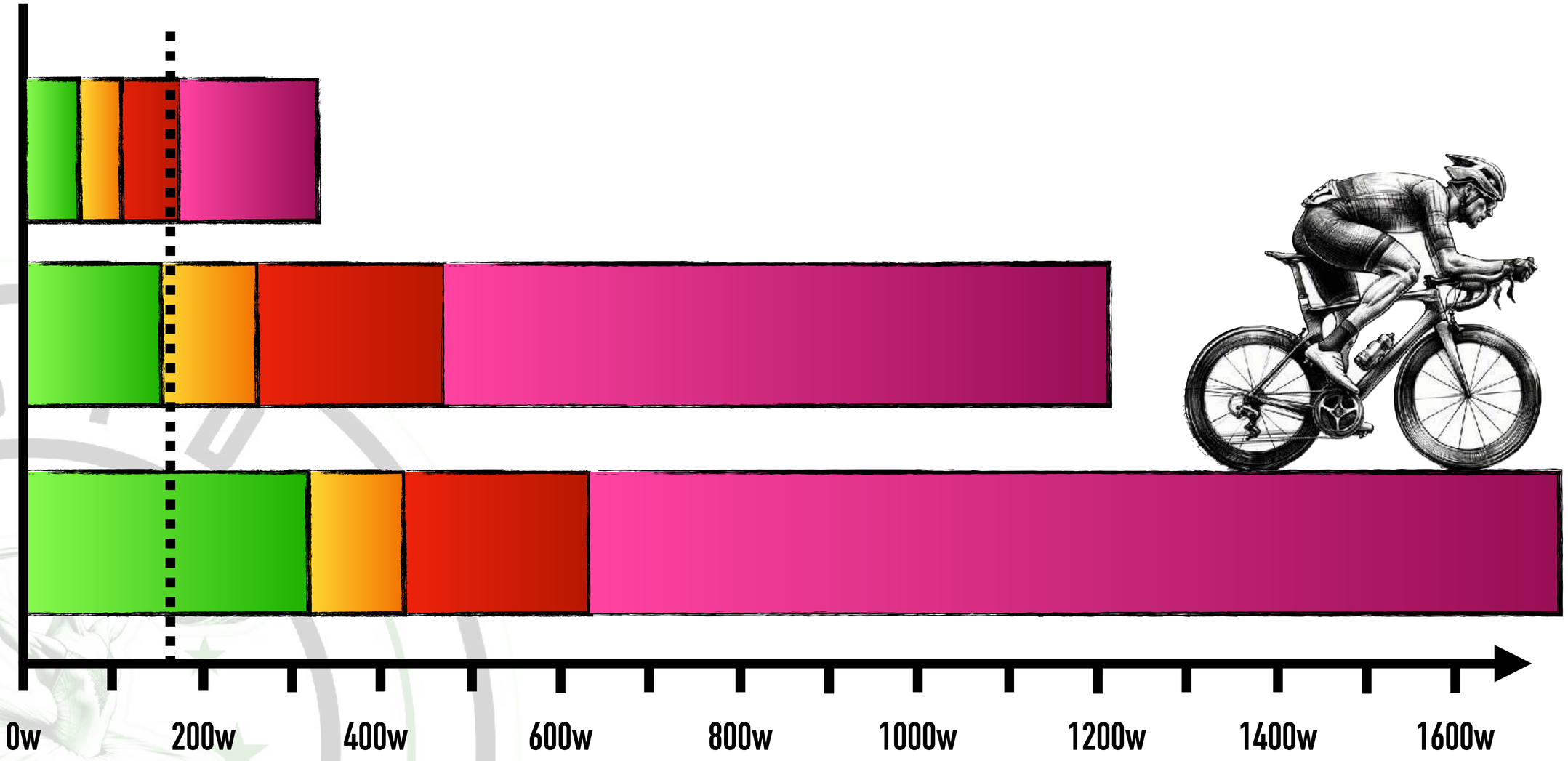
Le Sport

Le Profilage

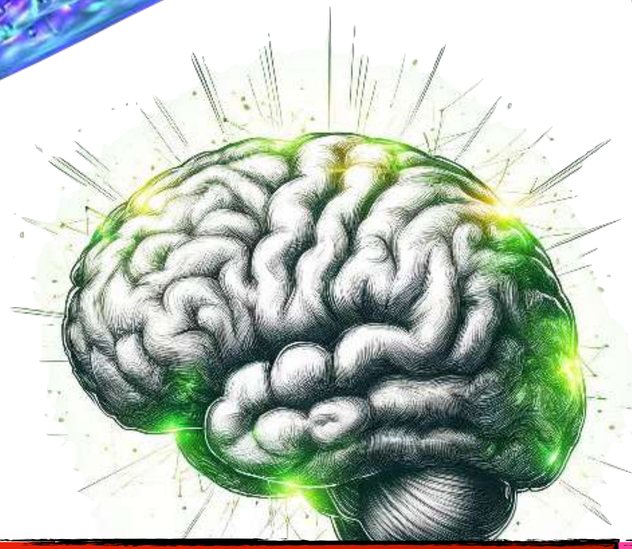


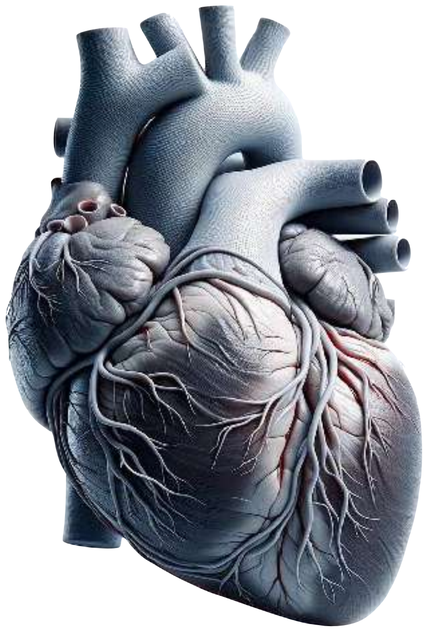
Pourquoi effectuer un Profilage Physiologique en Vélo ?

Profil Individuel



Vélo et PPG

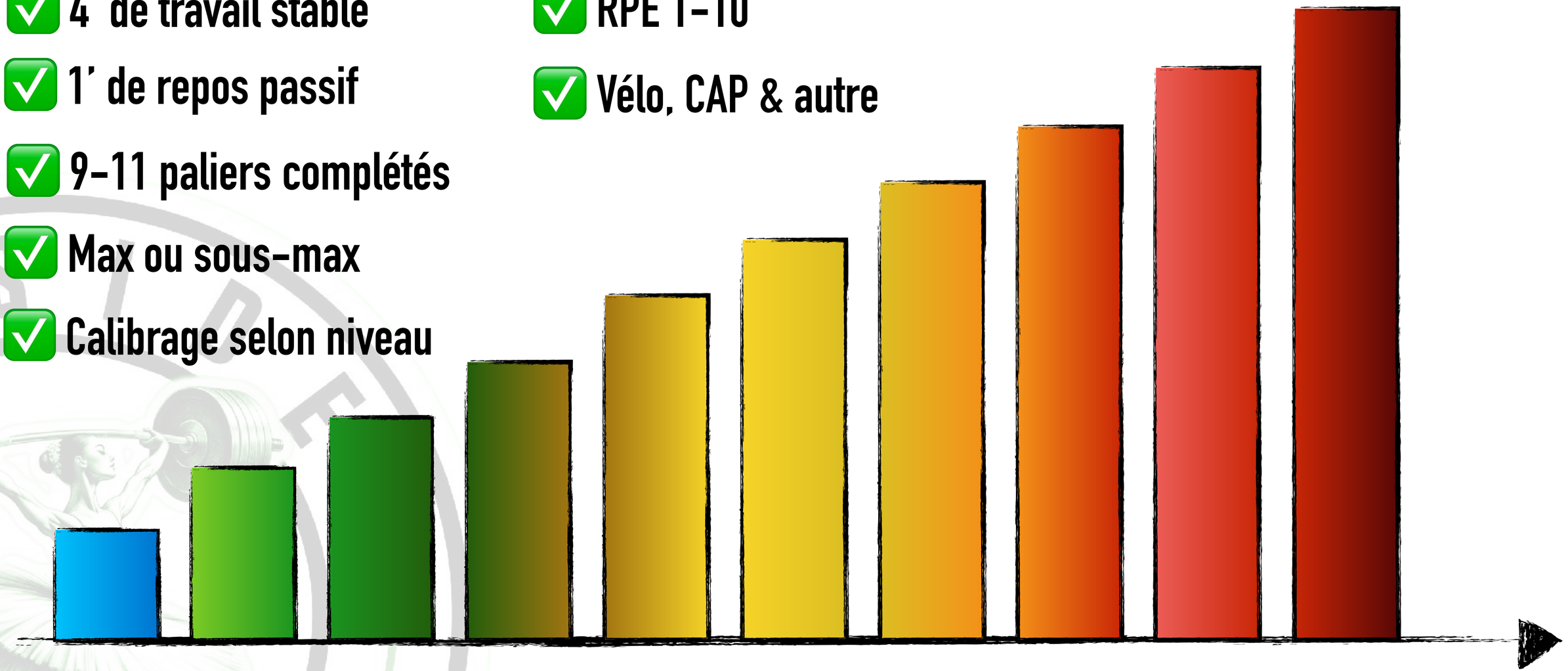




Quel Protocole de Test ?

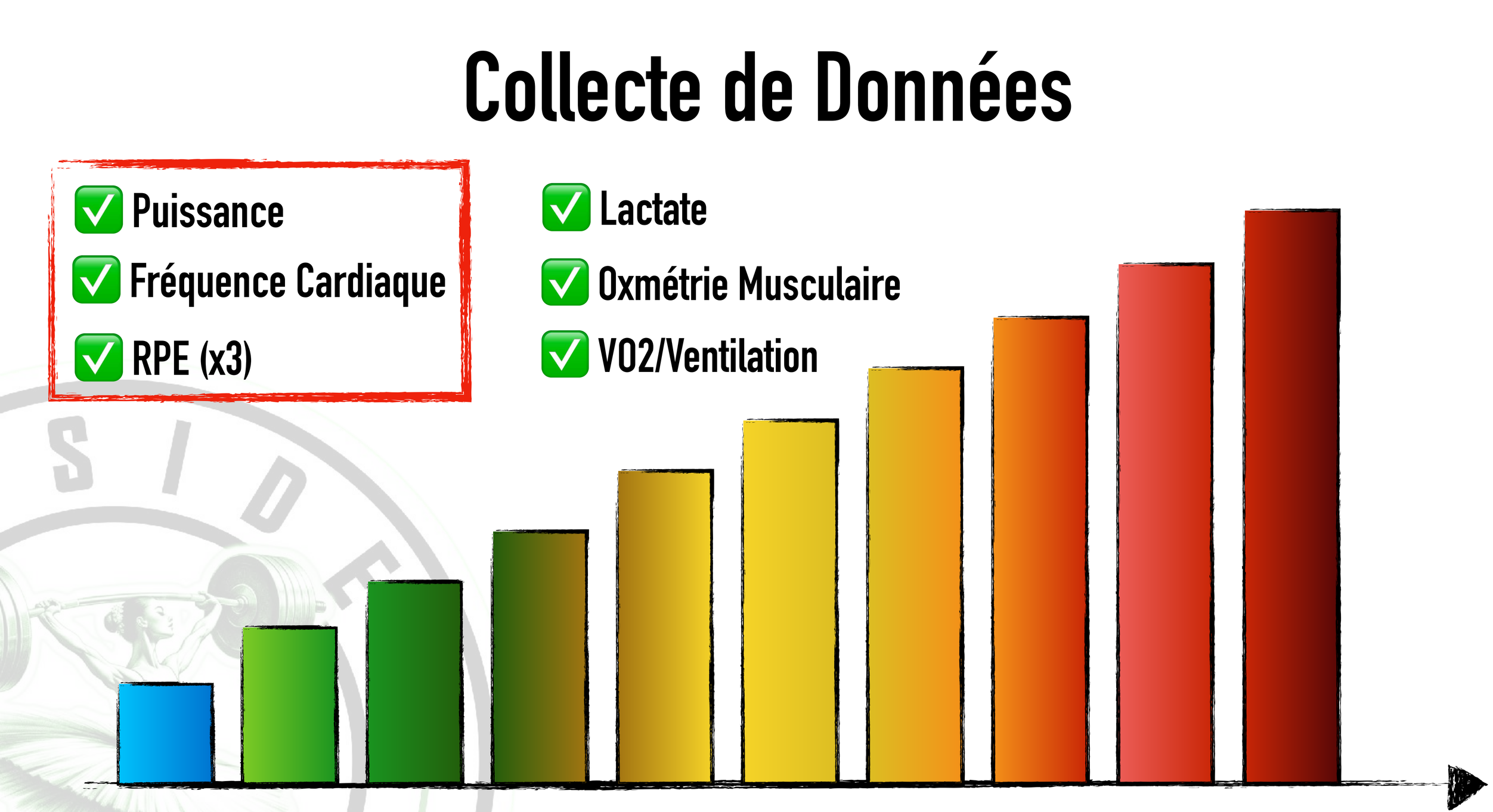
Protocole 41

- ✅ 4’ de travail stable
- ✅ 1’ de repos passif
- ✅ 9-11 paliers complétés
- ✅ Max ou sous-max
- ✅ Calibrage selon niveau
- ✅ RPE 1-10
- ✅ Vélo, CAP & autre

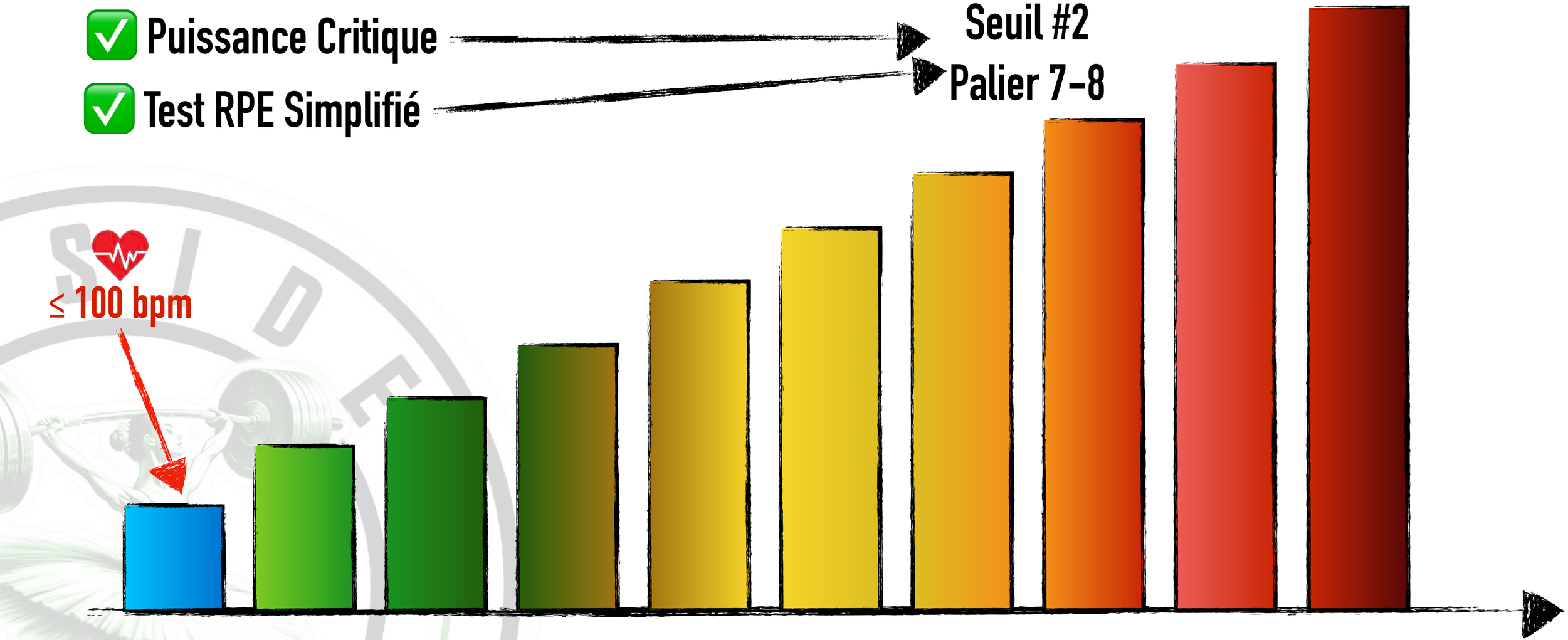


Collecte de Données

- ✅ Puissance
- ✅ Fréquence Cardiaque
- ✅ RPE (x3)
- ✅ Lactate
- ✅ Oxmétrie Musculaire
- ✅ VO2/Ventilation



Calibrer l'Évaluation

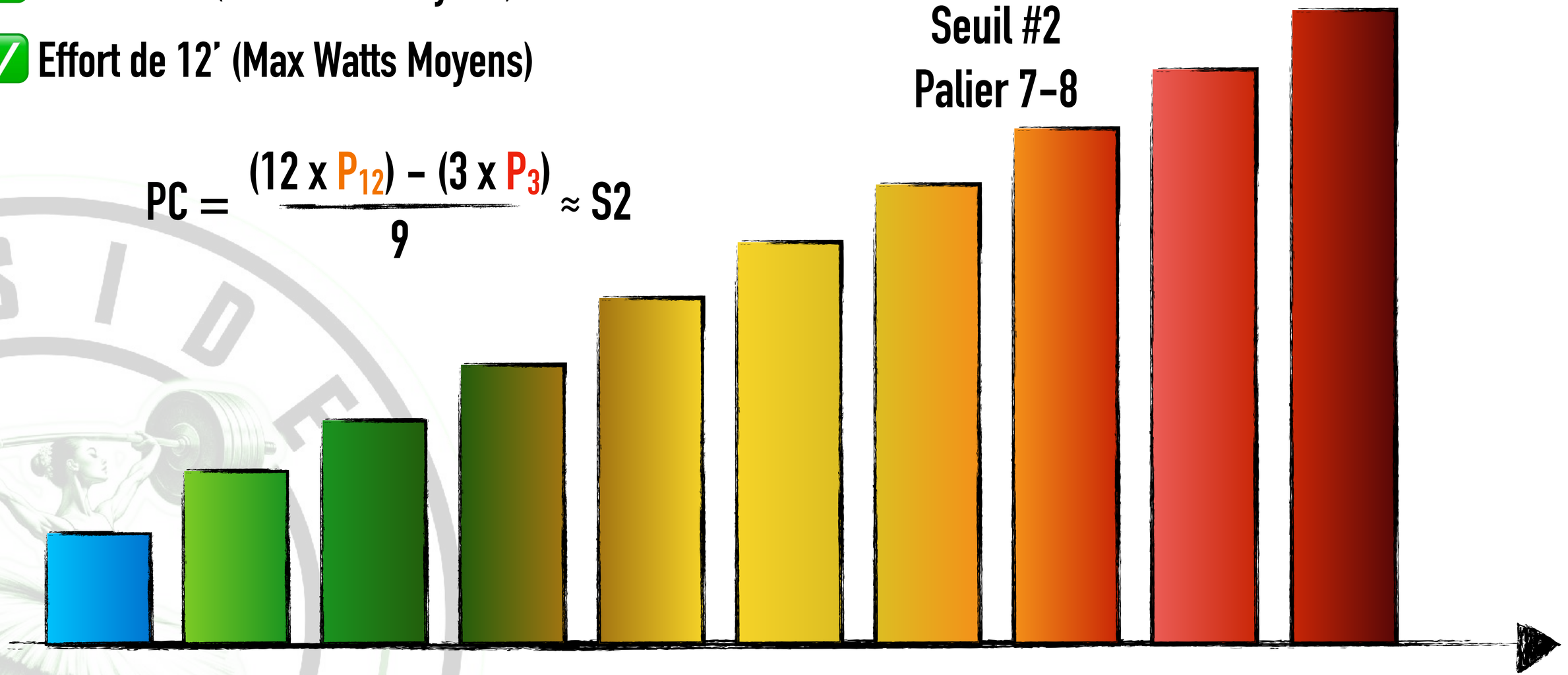


Puissance Critique

✅ Effort de 3' (Max Watts Moyens)

✅ Effort de 12' (Max Watts Moyens)

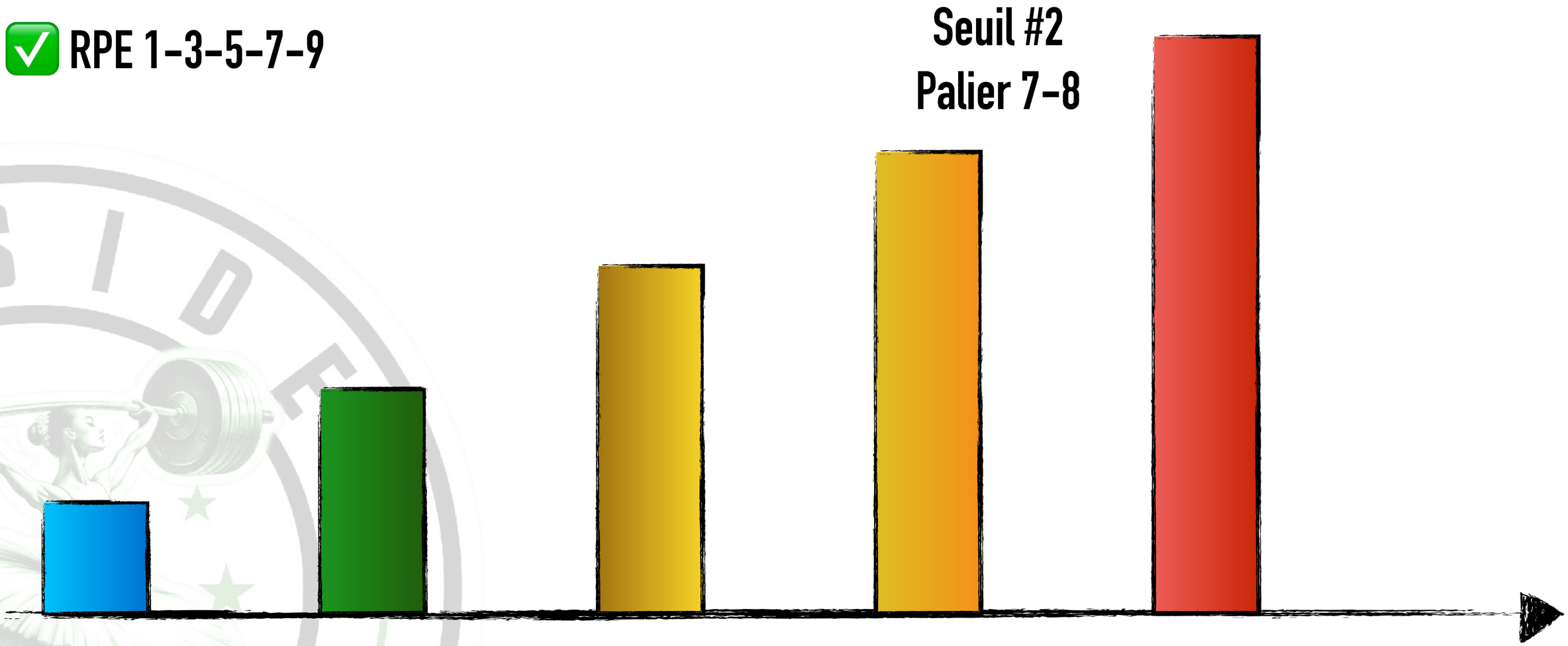
$$PC = \frac{(12 \times P_{12}) - (3 \times P_3)}{9} \approx S2$$



Test RPE Simplifié

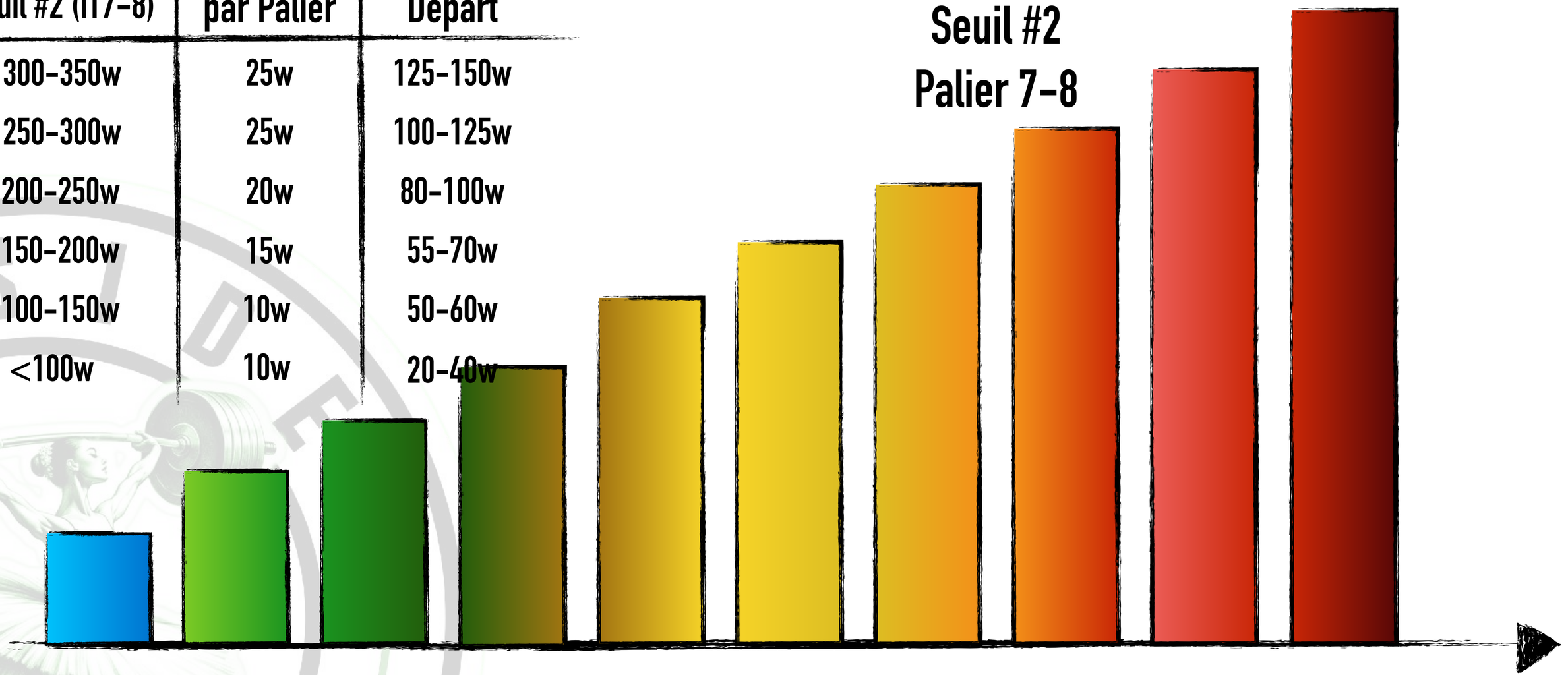
✅ 5 paliers autorégulés

✅ RPE 1-3-5-7-9

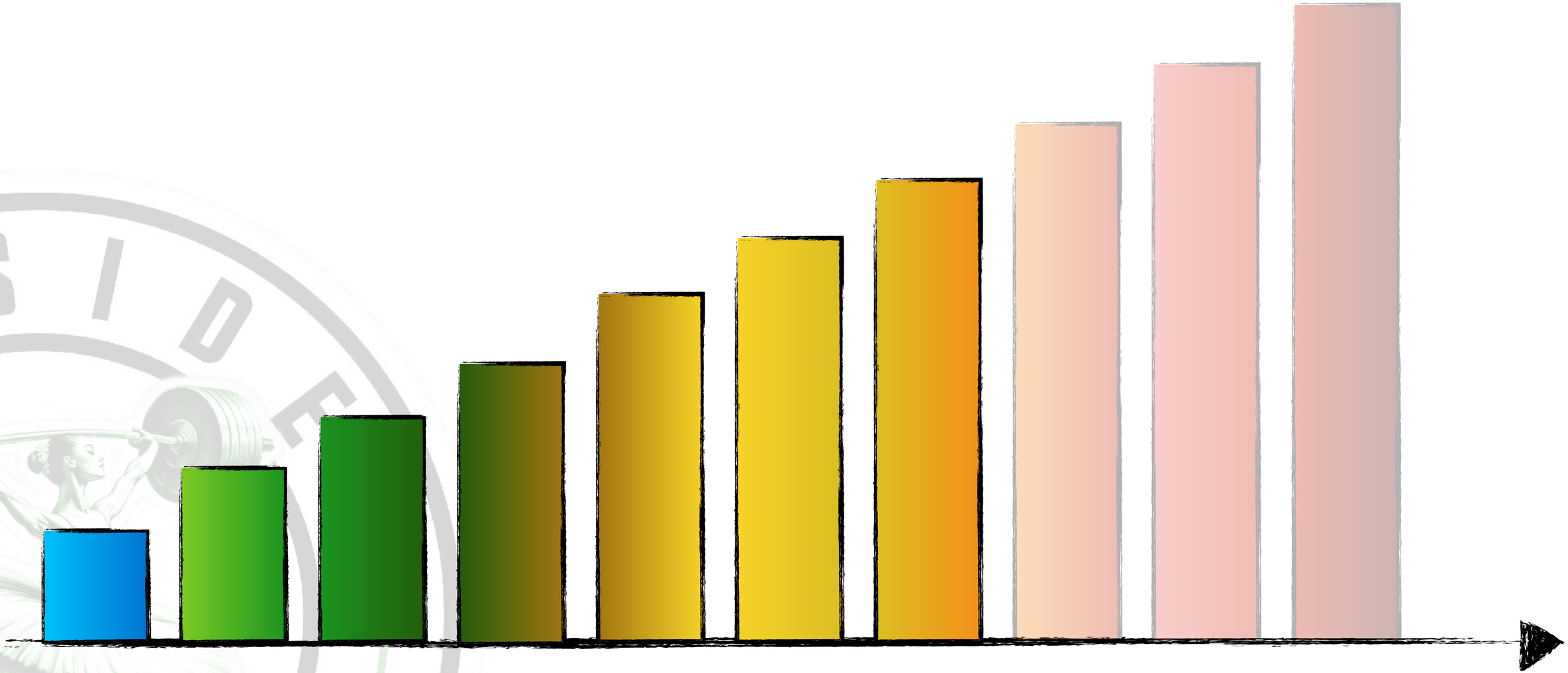


Protocol Individualisé

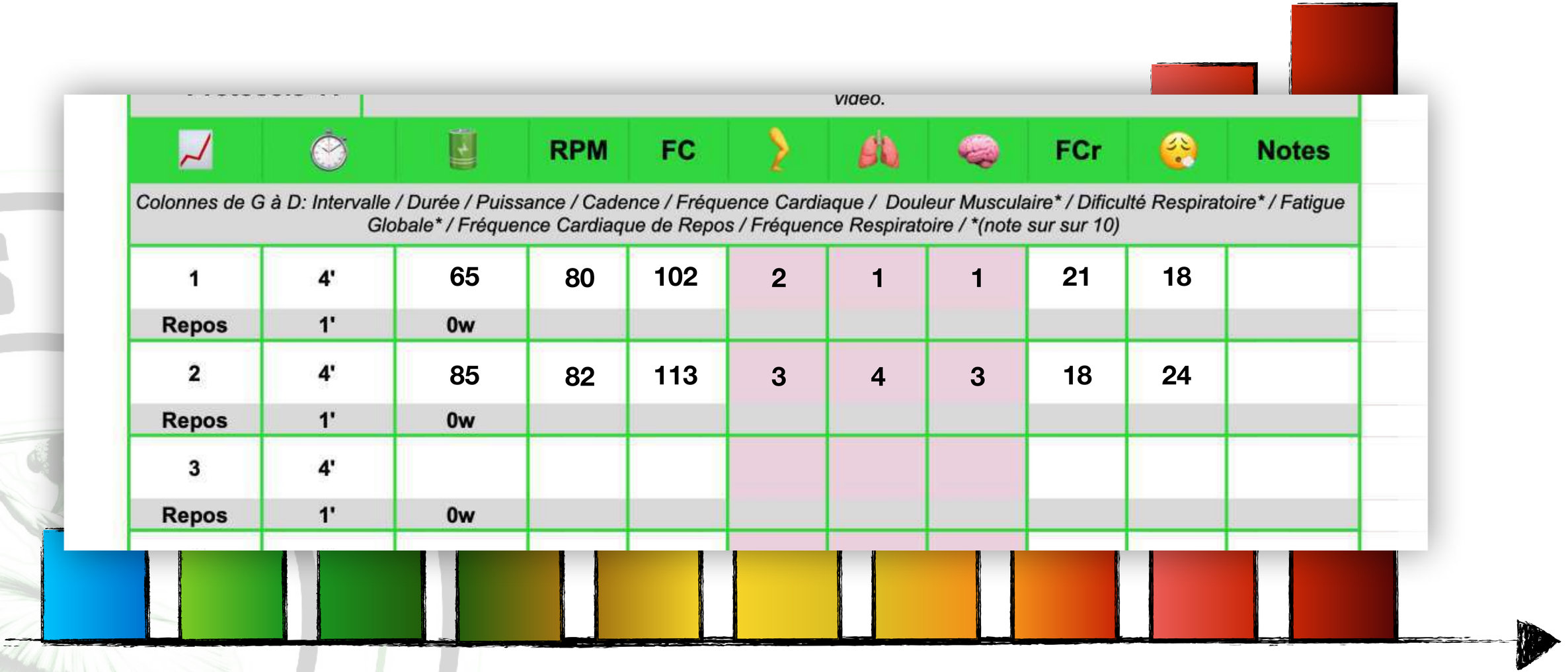
Estimation du Seuil #2 (IT7-8)	Incrément par Palier	Palier de Départ
300-350w	25w	125-150w
250-300w	25w	100-125w
200-250w	20w	80-100w
150-200w	15w	55-70w
100-150w	10w	50-60w
<100w	10w	20-40w



Protocol Sous-Maximal



Activité Pratique

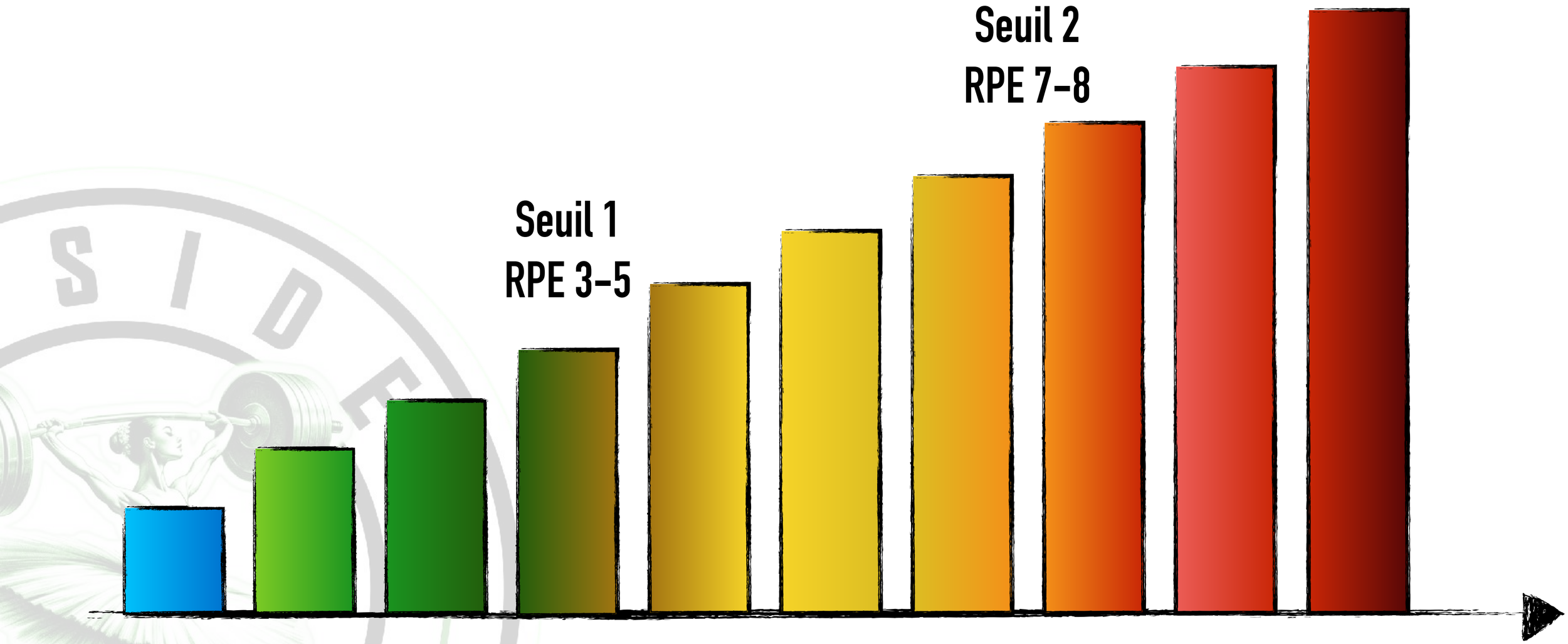


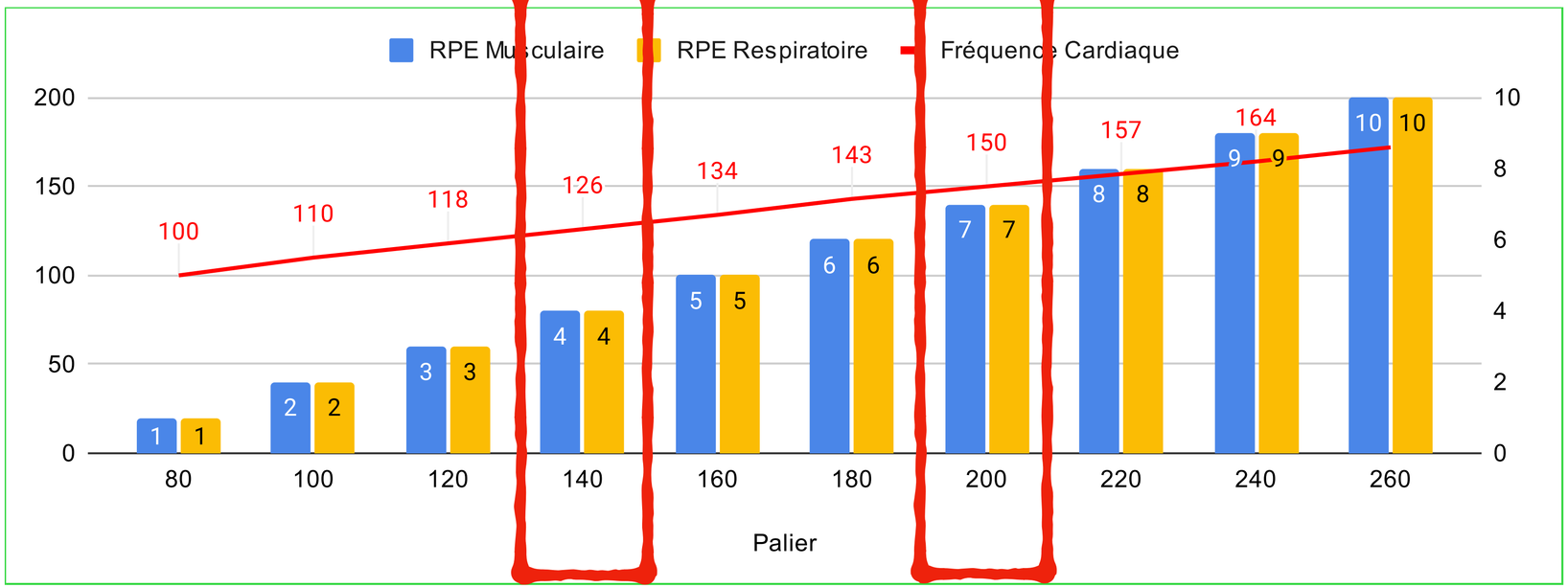
vidéo.

			RPM	FC				FCr		Notes
Colonnes de G à D: Intervalle / Durée / Puissance / Cadence / Fréquence Cardiaque / Douleur Musculaire / Dificulté Respiratoire* / Fatigue Globale* / Fréquence Cardiaque de Repos / Fréquence Respiratoire / *(note sur sur 10)*										
1	4'	65	80	102	2	1	1	21	18	
Repos	1'	0w								
2	4'	85	82	113	3	4	3	18	24	
Repos	1'	0w								
3	4'									
Repos	1'	0w								

Interpréter les Résultats

Déterminer les Seuils





Domaine d'Intensité	Modéré	Élevé	Sévère
Description	*Le **domaine modéré** est caractérisé par un équilibre métabolique au niveau cellulaire. C'est à dire que les muscles peuvent assumer la charge de travail et notamment recycler le lactate produit sans qu'il ne s'accumule dans le sang.*	*Le **domaine élevé** manifeste un équilibre métabolique au niveau systémique (du corps entier). L'intensité de travail ne peut plus être entièrement assumée par les muscles sollicités, on voit alors une accumulation de lactate dans le sang au dessus des valeurs de repos.*	*Le **domaine sévère** est caractérisé par une perte de l'équilibre interne. C'est dans ce domaine que le lactate s'accumule de manière exponentielle (pas d'état stable) et que la VO2max sera atteinte si l'effort se prolonge dans ce domaine.*

Les Seuils

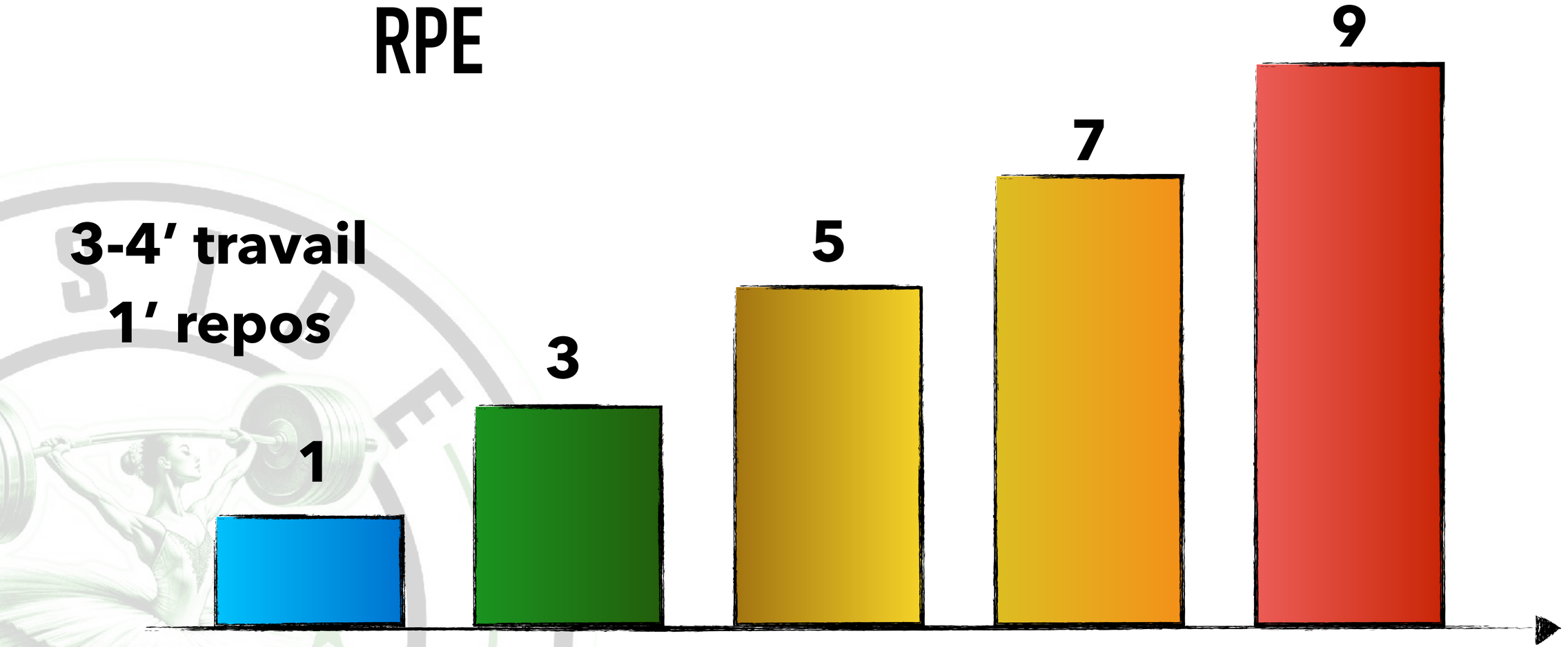
Les Seuils sont les transitions entre les domaines d'intensité. Il est important de suivre l'évolution des seuils au fil du temps afin de (1) baser ses intensités d'entraînement sur son profile actuel, (2) quantifier les progrès engendrés par les entrainements et (3) orienter les futures entrainements selon les besoins.

Seuil 1		
Puissance	140 watts	1.7 w/kg
Fréquence Cardiaque	126 bpm	73% % max

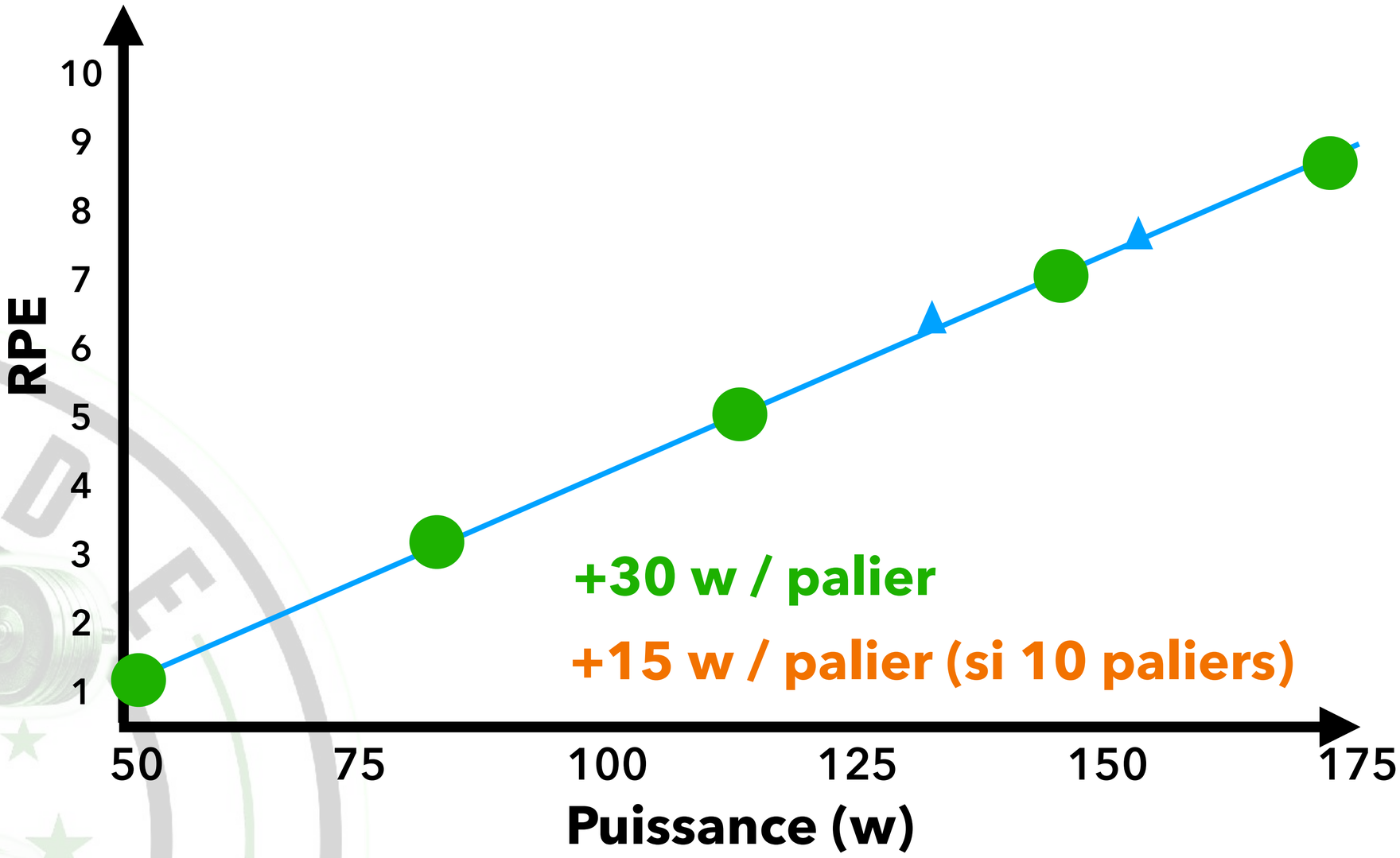
Seuil 2		
Puissance	200 watts	2.4 w/kg
Fréquence Cardiaque	150 bpm	87% % max

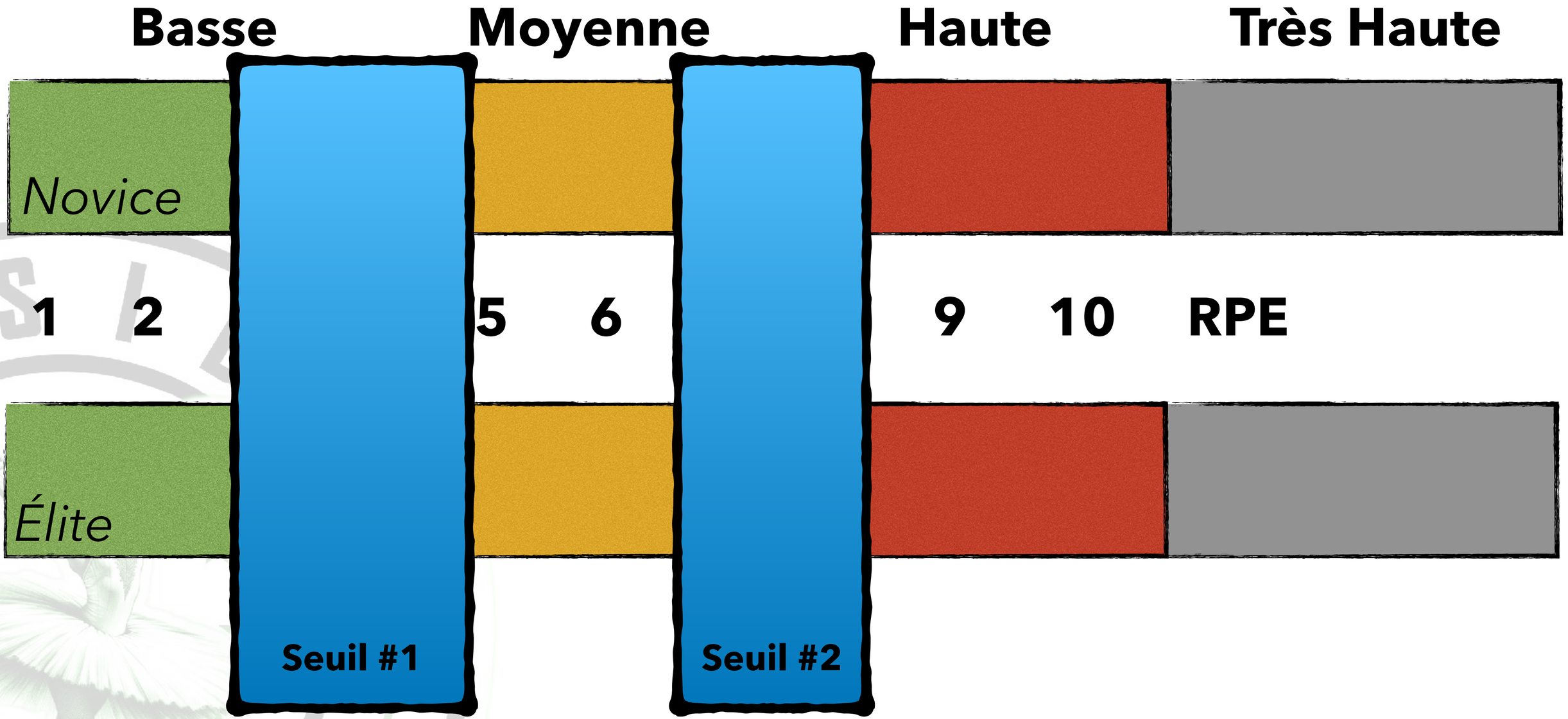
FC Max	172

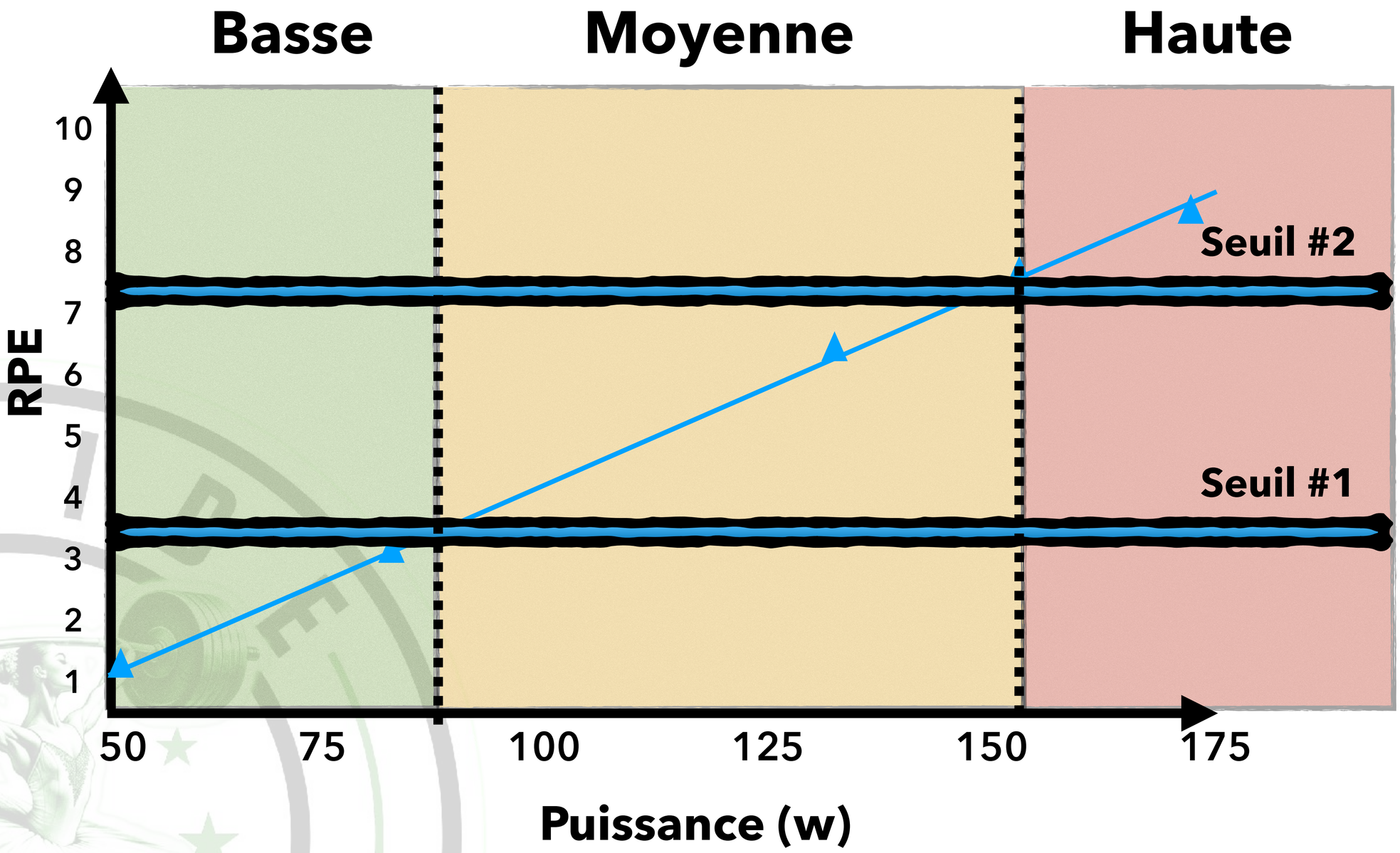
Test d'Effort Régulé au RPE



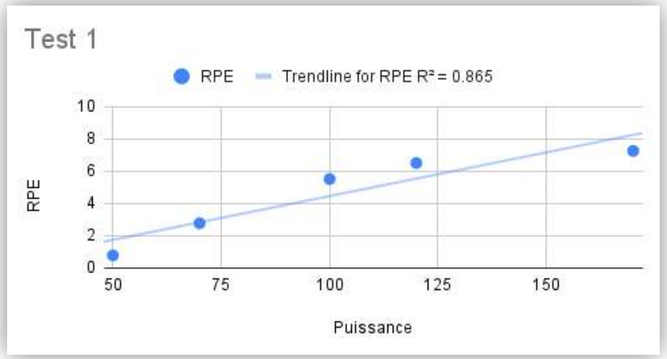
RPE 🎯	Puissance	RPE 💪	RPE 🫁	RPE µ
1	50 w	1.5	1	1.25
3	80 w	3	3	3
5	130 w	7	6	6.5
7	150 w	8	8	8
9	170 w	9	9	9

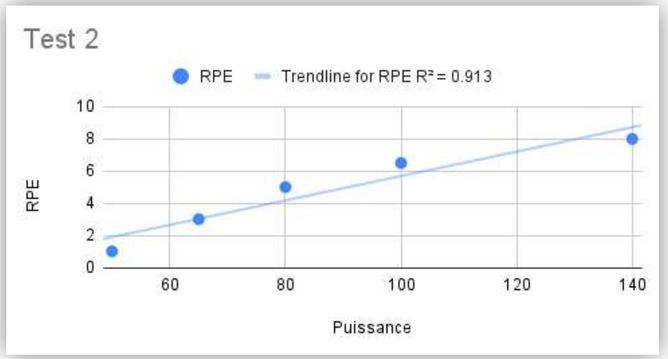

RPE
10
9
8
7
6
5
4
3
2
1
+30 w / palier
+15 w / palier (si 10 paliers)
50
75
100
125
150
175
Puissance (w)

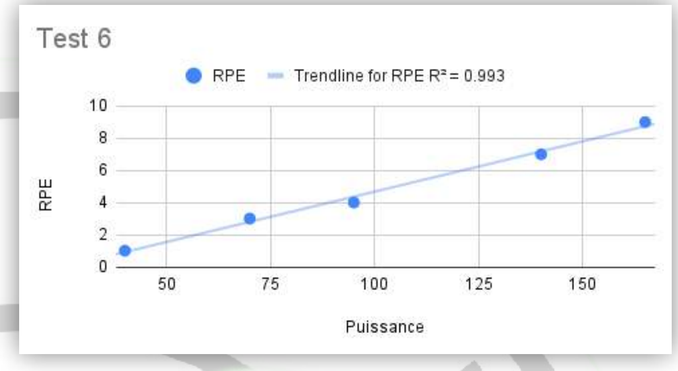

Basse
Moyenne
Haute
Très Haute
Novice
Élite
1
2
5
6
9
10
RPE
Seuil #1
Seuil #2

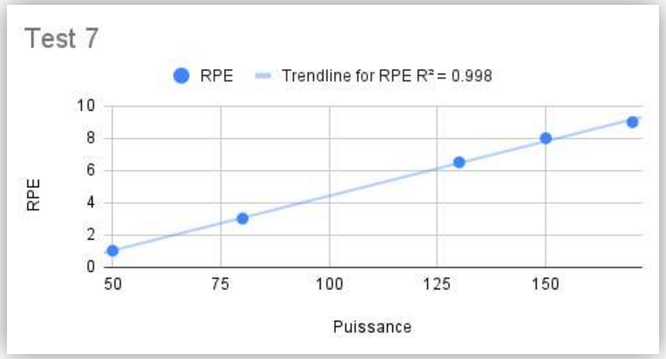

Basse
Moyenne
Haute
RPE
10
9
8
7
6
5
4
3
2
1
Seuil #2
Seuil #1
50
75
100
125
150
175
Puissance (w)

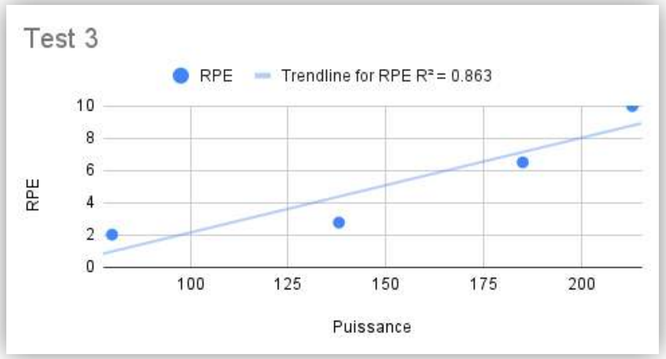
FORM API
MON PARCOURS MON MÉTIER MON EMPLOI
MÂCON

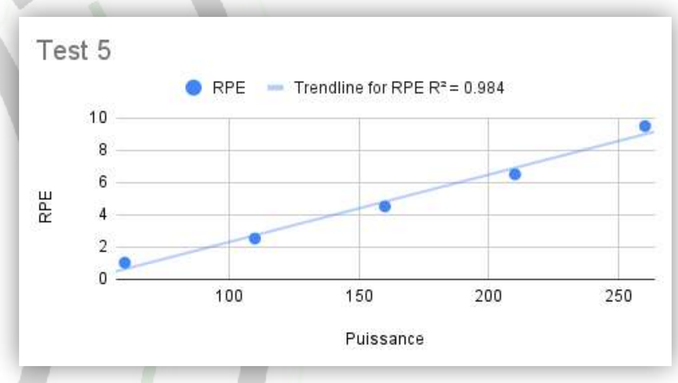


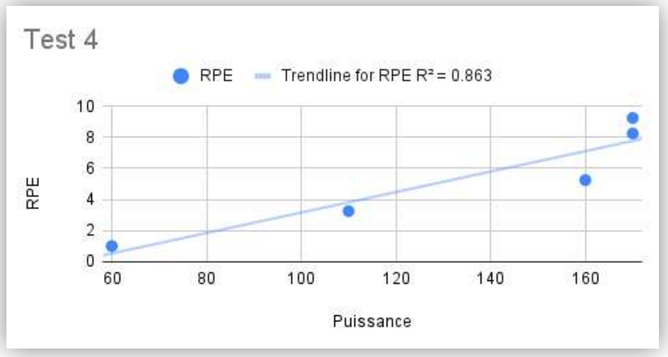












Cet Aprèm

🚴 Entraînements en endurance

🔗 Planification et intégration sportive

Typologie Musculaire

Typologie Musculaire

80% T1
20% T2

50% T1
50% T2

20% T1
80% T2







Endurance: Facteurs de Perf.

Capacité Mitochondriale

Apport d'Oxygène

Économie

VO_2 au S2

Intensité

Sprint: Facteurs de Perf.

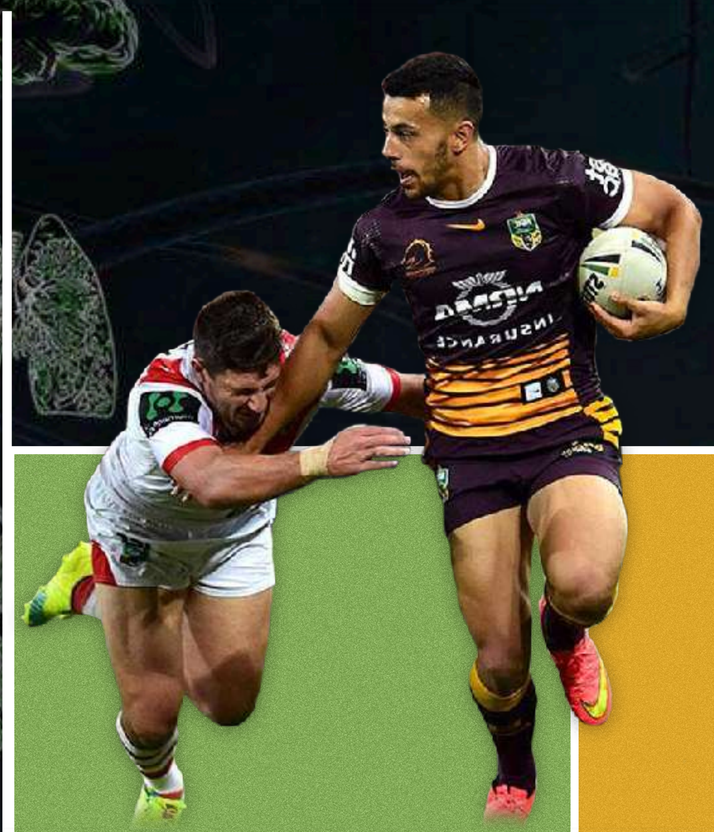
Proportion de Fibres T2

Capacité Glycolytique

GLY

Volume Musculaire

RSA: Facteurs de Perf.

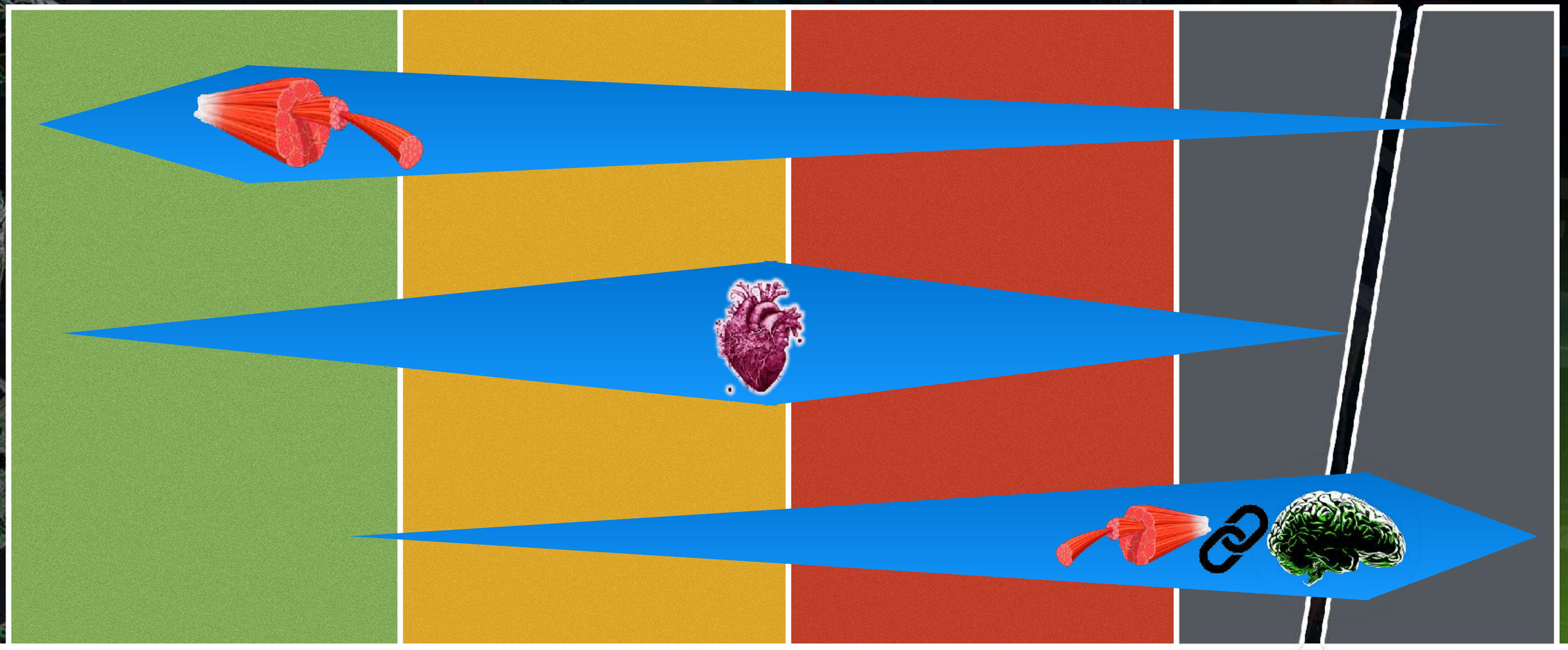


Apport
d'Oxygène

Vmax
Pmax

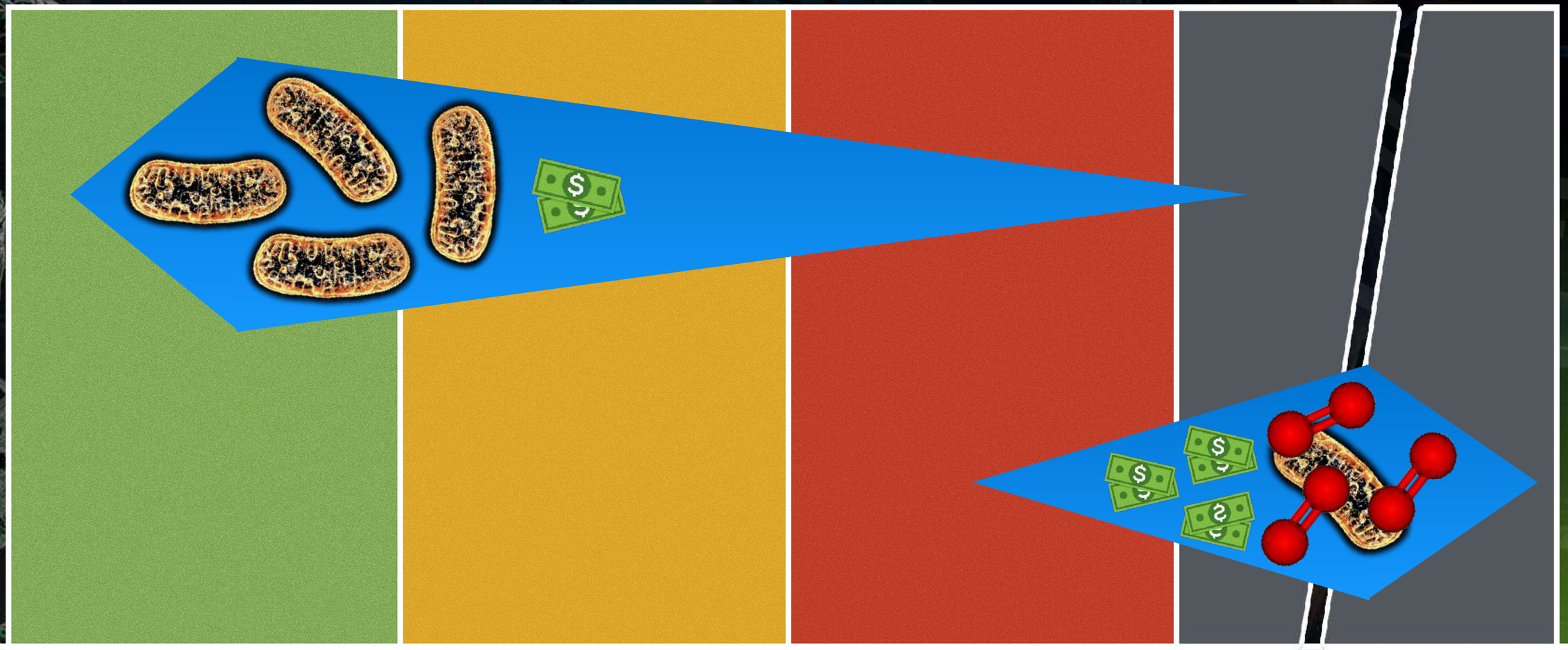
Intensité

Les Adaptations



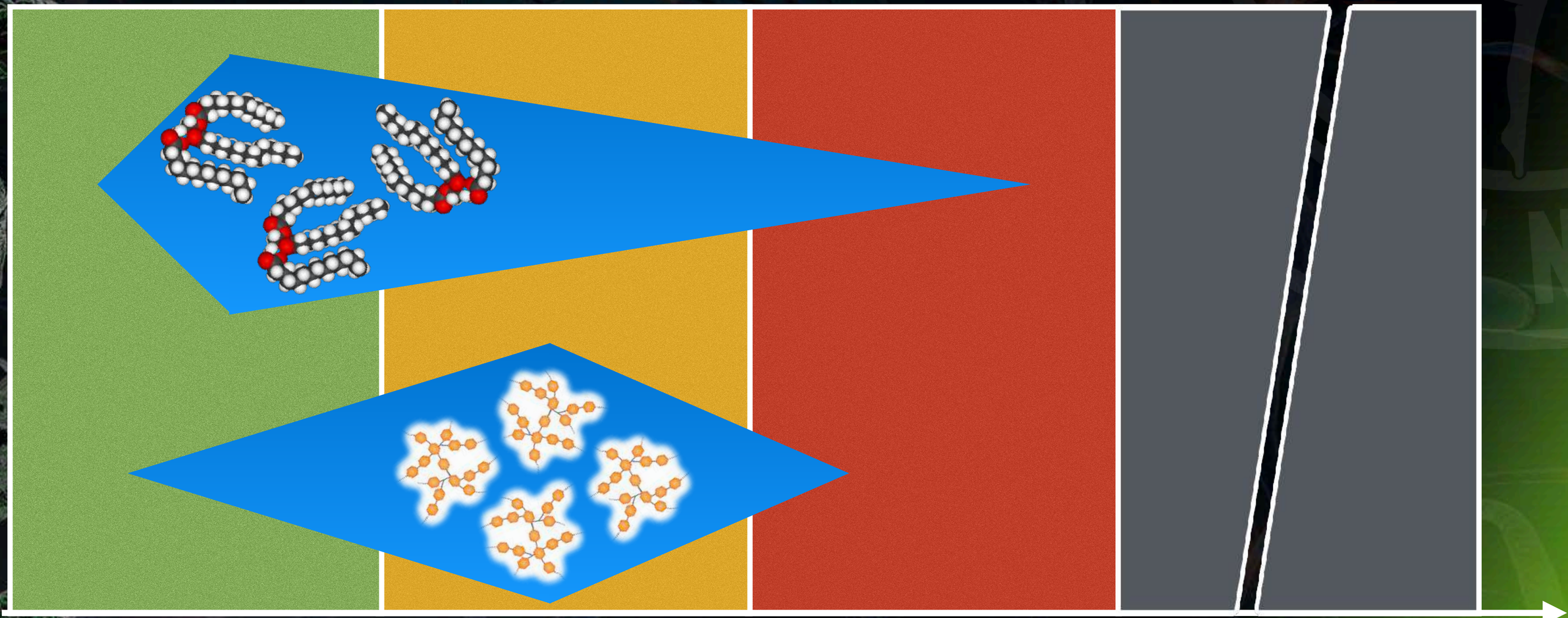
Intensité

Les Adaptations Mitochondriales



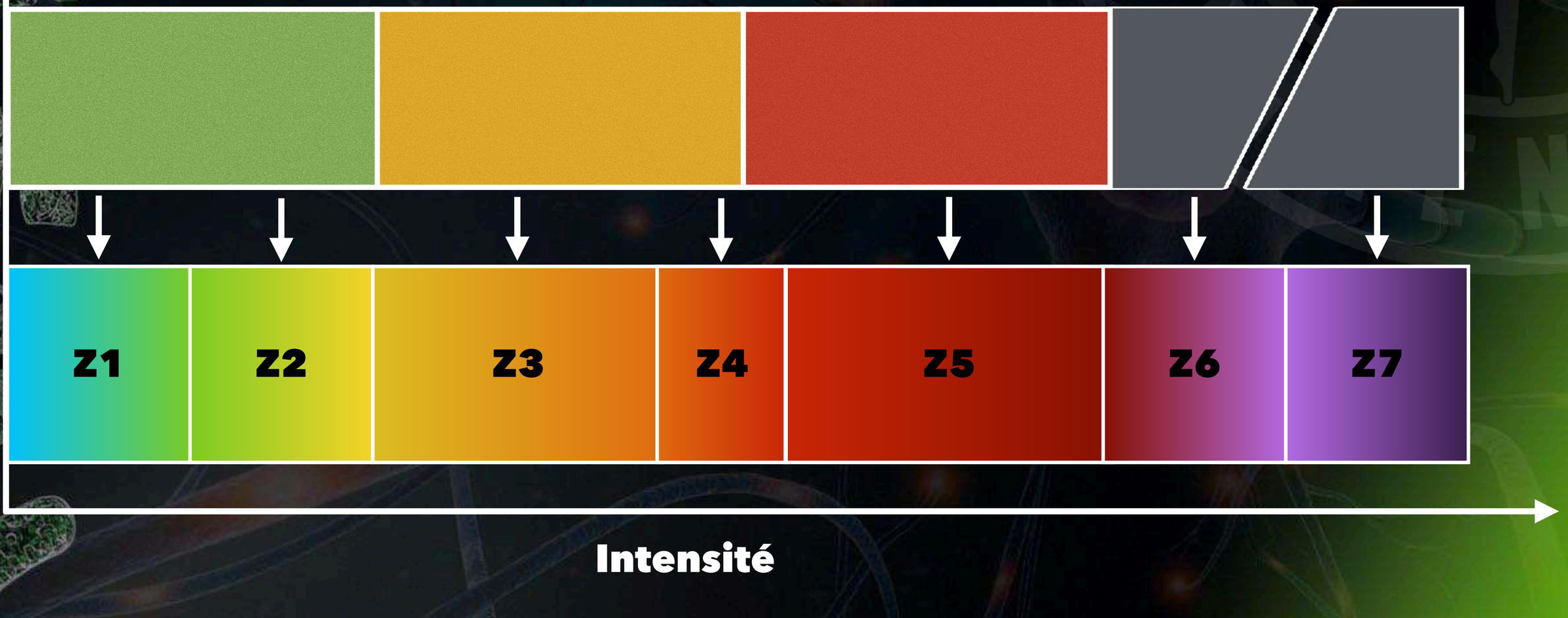
Intensité

Les Adaptations des Substrats

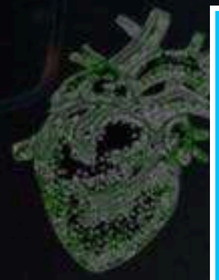


Intensité

Zones d’Entraînement



Nom des Zones

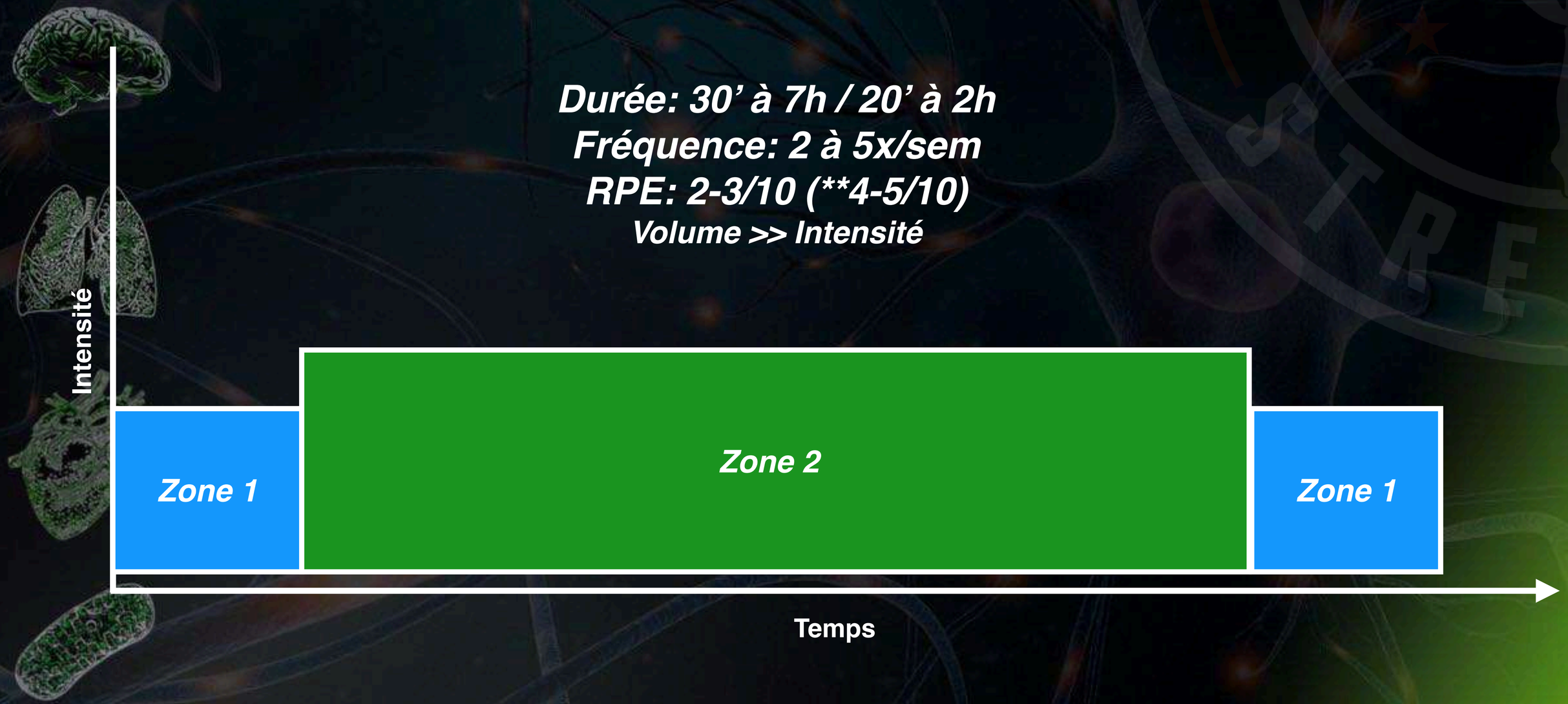


Endurance Fondamentale	Tempo	Seuil	VO2max	Sprint Long	Sprint All Out

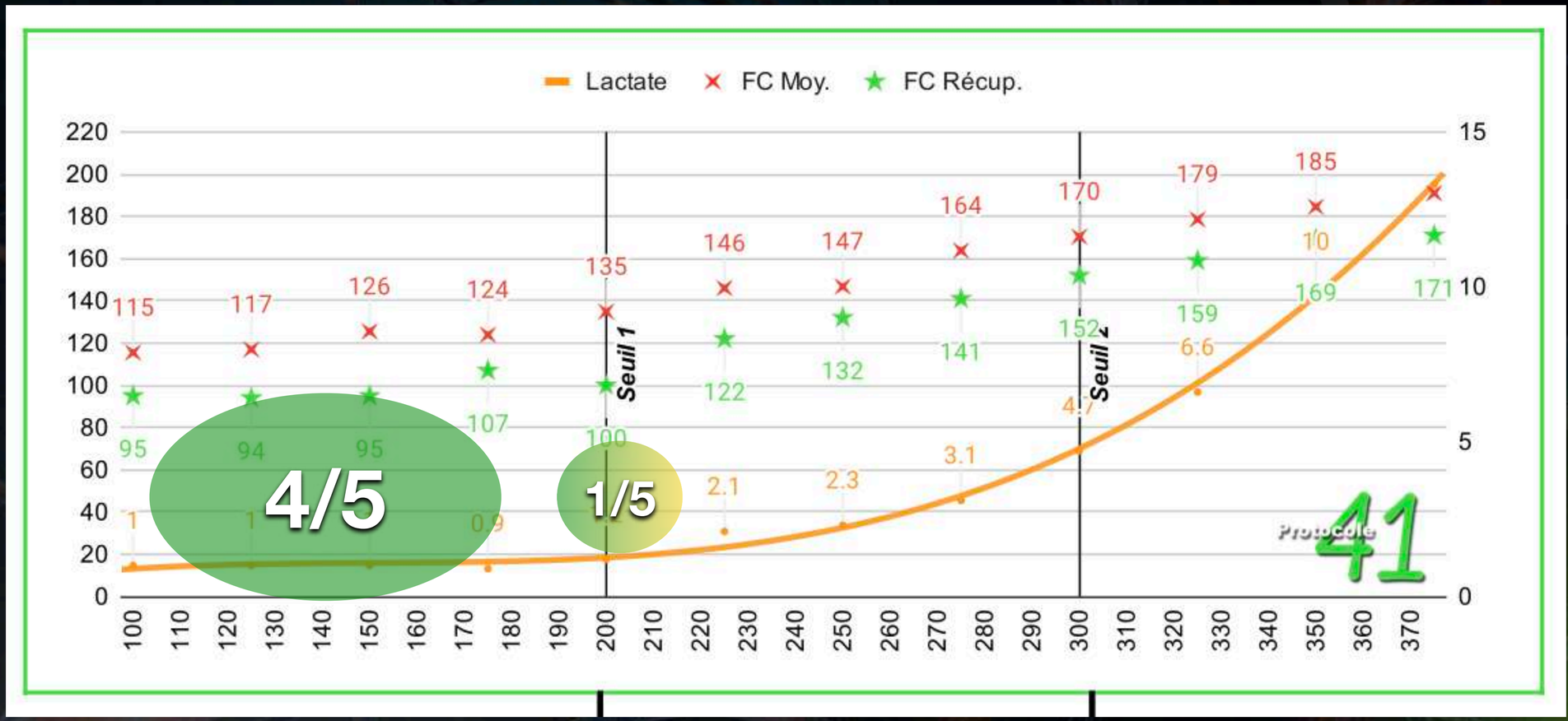
Z1	Z2	Z3	Z4	Z5	Z6	Z7

Endurance Fondamentale

Durée: 30’ à 7h / 20’ à 2h
Fréquence: 2 à 5x/sem
RPE: 2-3/10 (**4-5/10)
Volume >> Intensité

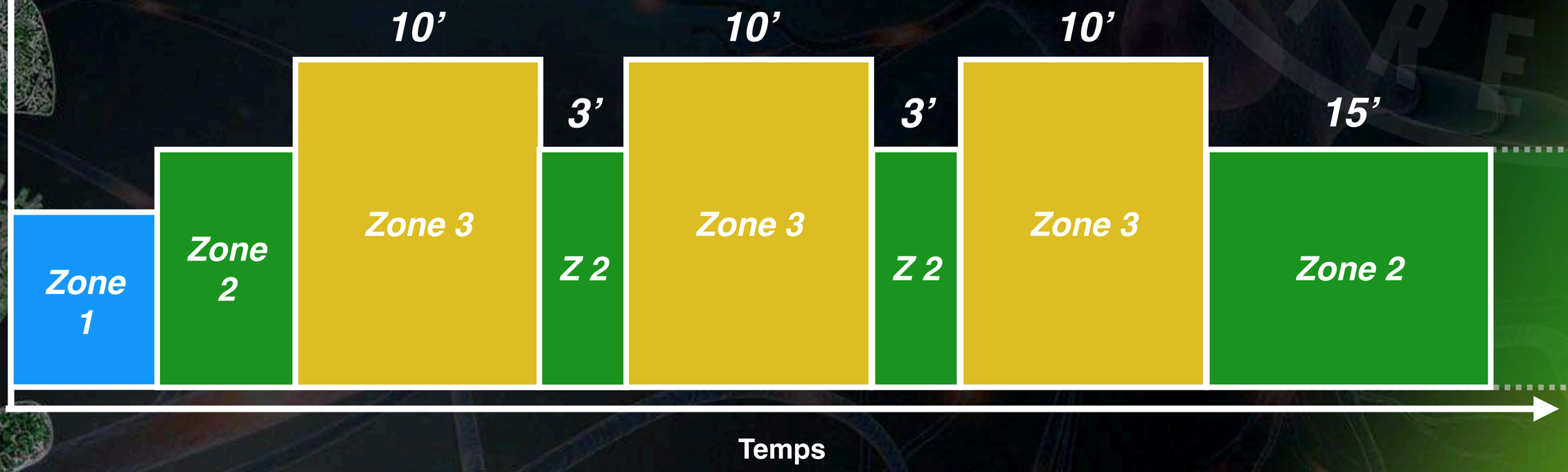


Endurance Fondamentale

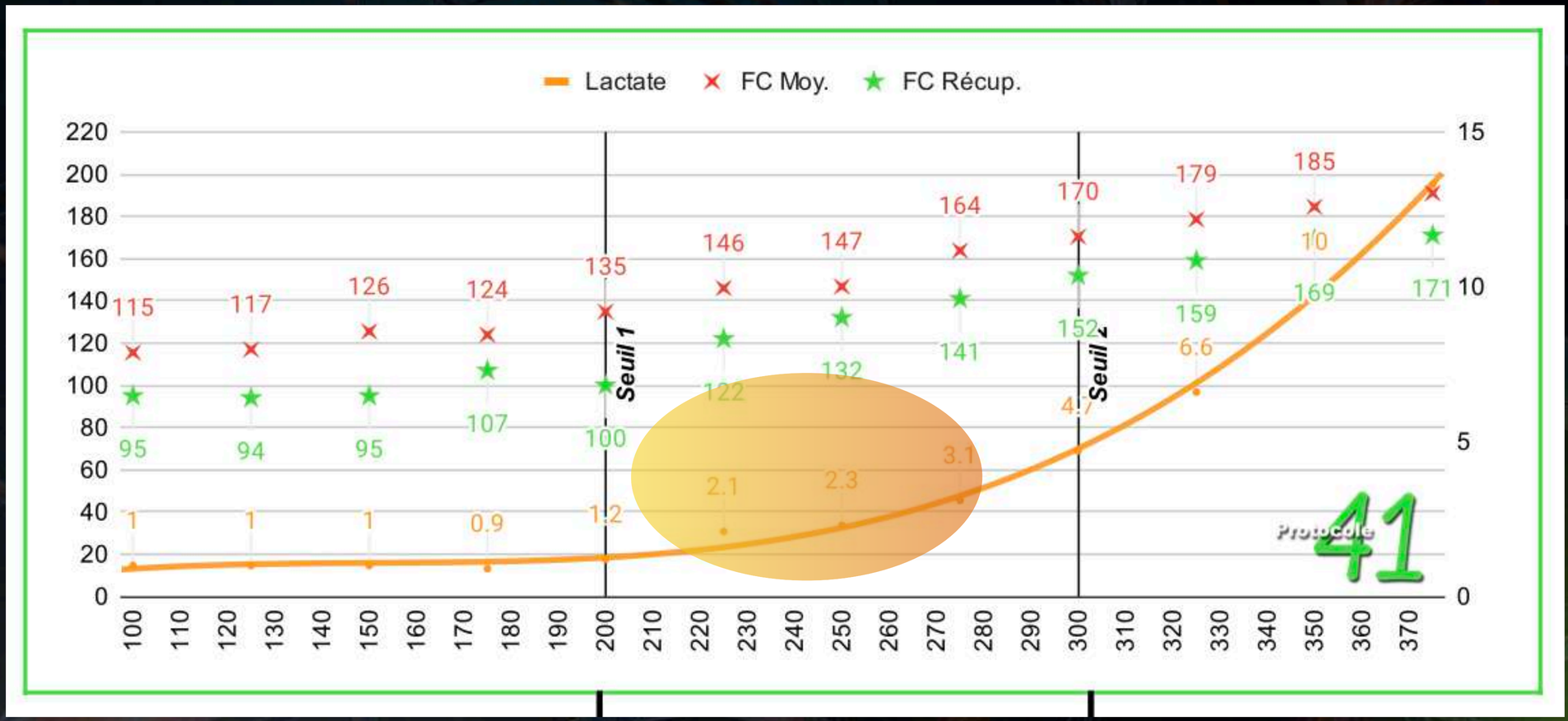


“Tempo”

Durée Effective: 30’ à 90’ / 10’ à 40’
Fréquence: 1 à 2x/sem
Intensité: 75-90% du Seuil 2// RPE: 4-6/10
Ratio T/R: 3-4/1

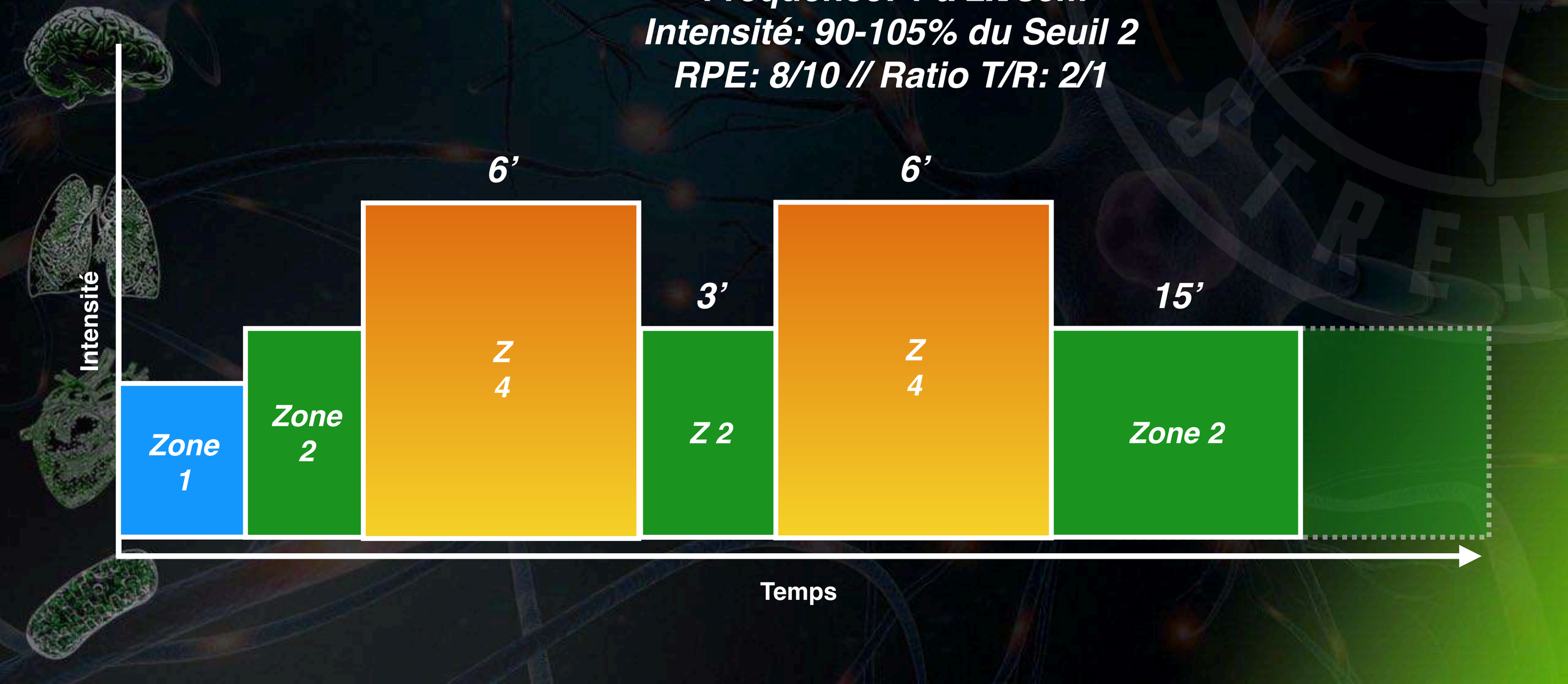


“Tempo”


Lactate
FC Moy.
FC Récup.
Seuil 1
Seuil 2
115
117
126
124
135
146
147
164
170
179
185
95
94
95
107
100
122
132
141
152
159
169
171
1
1
1
0.9
1.2
2.1
2.3
3.1
6.6
1'0
220
200
180
160
140
120
100
80
60
40
20
0
15
10
5
0
100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370

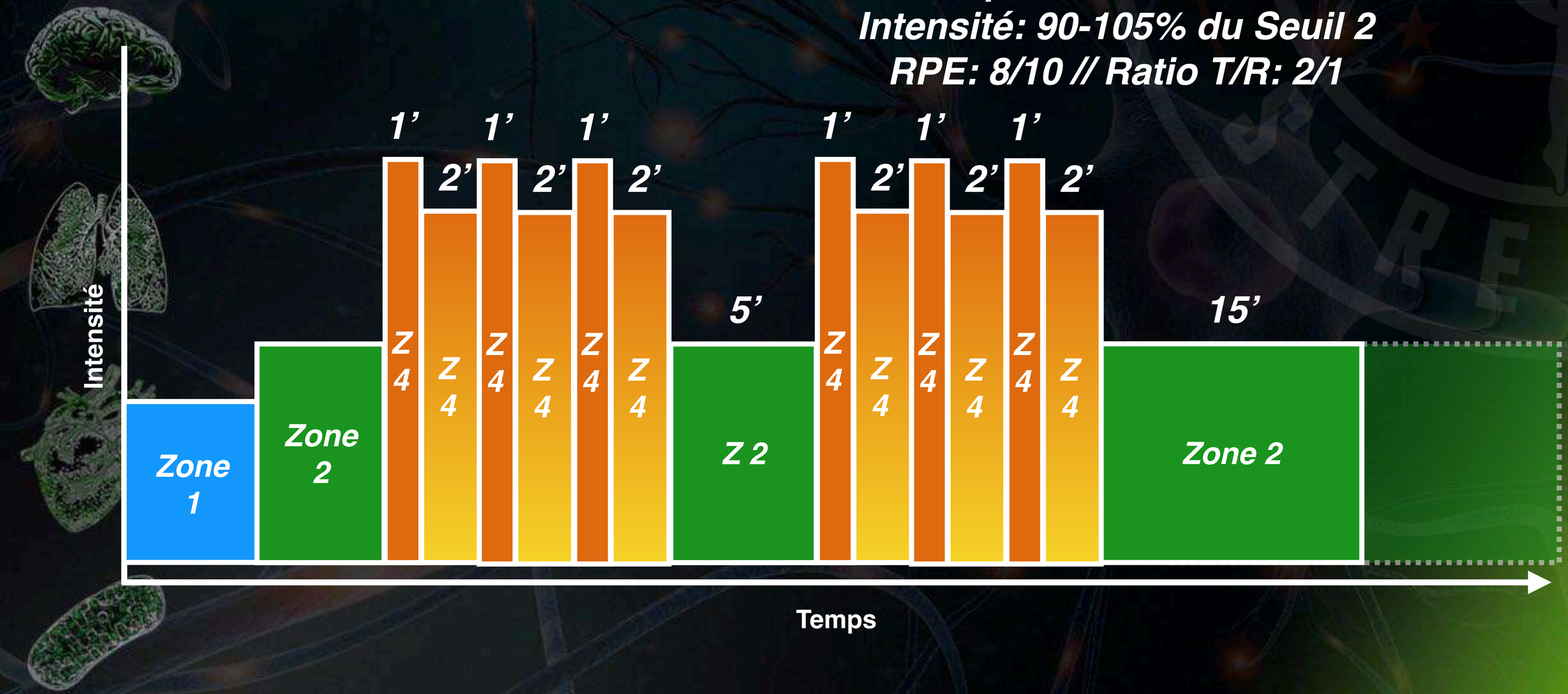
Seuil “Bloc”

Durée Effective: 10’ à 30’ / 10’ à 25’
Fréquence: 1 à 2x/sem
Intensité: 90-105% du Seuil 2
RPE: 8/10 // Ratio T/R: 2/1

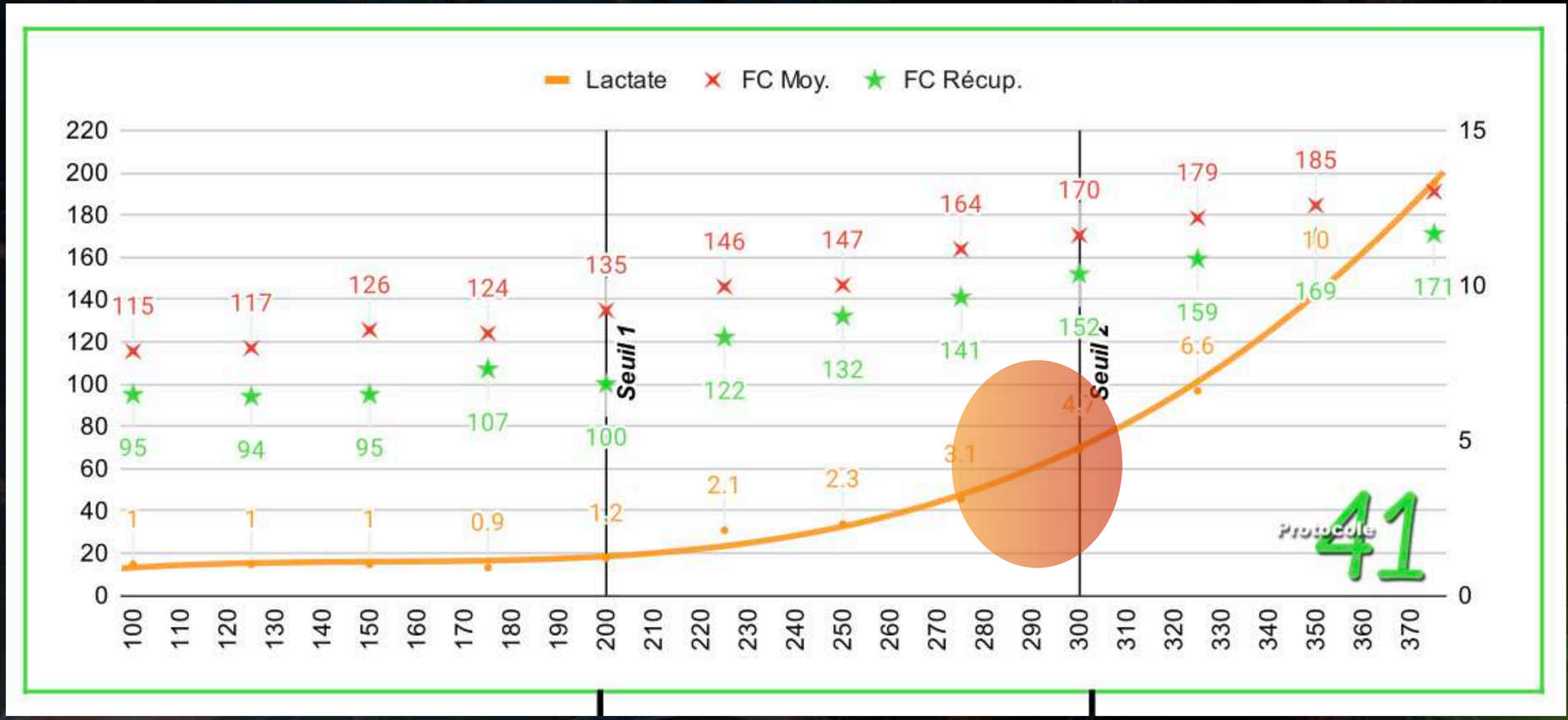


Seuil “Over-Under”

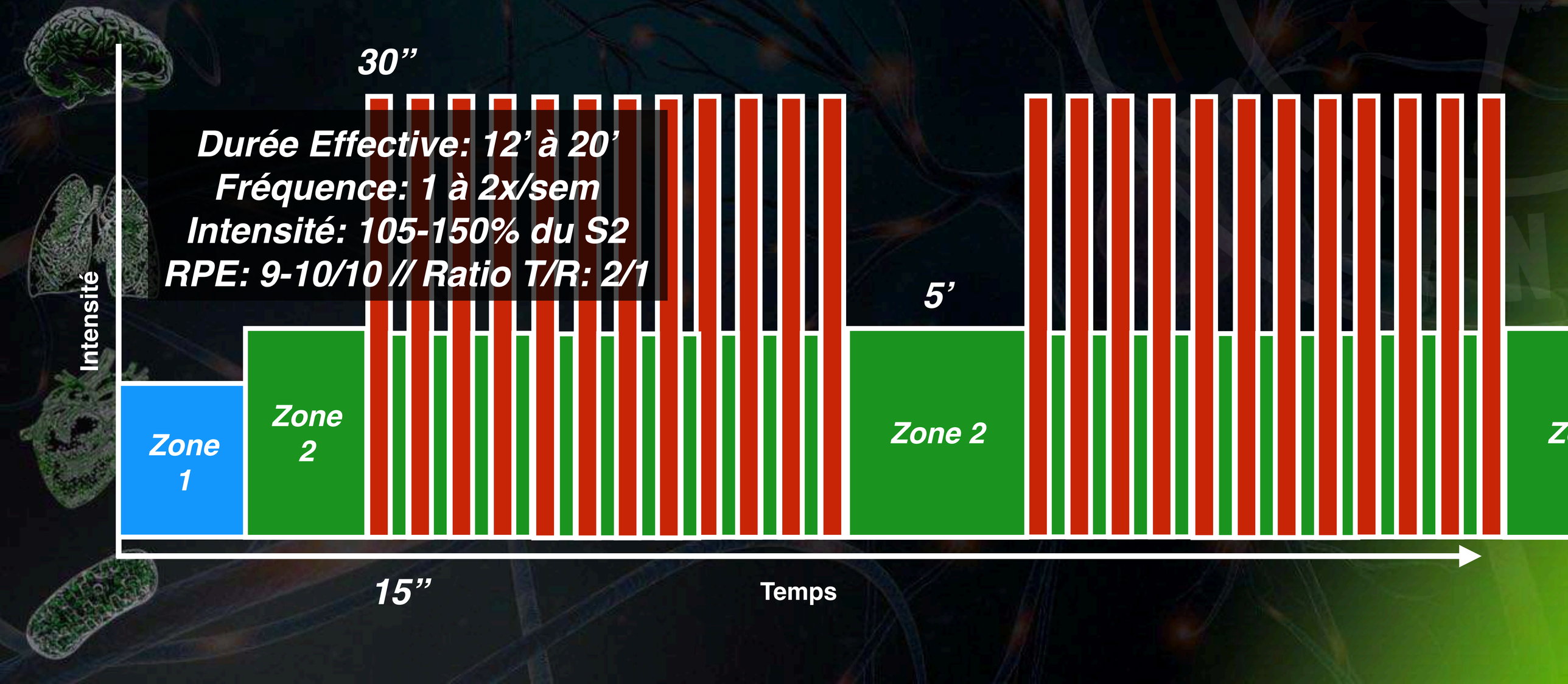
Durée Effective: 10’ à 20’
Fréquence: 1 à 2x/sem
Intensité: 90-105% du Seuil 2
RPE: 8/10 // Ratio T/R: 2/1



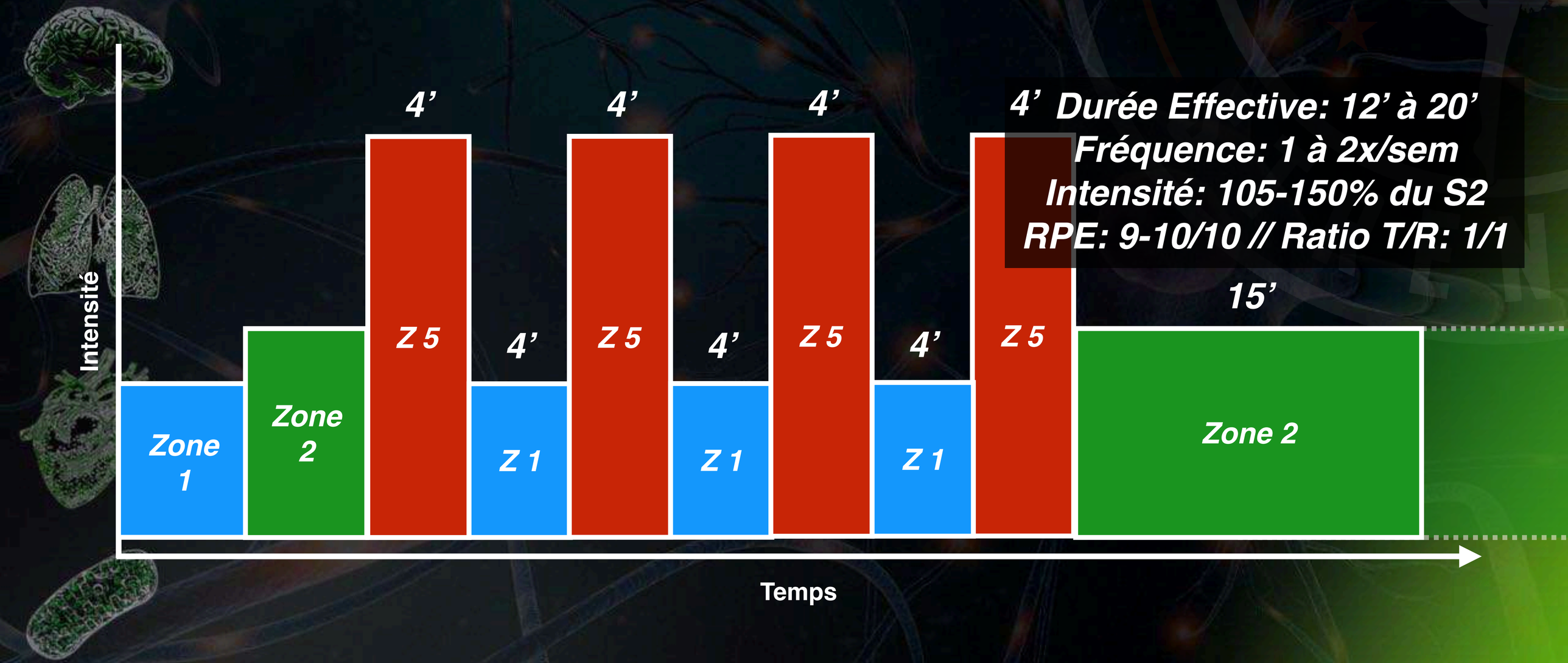
Seuil


Lactate
FC Moy.
FC Récup.
Seuil 1
Seuil 2
115
117
126
124
135
146
147
164
170
179
185
95
94
95
107
100
122
132
141
152
159
169
171
1
1
1
0.9
1.2
2.1
2.3
3.1
4.7
6.6
10
220
200
180
160
140
120
100
80
60
40
20
0
15
10
5
0
100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370

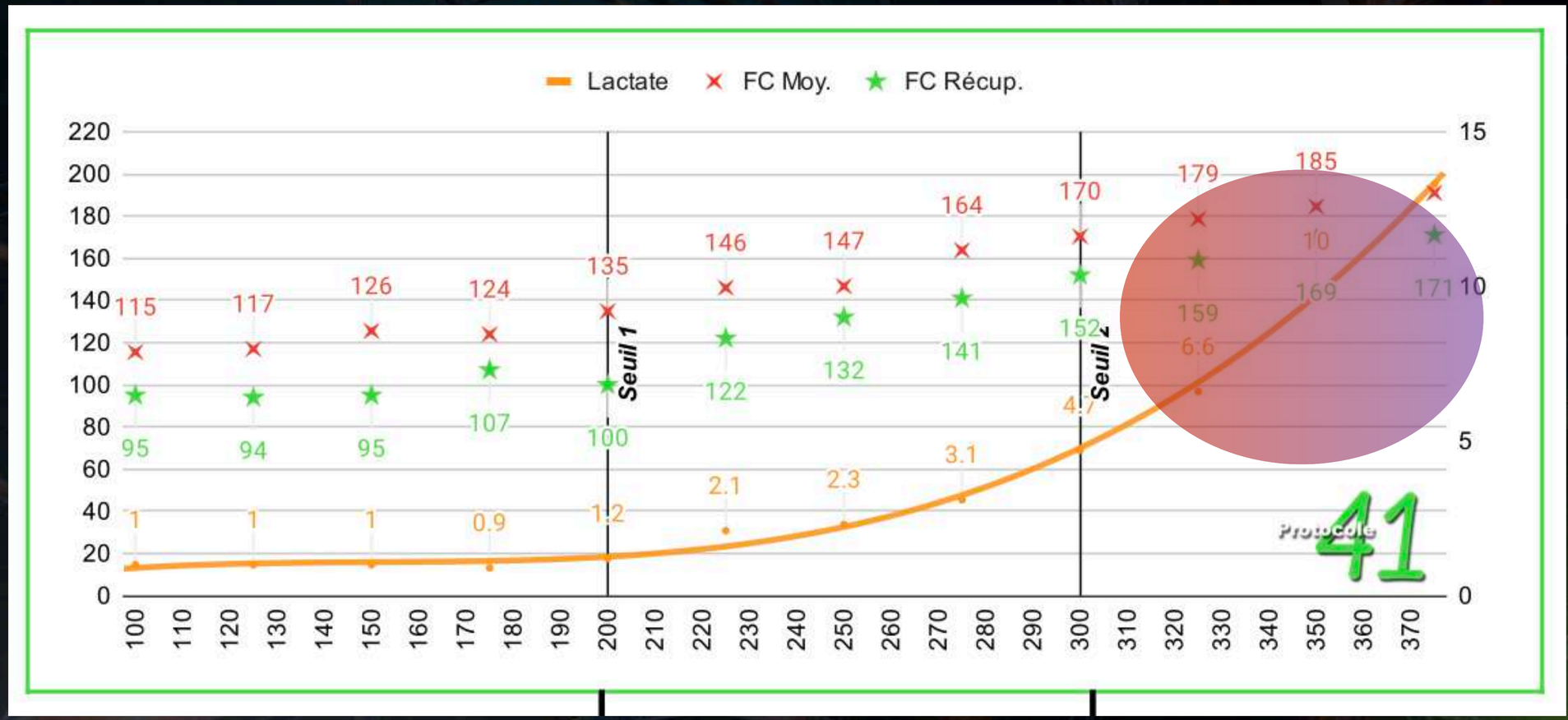
VO2max Fractionnée



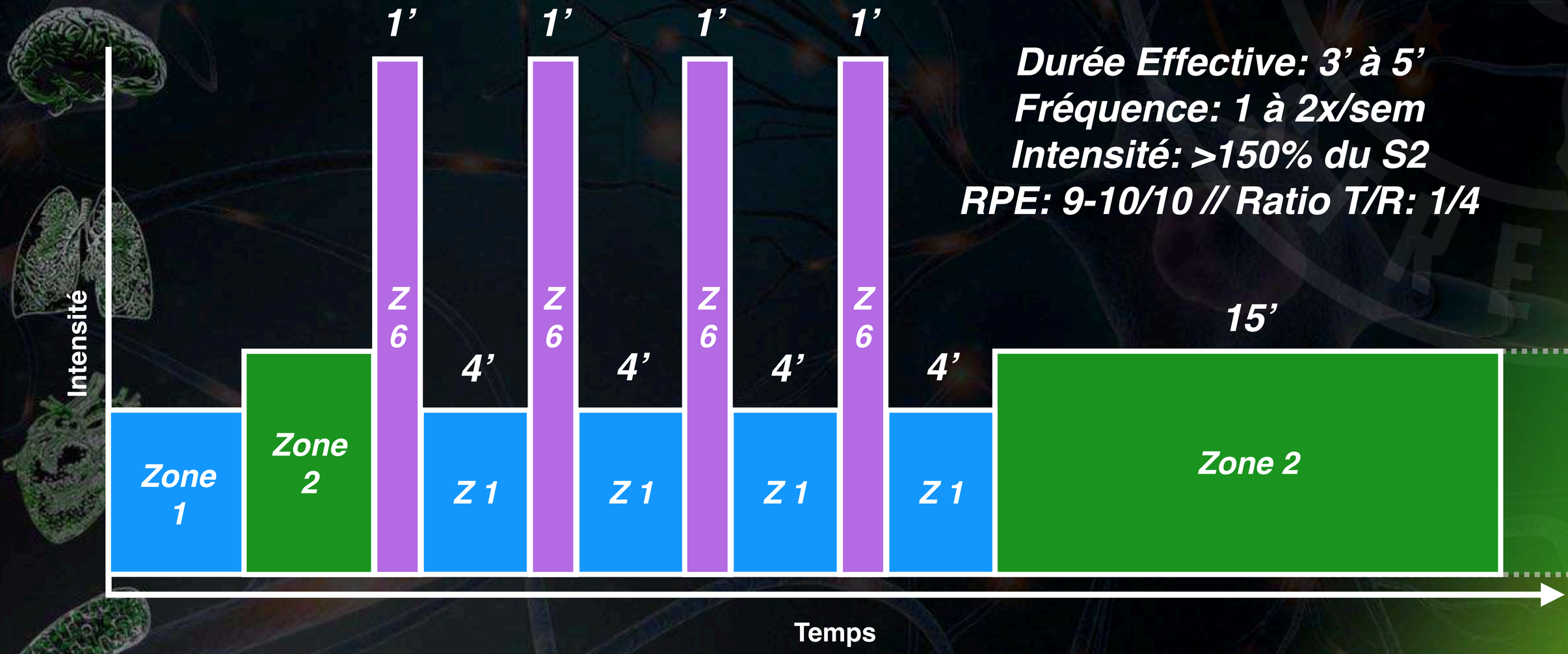
VO2max “Bloc”


Intensité
Temps
Zone 1
Zone 2
Z 5
4’
Z 1
Z 5
4’
Z 1
Z 5
4’
Z 1
Z 5
4’
Zone 2
15’
4’ Durée Effective: 12’ à 20’
Fréquence: 1 à 2x/sem
Intensité: 105-150% du S2
RPE: 9-10/10 // Ratio T/R: 1/1

VO2max

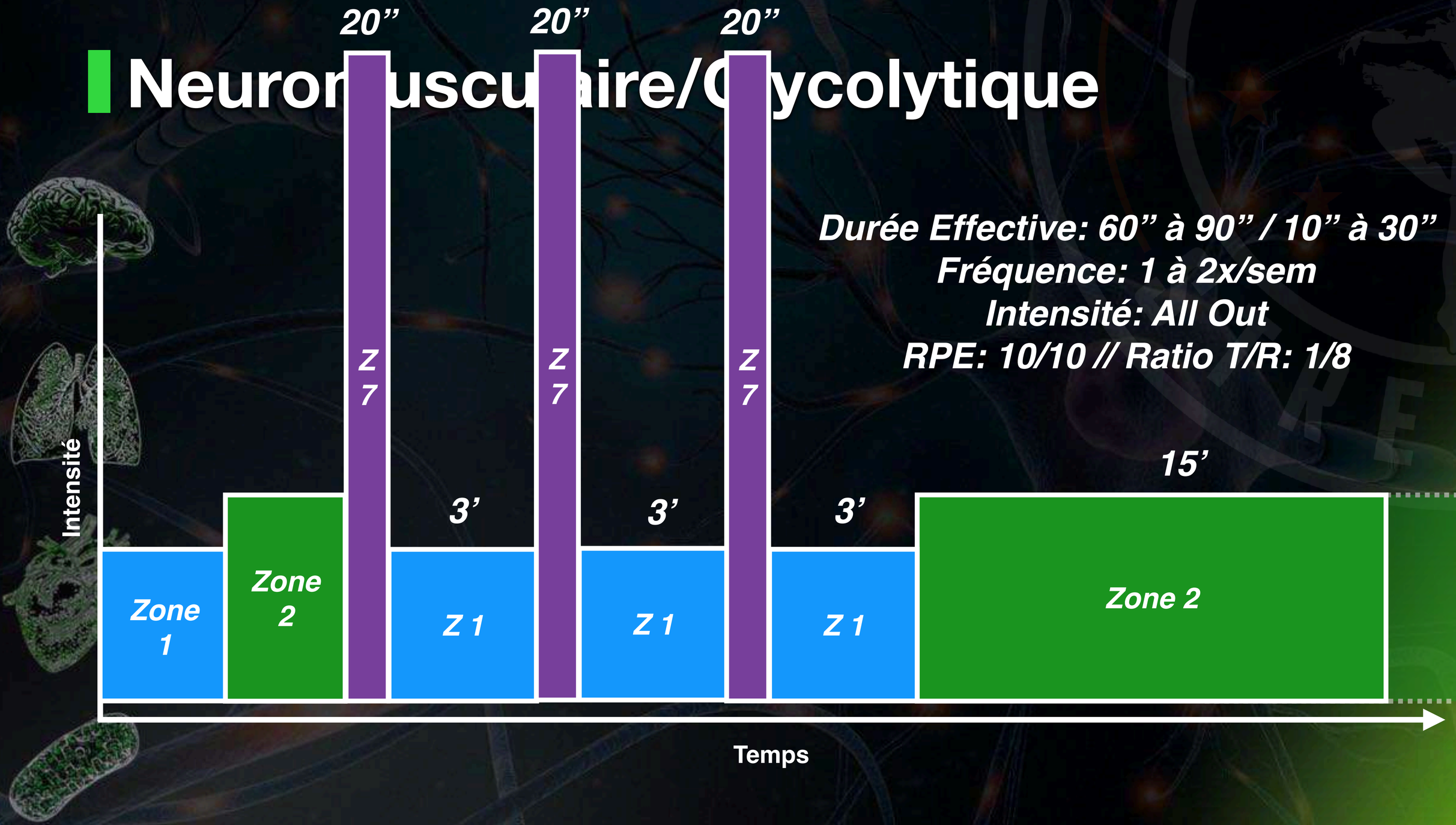

Lactate
FC Moy.
FC Récup.
Seuil 1
Seuil 2
115
117
126
124
135
146
147
164
170
179
185
95
94
95
107
100
122
132
141
152
159
169
171
1
1
1
0.9
1.2
2.1
2.3
3.1
6.6
Protocole 41

Glycolytique/Tampon



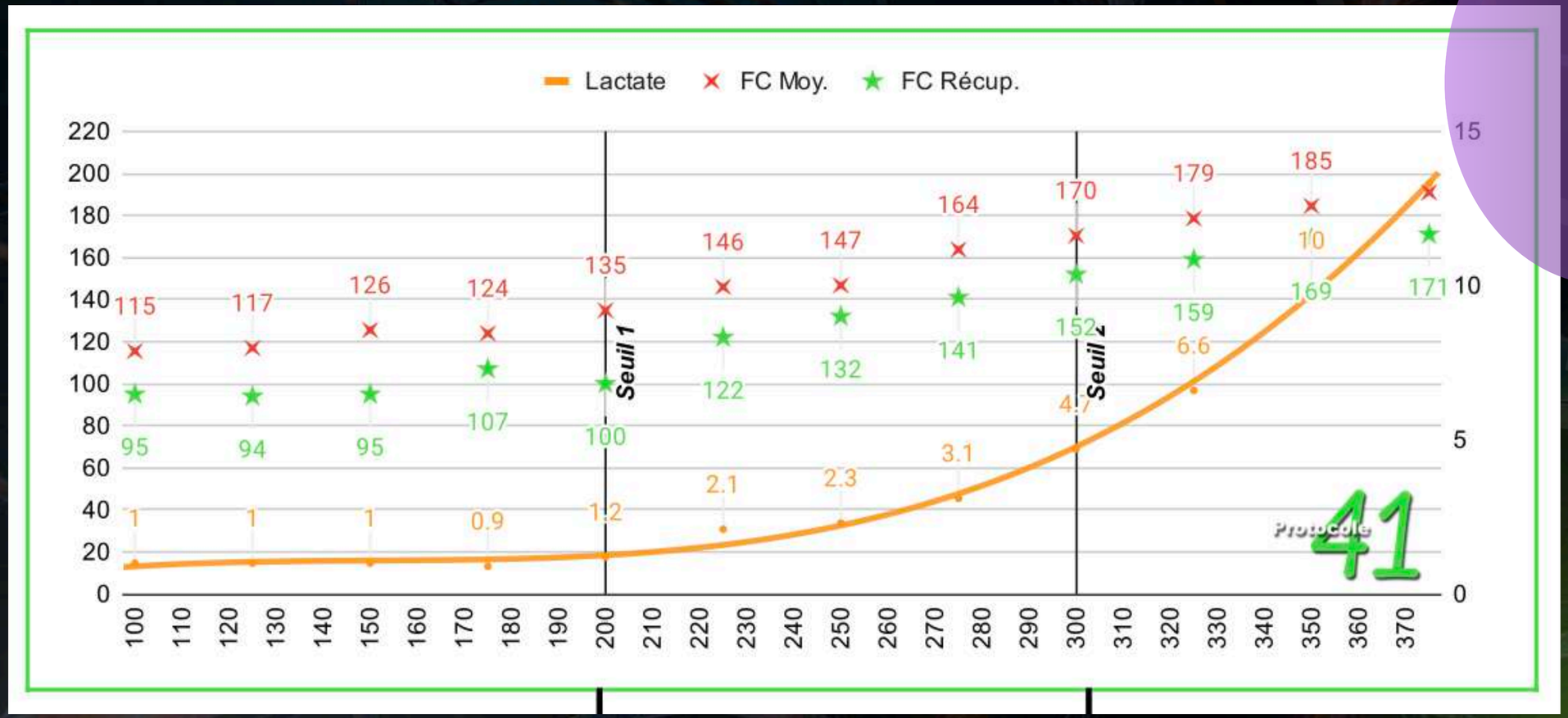
Durée Effective: 3’ à 5’
Fréquence: 1 à 2x/sem
Intensité: >150% du S2
RPE: 9-10/10 // Ratio T/R: 1/4

Neuromusculaire/Glycolytique

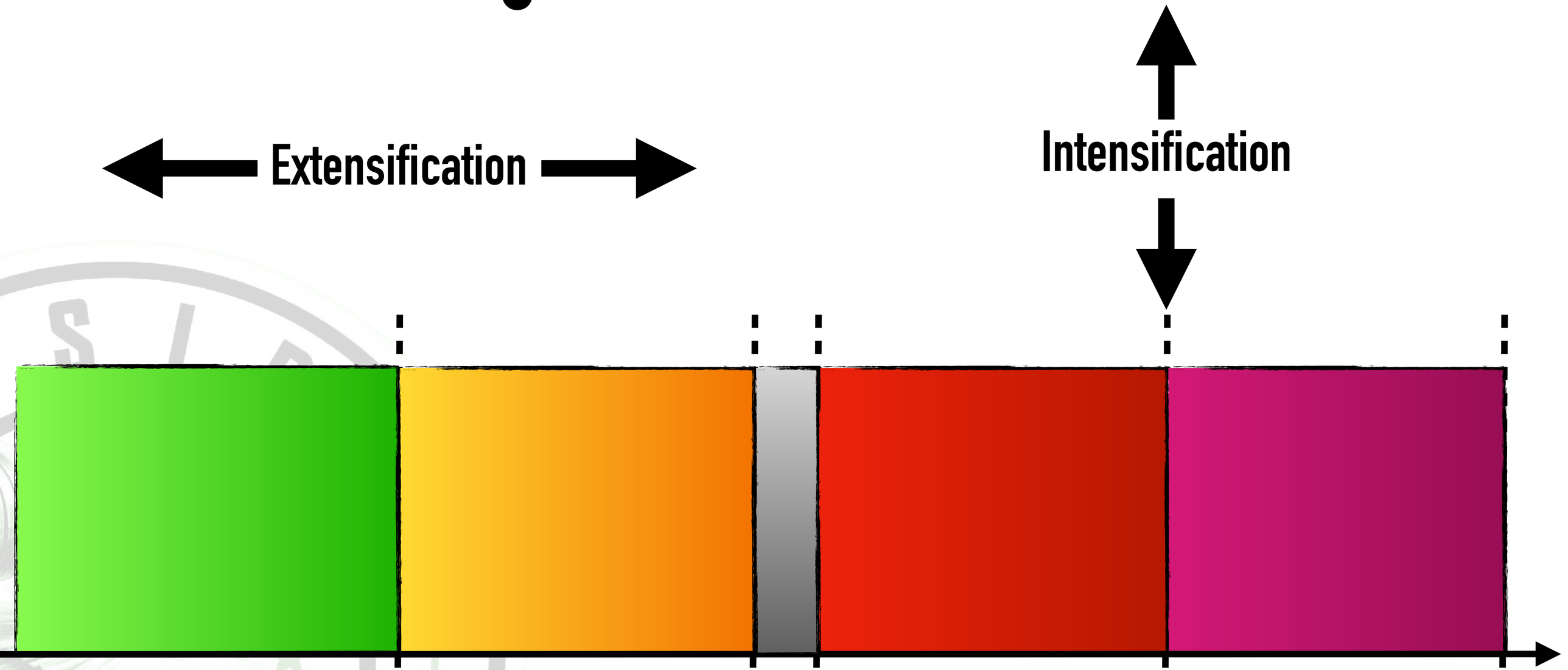


Durée Effective: 60” à 90” / 10” à 30”
Fréquence: 1 à 2x/sem
Intensité: All Out
RPE: 10/10 // Ratio T/R: 1/8

Puissance/Glycolytique

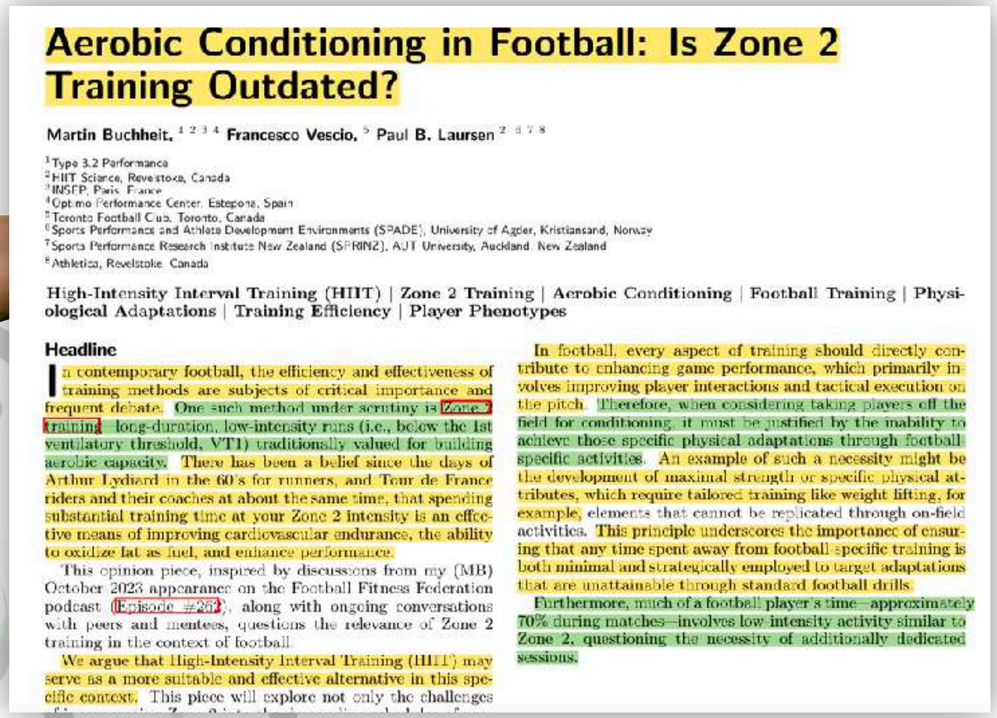


Progression des Séances



Choix de la Modalité

Zone 2 & Football



Aerobic Conditioning in Football: Is Zone 2 Training Outdated?

Martin Buchheit, [1 2 3 4] Francesco Vescio, [5] Paul B. Laursen [2 6 7 8]

[1] Type 3.2 Performance
[2] HIIT Science, Revelstoke, Canada
[3] INSEP, Paris, France
[4] Optimo Performance Center, Estepona, Spain
[5] Toronto Football Club, Toronto, Canada
[6] Sports Performance and Athlete Development Environments (SPADE), University of Agder, Kristiansand, Norway
[7] Sports Performance Research Institute New Zealand (SPRINZ), AUT University, Auckland, New Zealand
[8] Athletica, Revelstoke, Canada

High-Intensity Interval Training (HIIT) | Zone 2 Training | Aerobic Conditioning | Football Training | Physiological Adaptations | Training Efficiency | Player Phenotypes

Headline

In contemporary football, the efficiency and effectiveness of training methods are subjects of critical importance and frequent debate. One such method under scrutiny is 'Zone 2' training: long-duration, low-intensity runs (i.e., below the 1st ventilatory threshold, VT1) traditionally valued for building aerobic capacity. There has been a belief since the days of Arthur Lydiard in the 60's for runners, and Tour de France riders and their coaches at about the same time, that spending substantial training time at your Zone 2 intensity is an effective means of improving cardiovascular endurance, the ability to oxidize fat as fuel, and enhance performance.

This opinion piece, inspired by discussions from my (MB) October 2023 appearance on the Football Fitness Federation podcast (Episode #263), along with ongoing conversations with peers and mentees, questions the relevance of Zone 2 training in the context of football.

We argue that High-Intensity Interval Training (HIIT) may serve as a more suitable and effective alternative in this specific context. This piece will explore not only the challenges

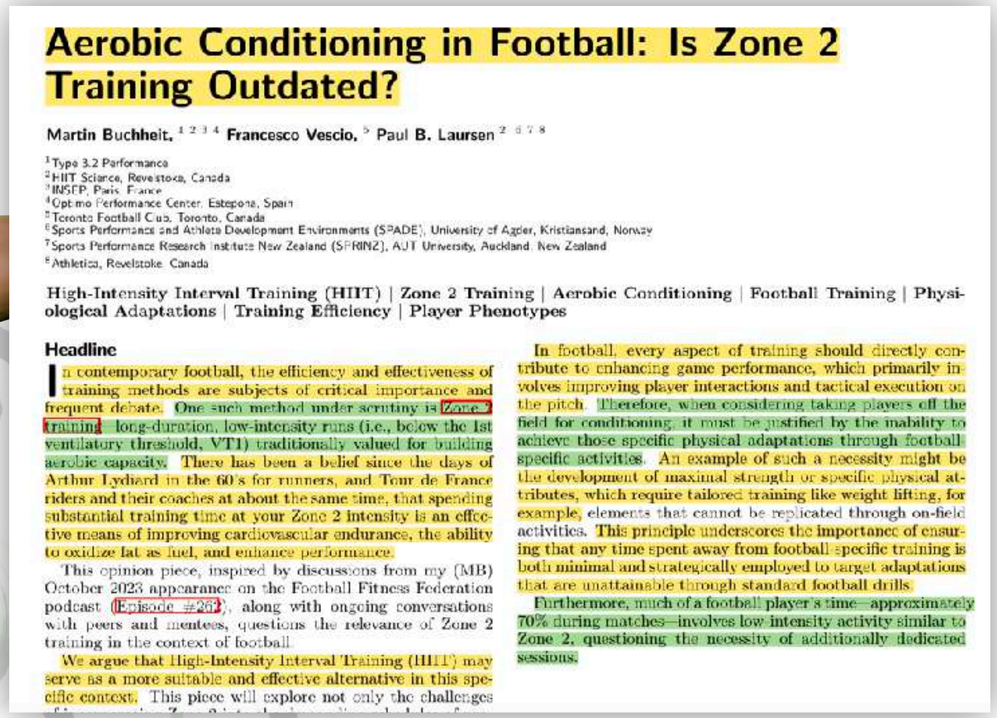
In football, every aspect of training should directly contribute to enhancing game performance, which primarily involves improving player interactions and tactical execution on the pitch. Therefore, when considering taking players off the field for conditioning, it must be justified by the inability to achieve those specific physical adaptations through football-specific activities. An example of such a necessity might be the development of maximal strength or specific physical attributes, which require tailored training like weight lifting, for example, elements that cannot be replicated through on-field activities. This principle underscores the importance of ensuring that any time spent away from football-specific training is both minimal and strategically employed to target adaptations that are unattainable through standard football drills.

Furthermore, much of a football player's time—approximately 70% during matches—involves low-intensity activity similar to Zone 2, questioning the necessity of additionally dedicated sessions.

Argument 1:

"En football, chaque aspect de l'entraînement doit contribuer directement à l'amélioration des performances du jeu, ce qui implique principalement l'amélioration des interactions entre les joueurs et de l'exécution tactique sur le terrain."

Zone 2 & Football



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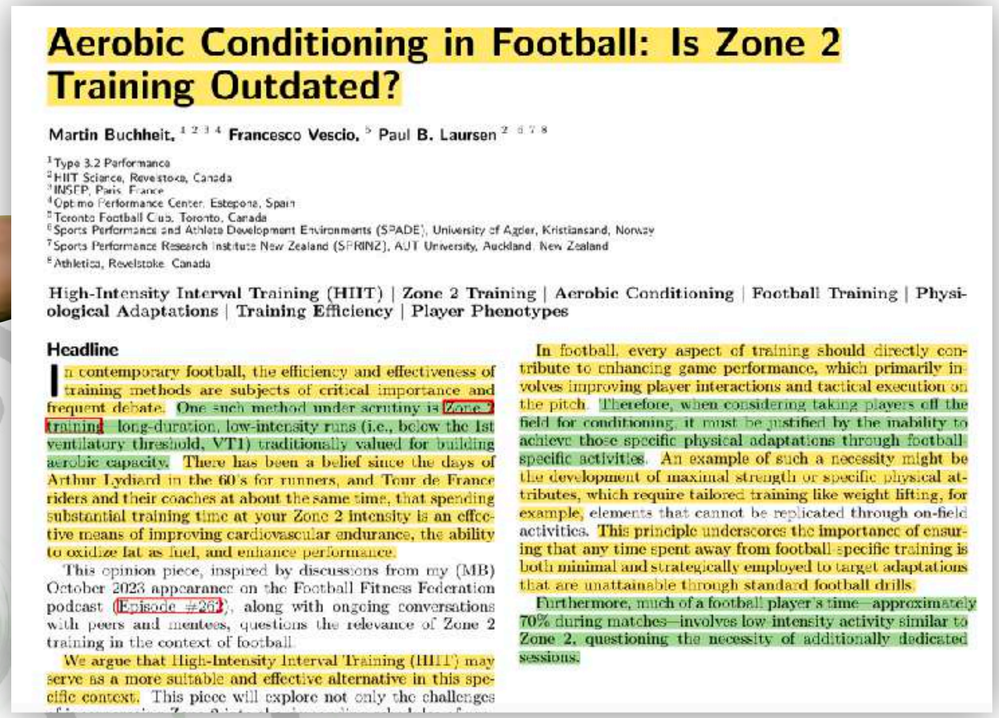
Argument 2:

"L'entraînement en zone 2, qui met l'accent sur une faible intensité soutenue, ne répond pas aux besoins de ces athlètes explosifs, qui bénéficient généralement davantage de modalités d'entraînement correspondant à leurs caractéristiques de performance à haute intensité et de courte durée, observées dans le jeu réel."

Zone 2 & Football



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Argument 3:

"La recherche suggère que le HIIT peut offrir des avantages physiologiques similaires, voire supérieurs, dans un cadre mieux adapté aux exigences du football professionnel (Laursen & Buchheit 2018). Les avantages du HIIT par rapport à la zone 2 peuvent être détaillés à travers trois points clés :"

(Signalisation moléculaire, Volume & Spécificité)

Performance en Football

Relationship Between Different Measures of Aerobic Fitness and Repeated-Sprint Ability in Elite Soccer Players

Juliano F. da Silva,[1] Luiz G.A. Guglielmo,[1] and David Bishop[2]

[1]Physical Effort Laboratory, Sports Center, Federal University of Santa Catarina, Florianópolis, Brazil; and [2]Institute of Sport, Exercise and Active Living (ISEAL), Victoria University, Melbourne, Australia

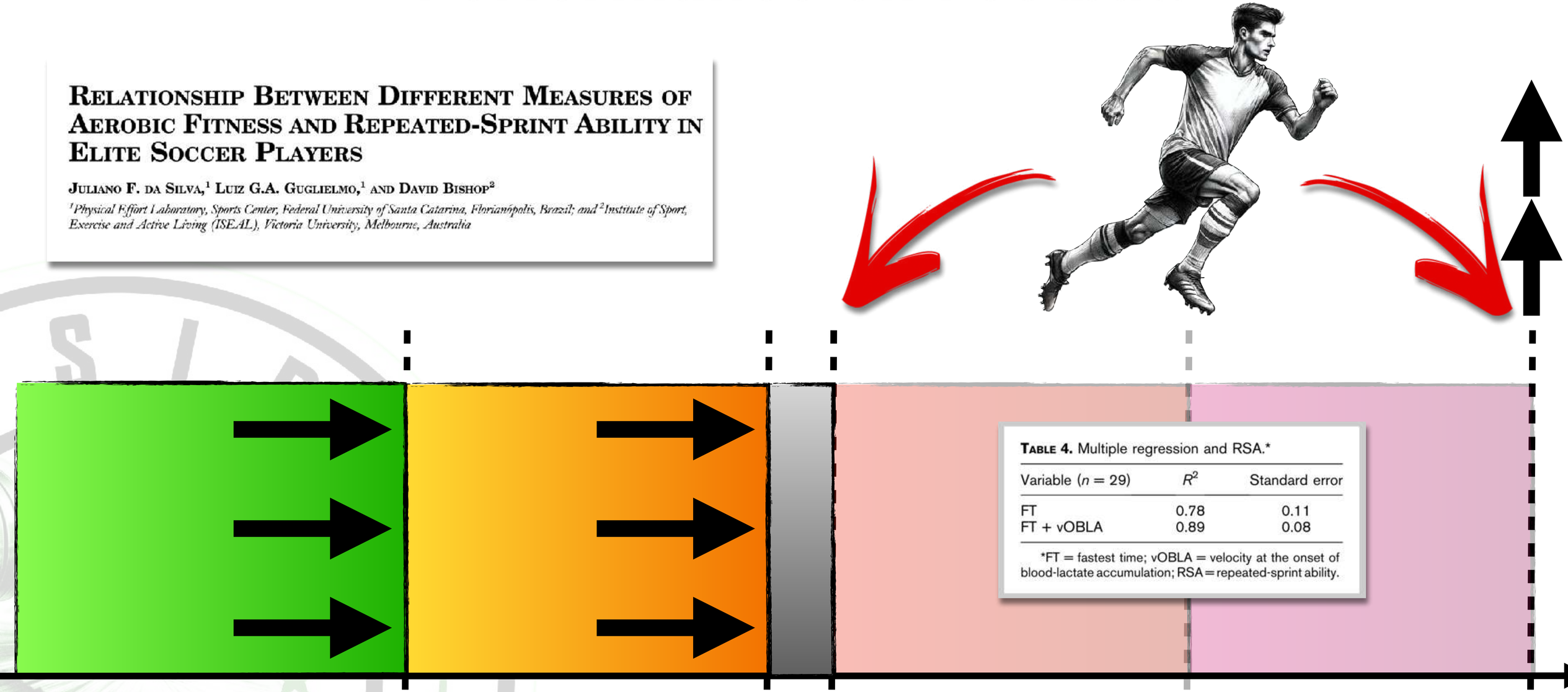
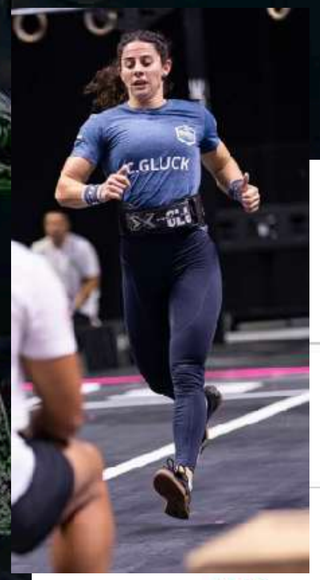


Table 4. Multiple regression and RSA.*

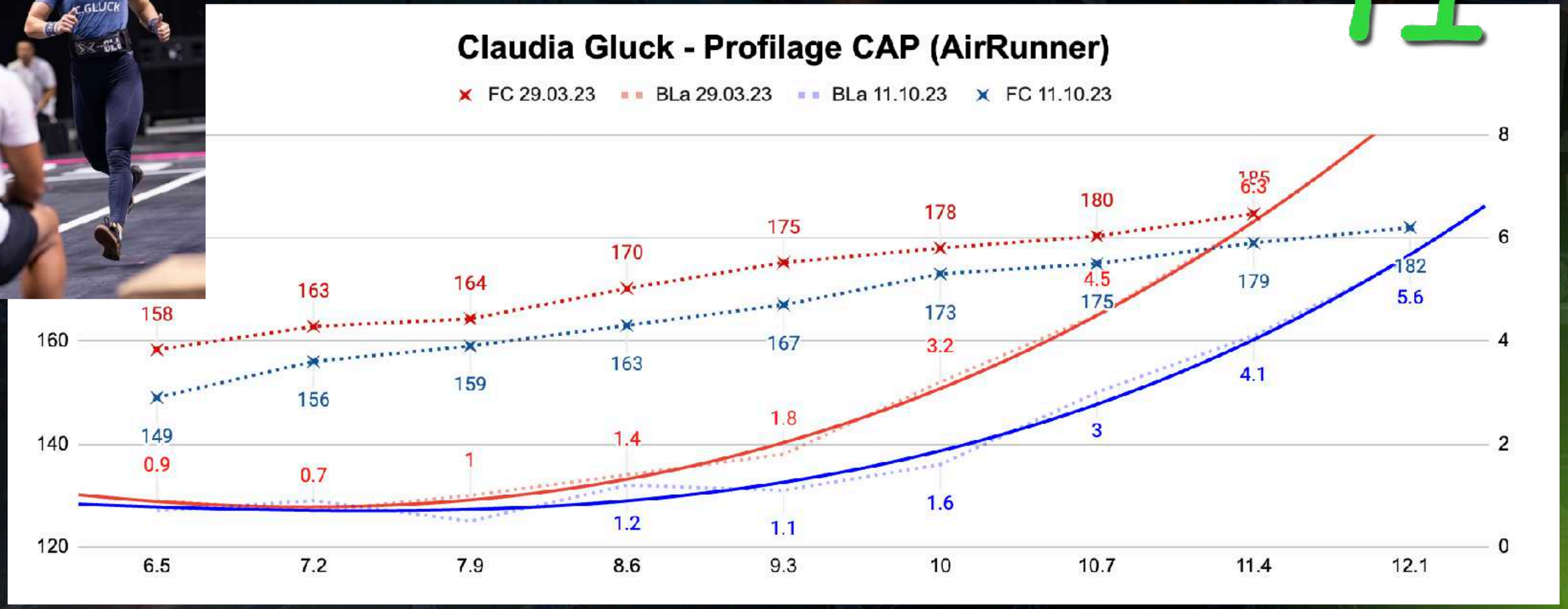
Variable ($n = 29$)	R^2	Standard error
FT	0.78	0.11
FT + vOBLA	0.89	0.08

*FT = fastest time; vOBLA = velocity at the onset of blood-lactate accumulation; RSA = repeated-sprint ability.

Progrès Attendus

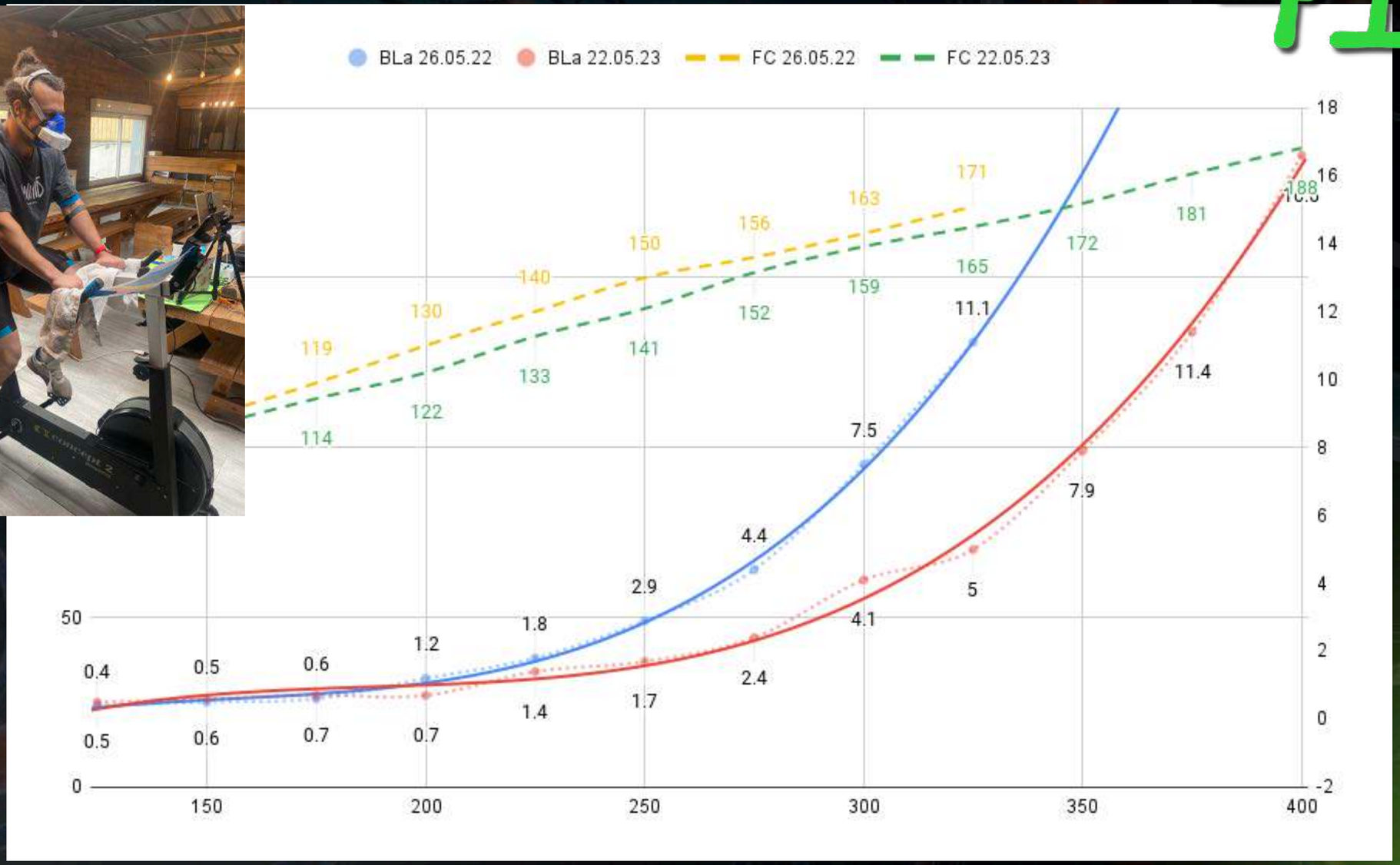


Protocole 41



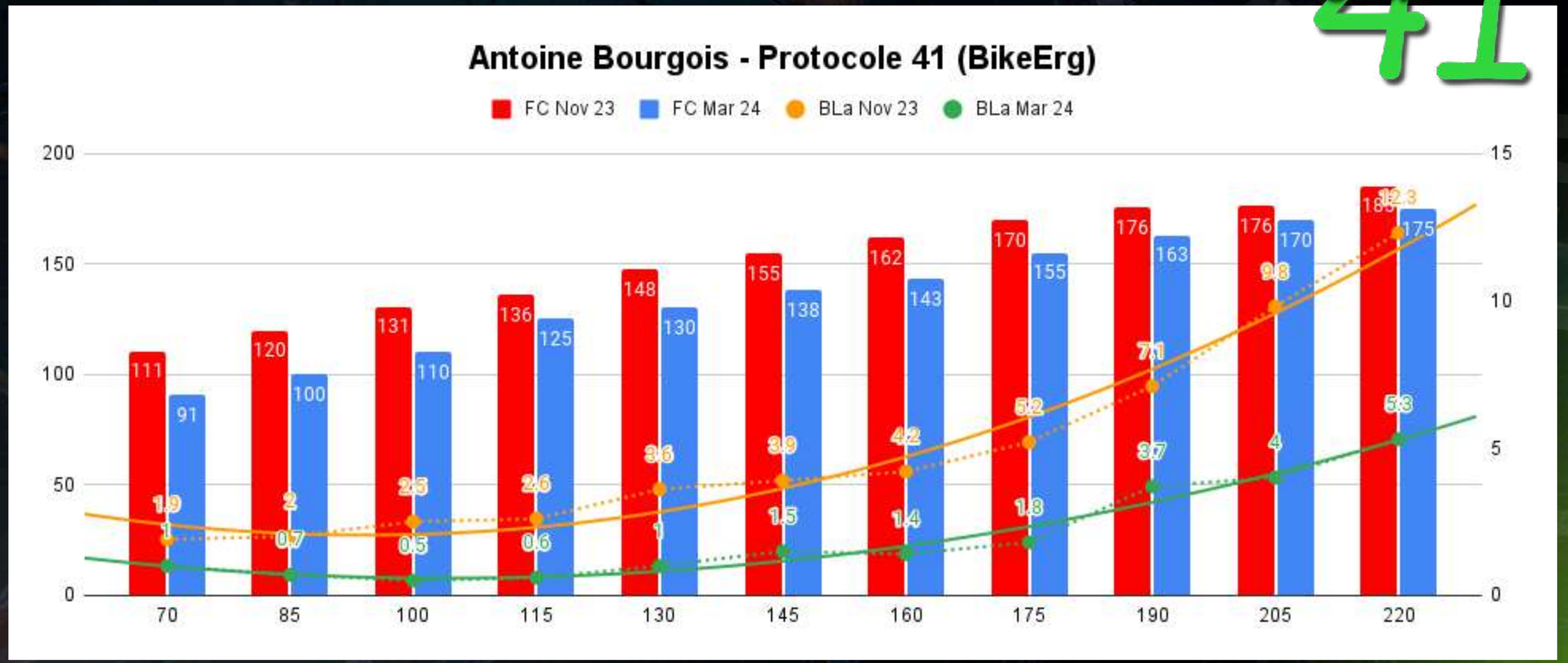
Progrès Attendus

Protocole 41



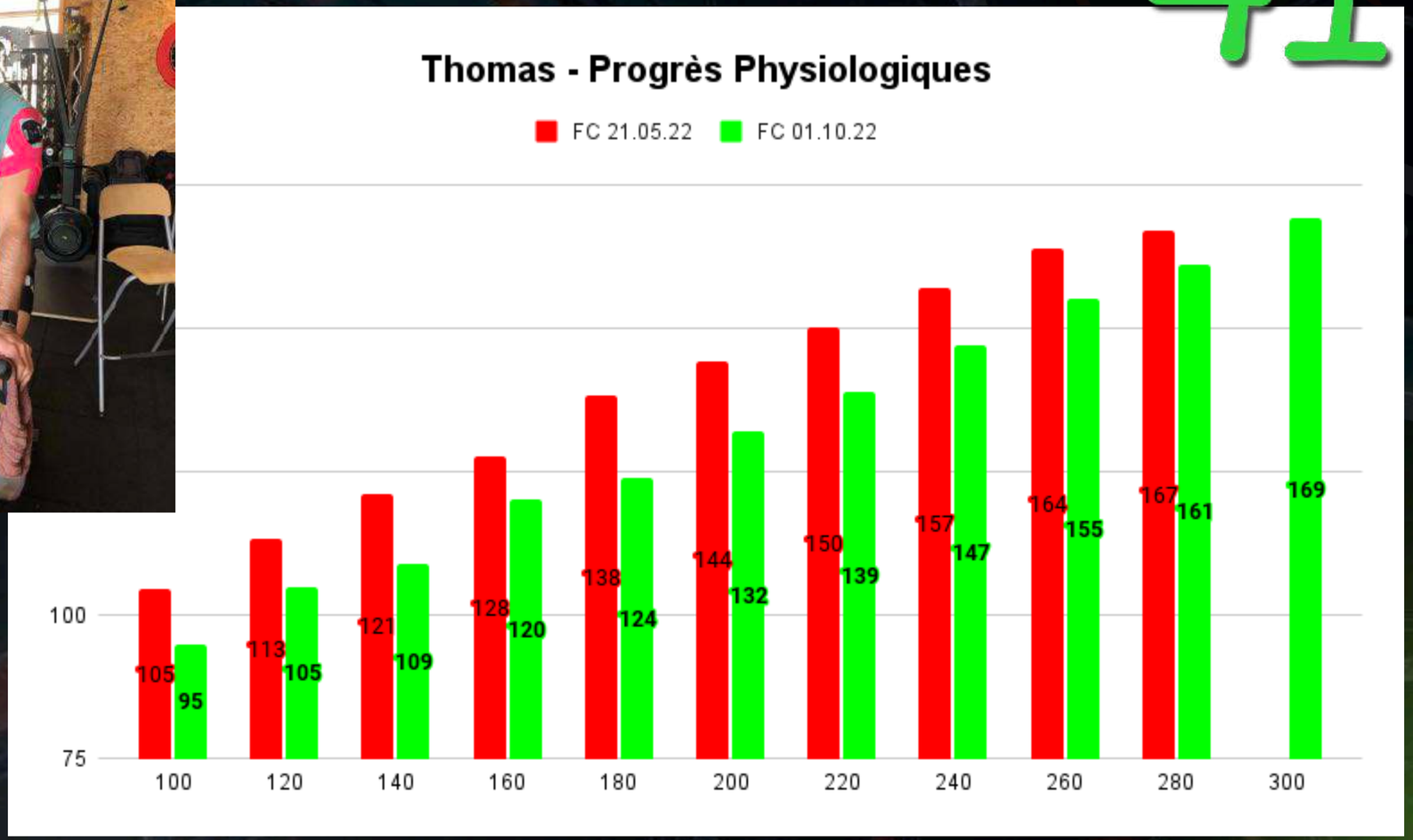
Progrès Attendus

Protocole 41



Progrès Attendus

Protocole 41



Progrès Attendus

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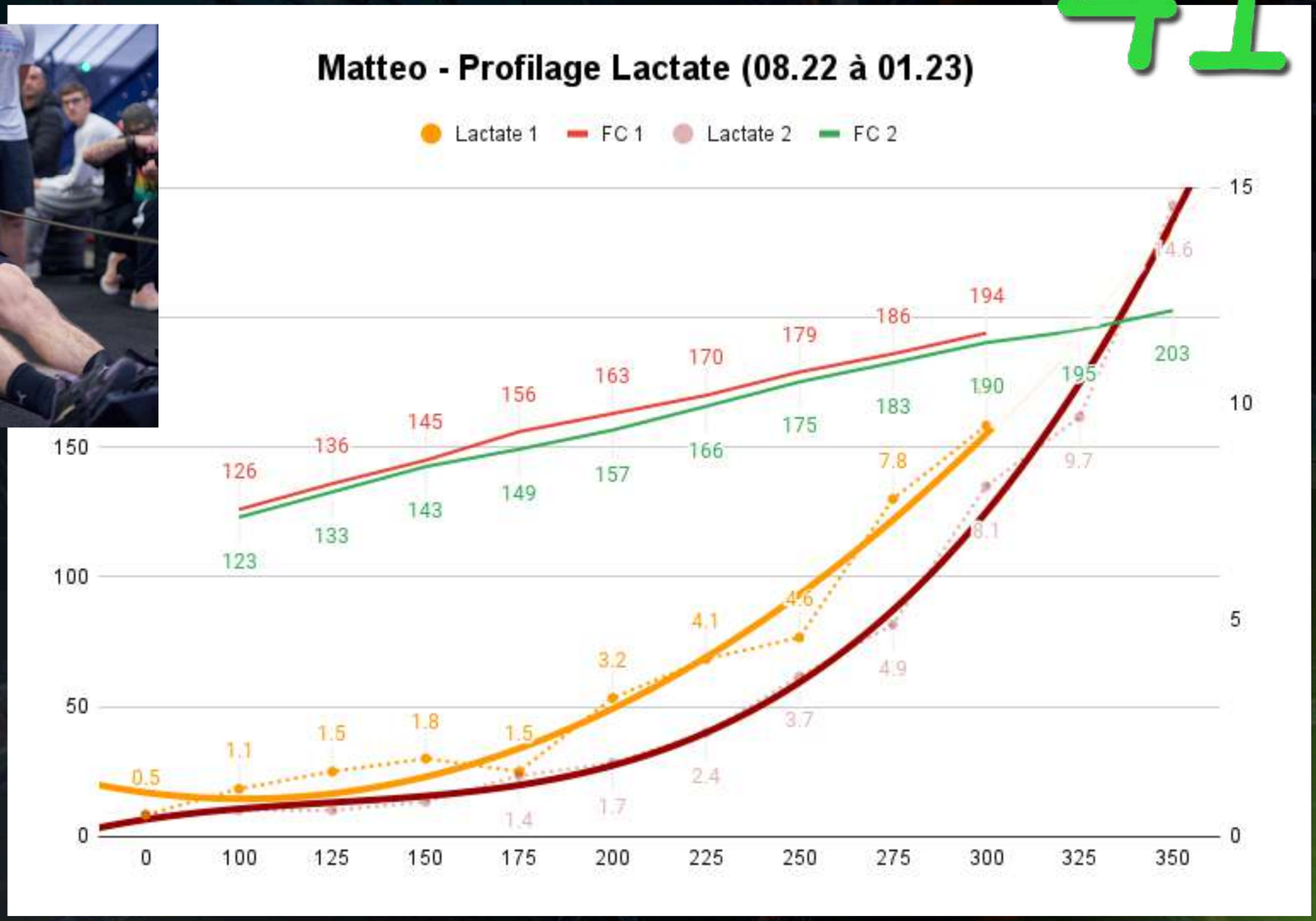

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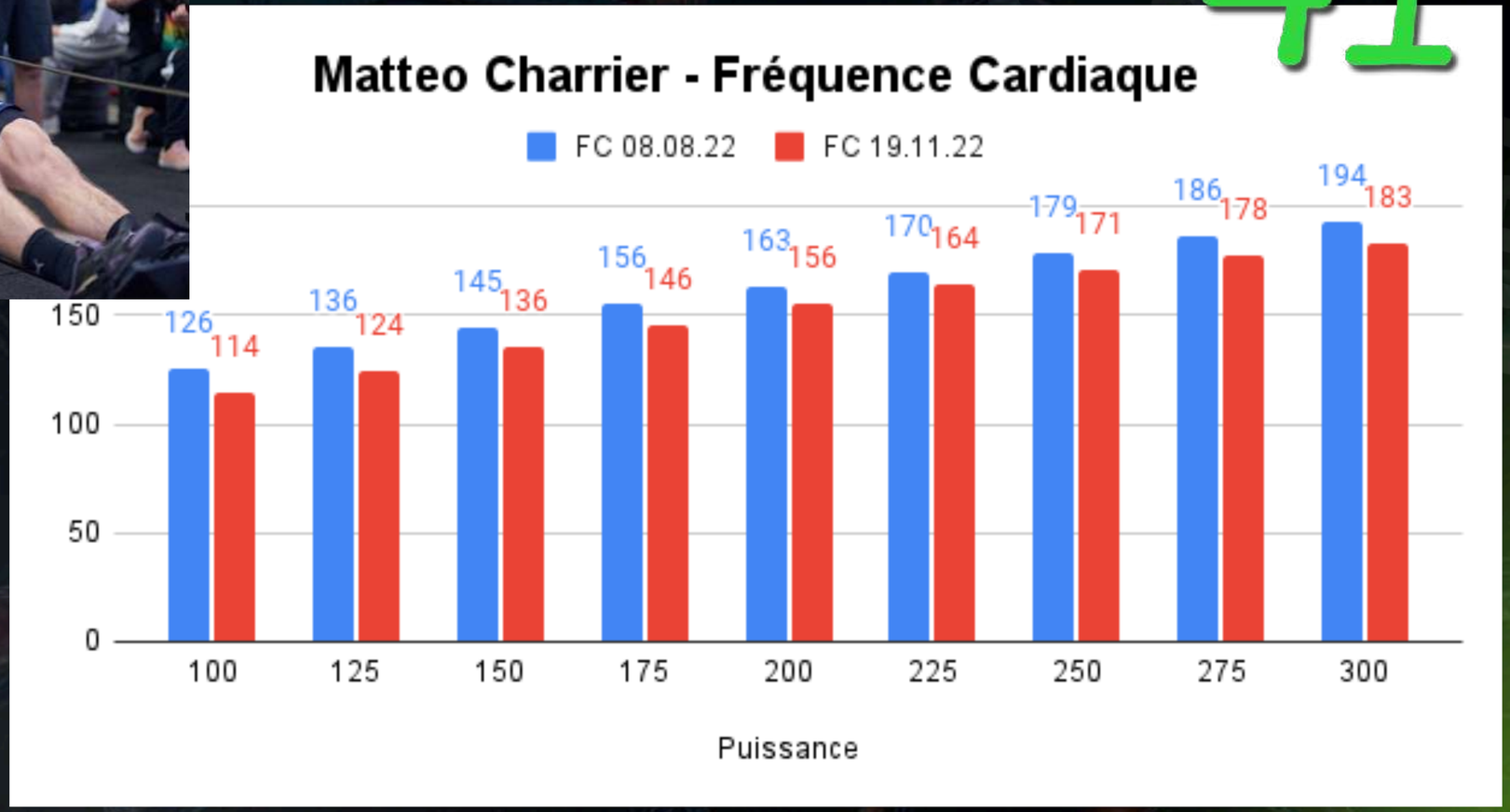

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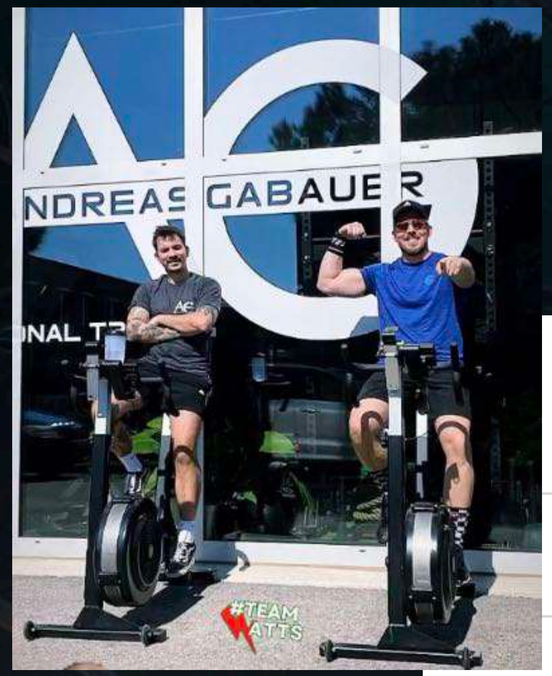

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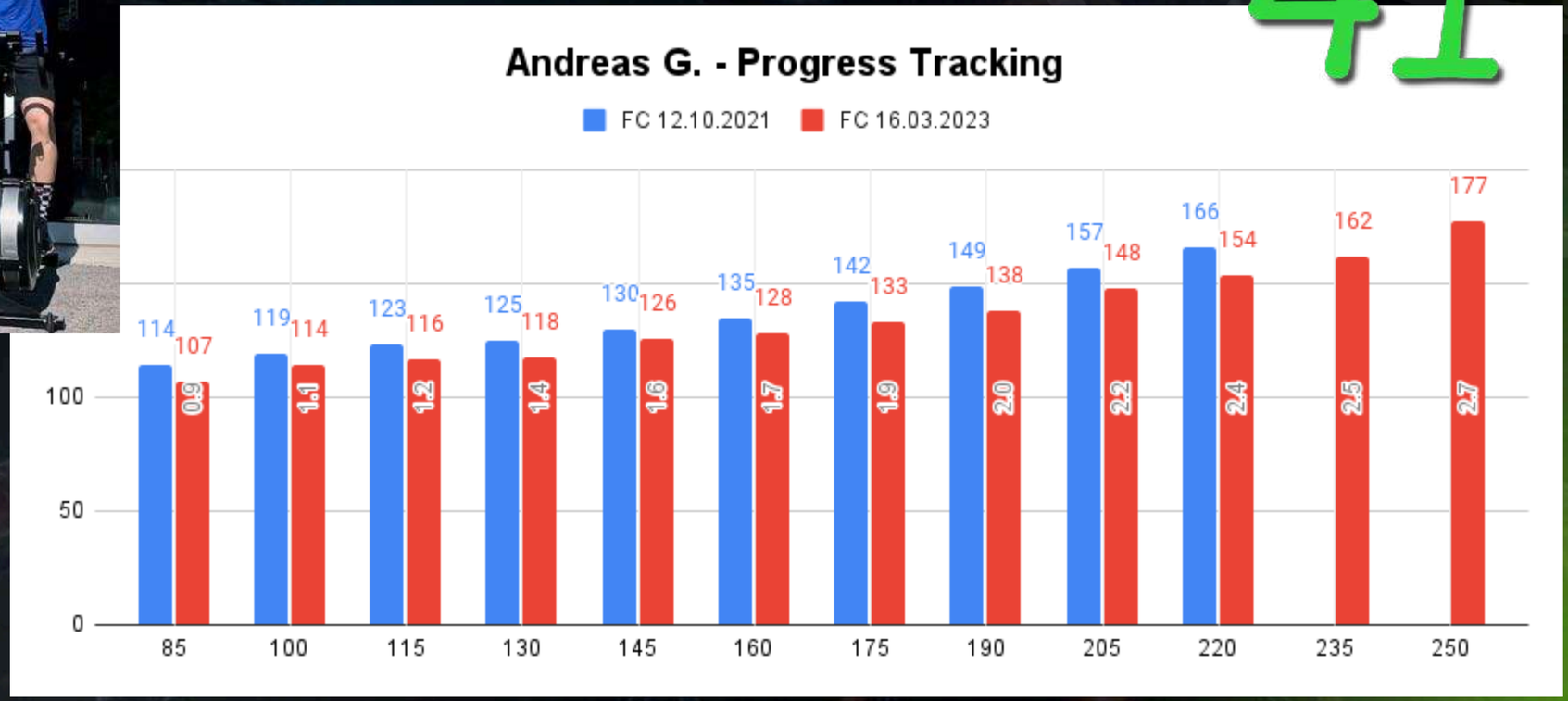


Exemple de Programmation

Semaine	Séance 1	Séance 2	Séance 3	Séance 4
Semaine 1	RPE10	RPE2-3	RPE2	Repose toi bien!
Semaine 2	RPE6	RPE2-3	RPE2	Repose toi bien!
Semaine 3	RPE2	RPE6	RPE6-7	RPE2
Semaine 4	RPE7	RPE4-5	RPE2	Repose toi bien!

Exemple de Programmation

Semaine	Séance 1	Séance 2	Séance 3	Séance 4
Semaine 1	RPE2	RPE10	RPE2-3	RPE2-3
Semaine 2	RPE2	RPE10	RPE2-3	RPE4-5
Semaine 3	RPE2	RPE10	RPE9	RPE2
Semaine 4	RPE2	Repose toi bien!	RPE8-9	RPE2-3

Exemple de Programmation




Semaine	Séance 1	Séance 2	Séance 3	Séance 4
Semaine 1	Total: 60', WU 20' Test 20', RPE 10 Note les watts moyens	Total: 60' Test Z2b, RPE 2-3 Note la FC moyenne	Total: 60' Z2a RPE 2	Repose toi bien!
Semaine 2	Total: 75', WU: 15', 2x15' @85% / 3' @Z2b, 70-80rpm, RPE 6	Total: 75' 5x15' en continu Z2a/b/c/b/a RPE 2-3	Total: 60' Z2a RPE 2	Repose toi bien!
Semaine 3	Total: 60' Z2a RPE 2	Total: 75', WU: 15', 3x10' @85% / 2' @Z2b, 70-80rpm, RPE 6	Total: 60', WU: 15' 3x15' @85% / 3' @Z2b, 70- 80rpm, RPE 6-7	Total: 45' Z2a RPE 2
Semaine 4	Total: 75', WU: 20', 2x20' @85% / 5' @Z2b, 70-80rpm, RPE 7	Total: 30' Z2c RPE 3-4	Total: 45' Z2a RPE 2	Repose toi bien!

Exemple de Programmation

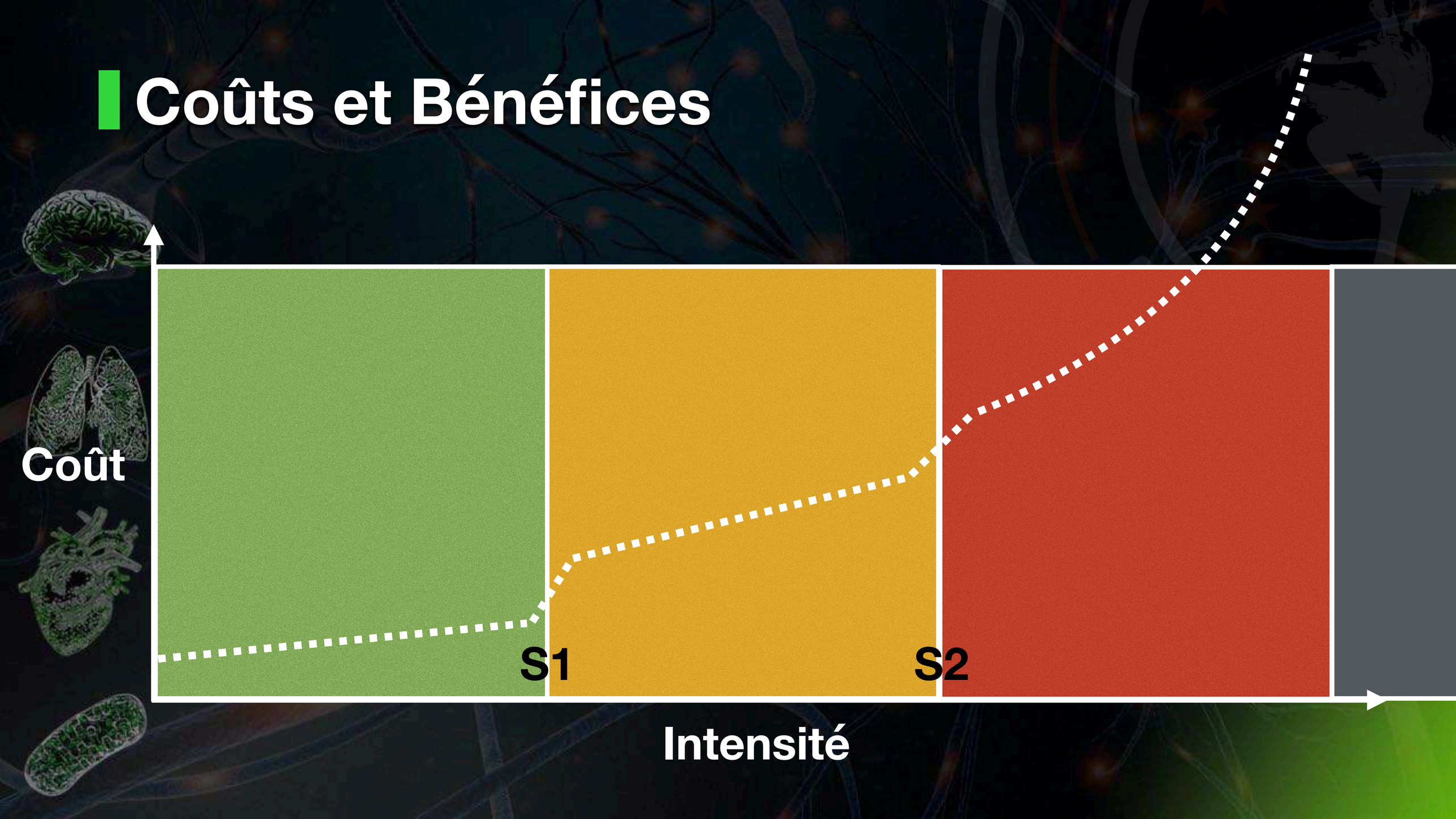


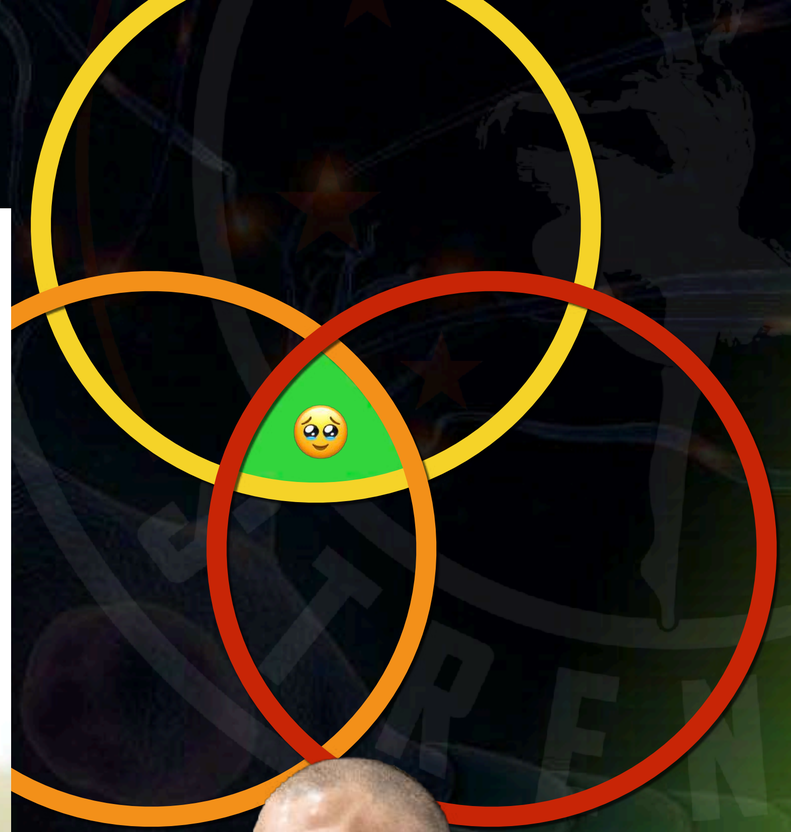

Semaine	Séance 1	Séance 2	Séance 3	Séance 4
Semaine 1	45' - Bas de Z2 (Ou 3x15' Pré/Post WOD)	45' Total, 20' WU, 5x10"/3' ME, >110rpm, RA, RPE10	45' Milieu de Z2	45' Milieu de Z2
Semaine 2	45' (ou 3x15') Bas de Z2	60' Total, 20' WU, 3x30"/4' ME, >110rpm, RP, RPE10	60', Milieu de Z2 avec 1x10' @60rpm	45' Haut de Z2
Semaine 3	60' (ou 3x20') Bas de Z2	60' Total, 20' WU, 5x20"/3' ME, >110rpm, RP, RPE10	75' Total, 20' WU, 3x10x30" /15" /4' @120/50% de PC, RA, RPE9	45' Bas de Z2
Semaine 4	45' (ou 3x15') Bas de Z2	Repose toi bien!	60' Total, 20' WU, 2x12x30" /15" /4' @120/50% de PC, RA, RPE8-9	45' Milieu de Z2

Exemple de Progression

Semaine 1	Semaine 2	Semaine 3	Semaine 4
20’ – RPE3	20–30’ – RPE3	20–30’ – RPE3	20–30’ – RPE3
2x8’ – RPE5	2x8’ – RPE5	2x8’ – RPE5	3x8’ – RPE5
20’ – RPE3	20’ – RPE3	20’ – RPE3	20’ – RPE3
1x8’ – RPE5	2x8’ – RPE5	3x8’ – RPE5	20’ – RPE3

Coûts et Bénéfices





Z1	Z2