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CFI

Workshop

the conditioning for swimming

Chapter one المحاضرة الأولى

- What is strength and conditioning (general, and in swimming)?
- Understanding the Importance of S&C for swimming
- Understanding the demands of swimming

Chapter two

- the physiology of swimming (terms, energy systems, and theories) المحاضرة الثانية
- The physical abilities in pool and in dry-land المحاضرة الثالثة
- Training methods in pool and in dry-land (END 1,2, and 3, SP 1,2, and 3) المحاضرة الرابعة
- (max strength, power, mobility, stretching-flexibility) المحاضرة الخامسة

Chapter three

- The warming-up (in pool and in dry land) المحاضر السادسة
- Testing (in pool and in dry-land) المحاضرة السابعة
- Periodization المحاضرة الثامنة

المحاضرة الأولى

A- What is strength and conditioning (general, and in swimming) ?

B- Understanding the Importance of S&C for swimming

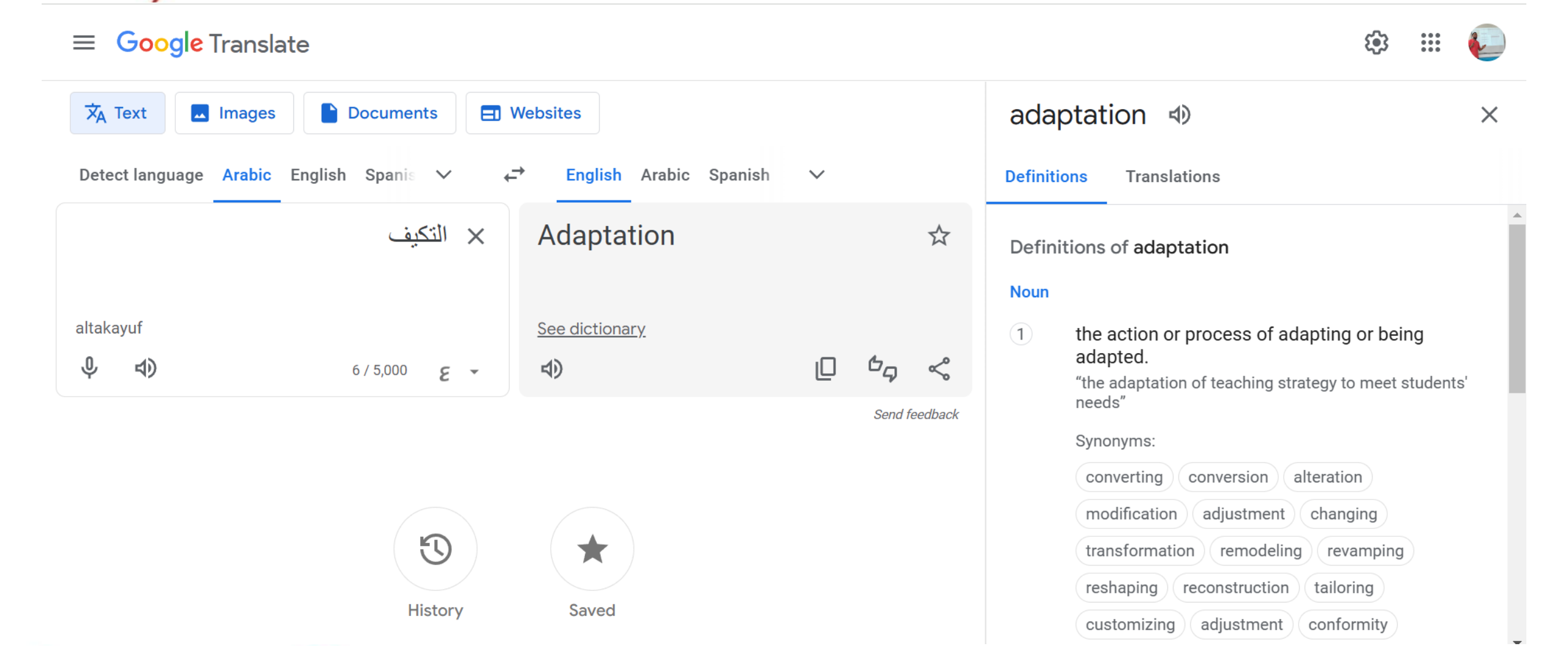
C-Understanding demands of swimming

A- What is strength and conditioning in general

Strength
Ability to generate force or power and all strength physical abilities such as (agility, COD, speed, reaction time)

Conditioning
Ability to sustain repeated force/power outputs
القدرة على تحمل مخرجات القوة / الطاقة المتكررة

الكلام عن الفرق بين ال conditioning , adaptation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Adaptation
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Definitions
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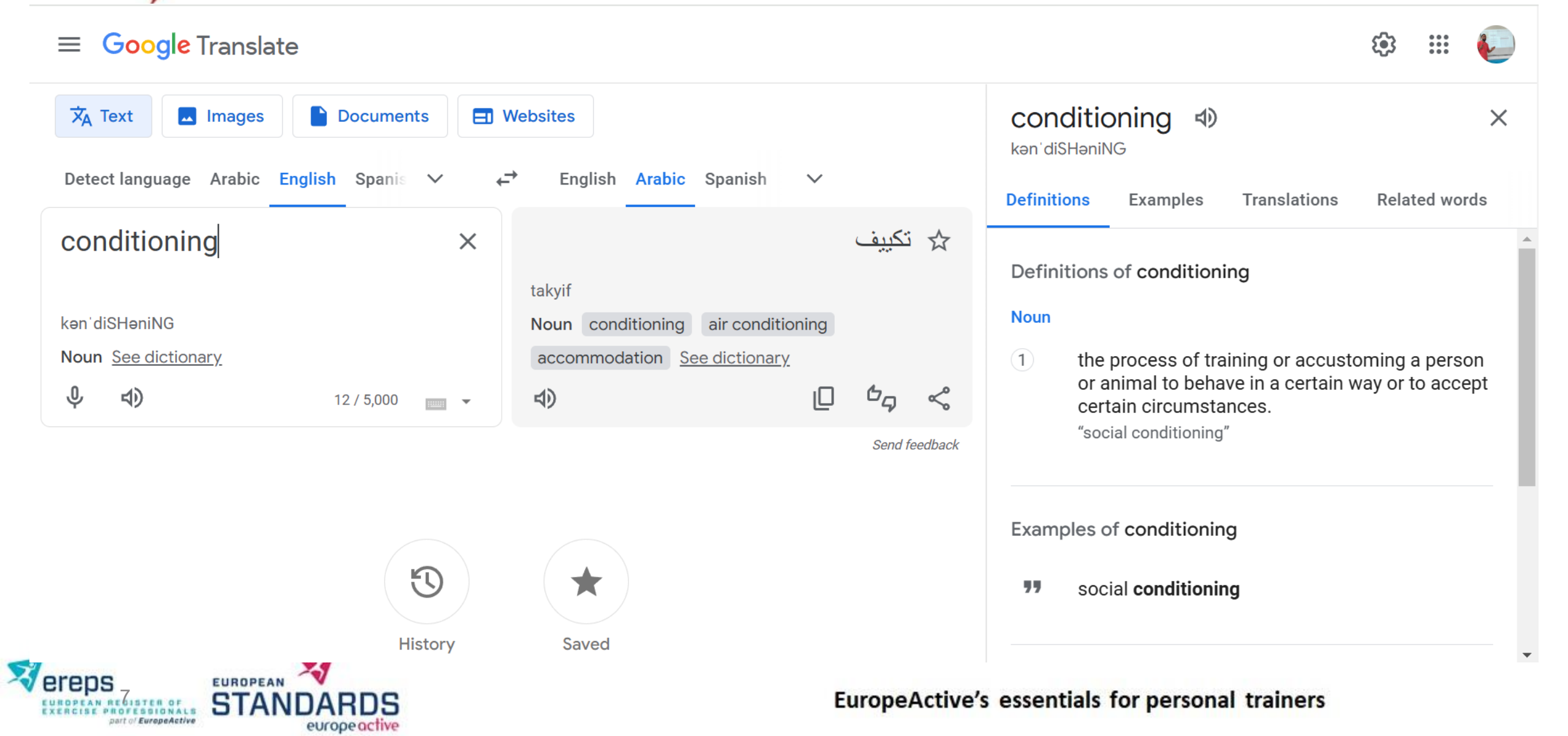
Definitions of adaptation
Noun
1
the action or process of adapting or being adapted.
"the adaptation of teaching strategy to meet students' needs"
Synonyms:
converting
conversion
alteration
modification
adjustment
changing
transformation
remodeling
revamping
reshaping
reconstruction
tailoring
customizing
adjustment
conformity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Definitions
Examples
Translations
Related words
Definitions of conditioning
Noun
1 the process of training or accustoming a person or animal to behave in a certain way or to accept certain circumstances.
“social conditioning”
Examples of conditioning
social conditioning

What is Sports Conditioning?
Sports conditioning is training the body for the athletes' training season.

What is swimming Conditioning?

- Prepare or training the swimmer to able to compete
- Elevate the aerobic and technique level of your swimmers

- (example 1 50m break his num, example 2 international team

B-Understanding the Importance of S&C for swimming

Strength and conditioning in swimming will be divided into two parts

- Dryland;

strength (strength, power, ME) conditioning (aerobic training, mobility, stretching)

- Inside pool

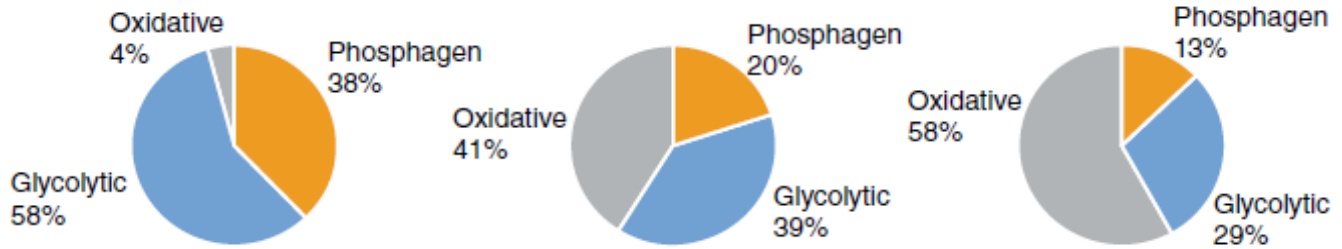
Strength (sprints, power) conditioning (aerobic work, drills, techniques, warm-up and cooldown)

The importance will be in to side;

- Injury-prevention
- Enhance performance

C-Understanding demands of swimming

Distance	50 m	100 m	200 m
Time (s.0, or min:s)	22.0	48.0	1:45



Distance	400 m	800 m	1500 m
Time (s.0, or min:s)	3:45	7:50	14:50

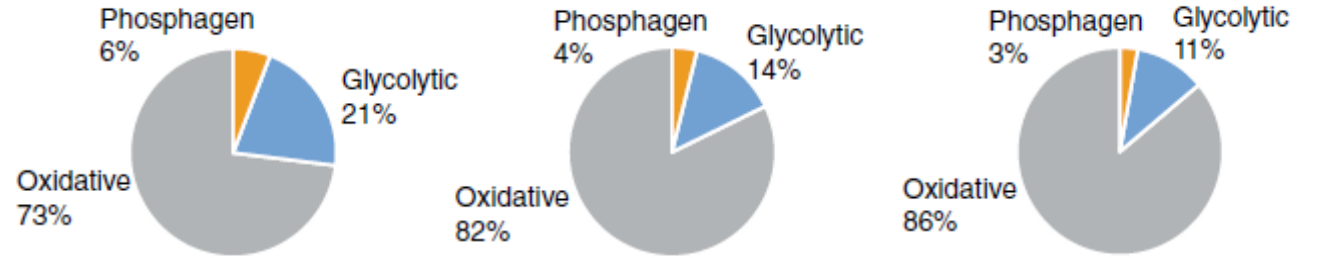


Figure 17.3 Share of energy system contribution during competitive freestyle swimming events in top-level swimmers using computer simulation.

Data from F.A. Rodriguez and A. Mader, "Energy Systems in Swimming," in *World Book of Swimming: From Science to Performance*, edited by L. Seifert, D. Chollet, and I. Mujika (New York: Nova Science, 2011): 225-240.

الشكل بتاع النسب

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RESEARCH ARTICLE Open Access

Physical performance determinants in competitive youth swimmers: a systematic review

Todd Price[1], Giuseppe Cimadoro[1] and Hayley S Legg[1,2*]

All swimmers need to;
Max-strength, power, mobility and lean body mass for performance
Max-strength and power for start and turn

Mid and distance swimmers:
Aerobic and anaerobic capacity and power

Sprint swimmers (50m,100m);
Body fat percentage, reaction time, all related rate of force production

Master the essential skills;

- Gliding
- Break-out
- Stroke rate, stroke length
- Technique of SP1
- Streamline
- Starts, finish
- Breathing
- Kicking

Chapter two

المحاضرة الأولى

The physiology of swimming (terms, energy systems, and theories)

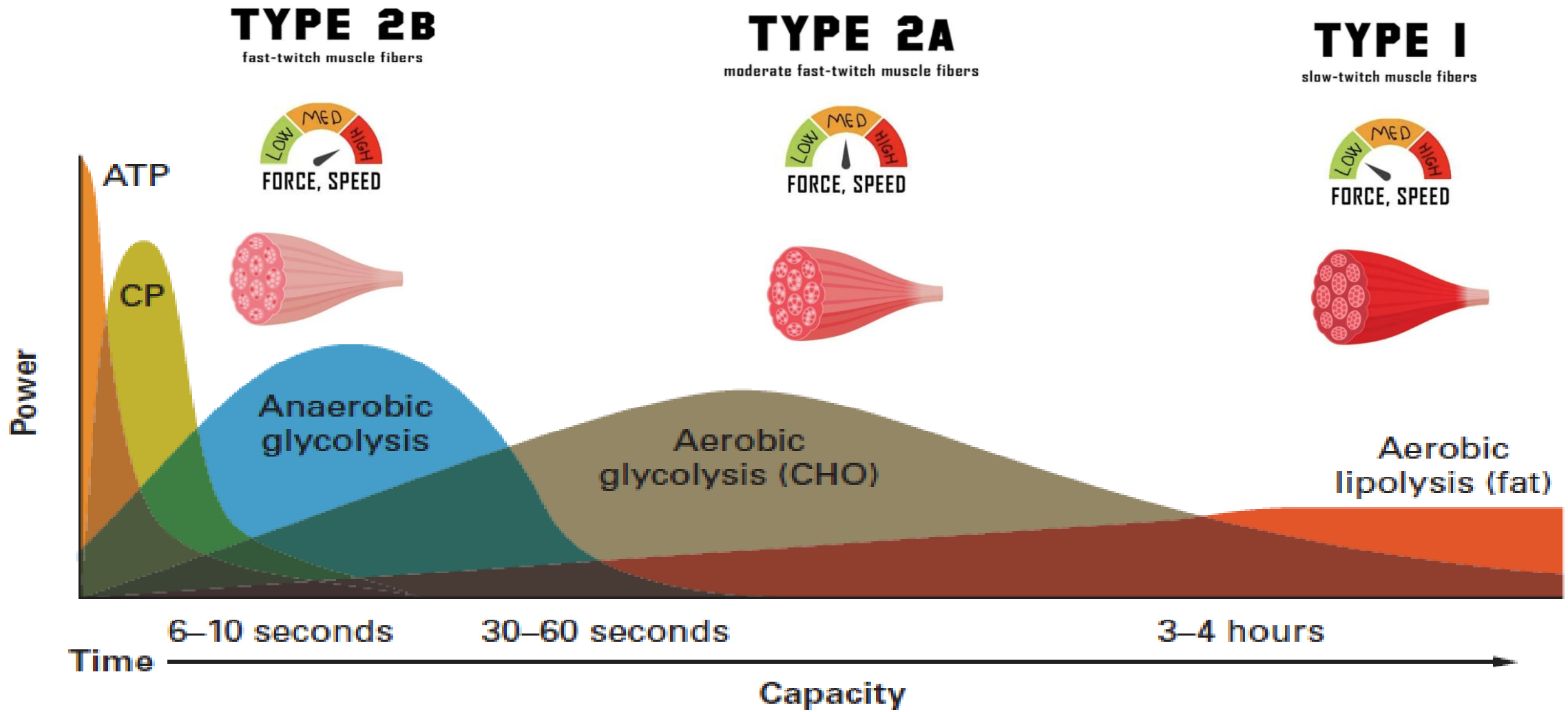
المحاضرة التانية

The physical abilities in the pool and dry land

المحاضرة التالتة

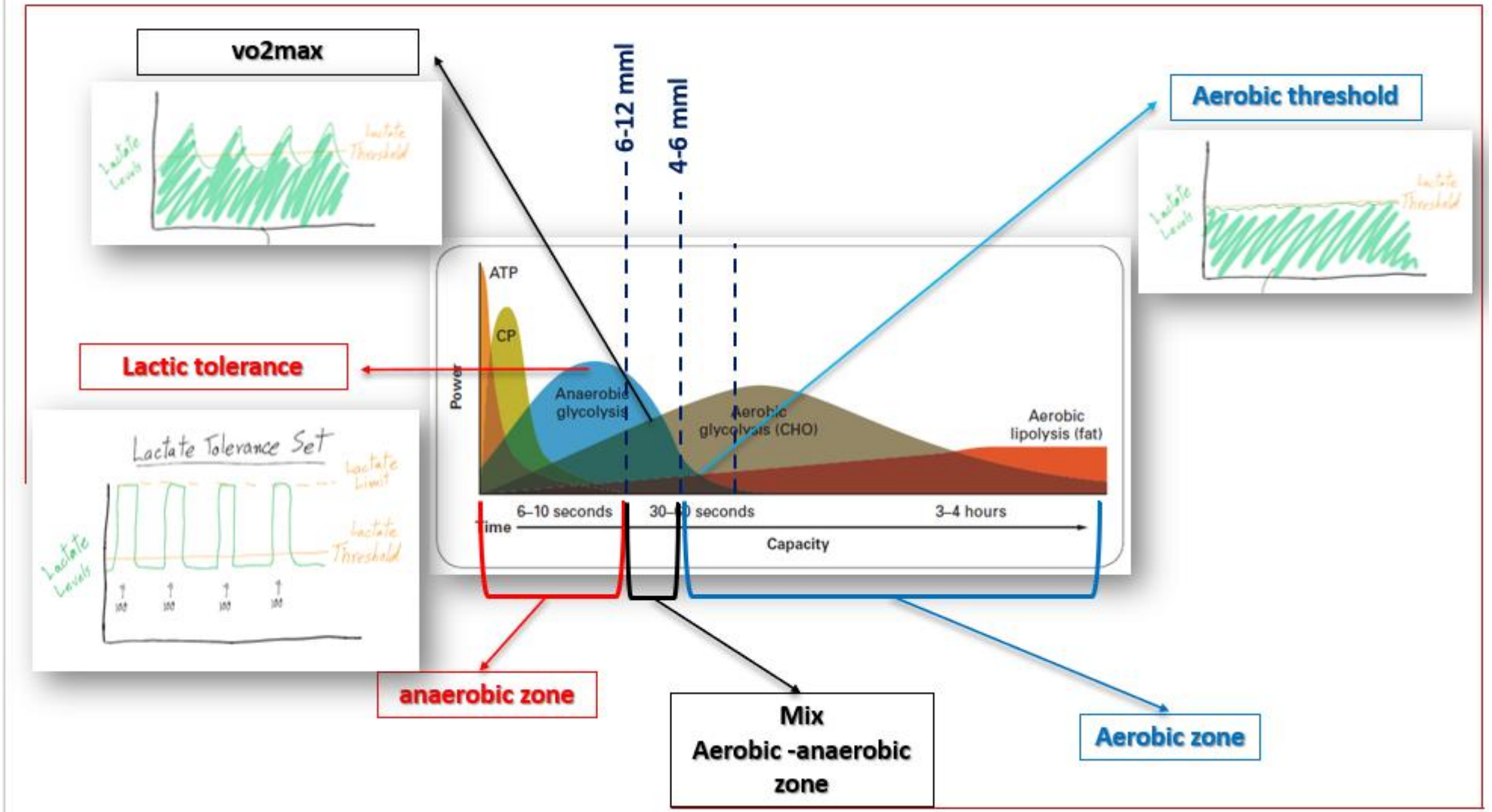
C-Training methods in pool and dry-land (END 1,2, and 3, SP 1,2, and 3

A- the physiology of swimming (energy systems, and theories)


TYPE 2B
fast-twitch muscle fibers
TYPE 2A
moderate fast-twitch muscle fibers
TYPE I
slow-twitch muscle fibers
LOW MED HIGH
FORCE, SPEED
ATP
CP
Anaerobic glycolysis
Aerobic glycolysis (CHO)
Aerobic lipolysis (fat)
Power
6–10 seconds
30–60 seconds
3–4 hours
Time
Capacity

الشكل بتاع النسب

Swimming	50 m	95	5	0	Powers and Howley (99)
	100 m	80	15	5	Powers and Howley (99)
	200 m	30	65	5	Powers and Howley (99)
	400 m	20	40	40	Powers and Howley (99)
	800 m	10	30	60	Mathews and Fox (86)
	1,500 m	10	20	70	Powers and Howley (99)


vo2max
6-12 mml
4-6 mml
Aerobic threshold
Lactic tolerance
ATP
CP
Power
Anaerobic glycolysis
Aerobic glycolysis (CHO)
Aerobic lipolysis (fat)
6–10 seconds
3–4 hours
Time
Capacity
Lactate Tolerance Set
anaerobic zone
Mix
Aerobic -anaerobic zone
Aerobic zone

B- The abilities in pool and land

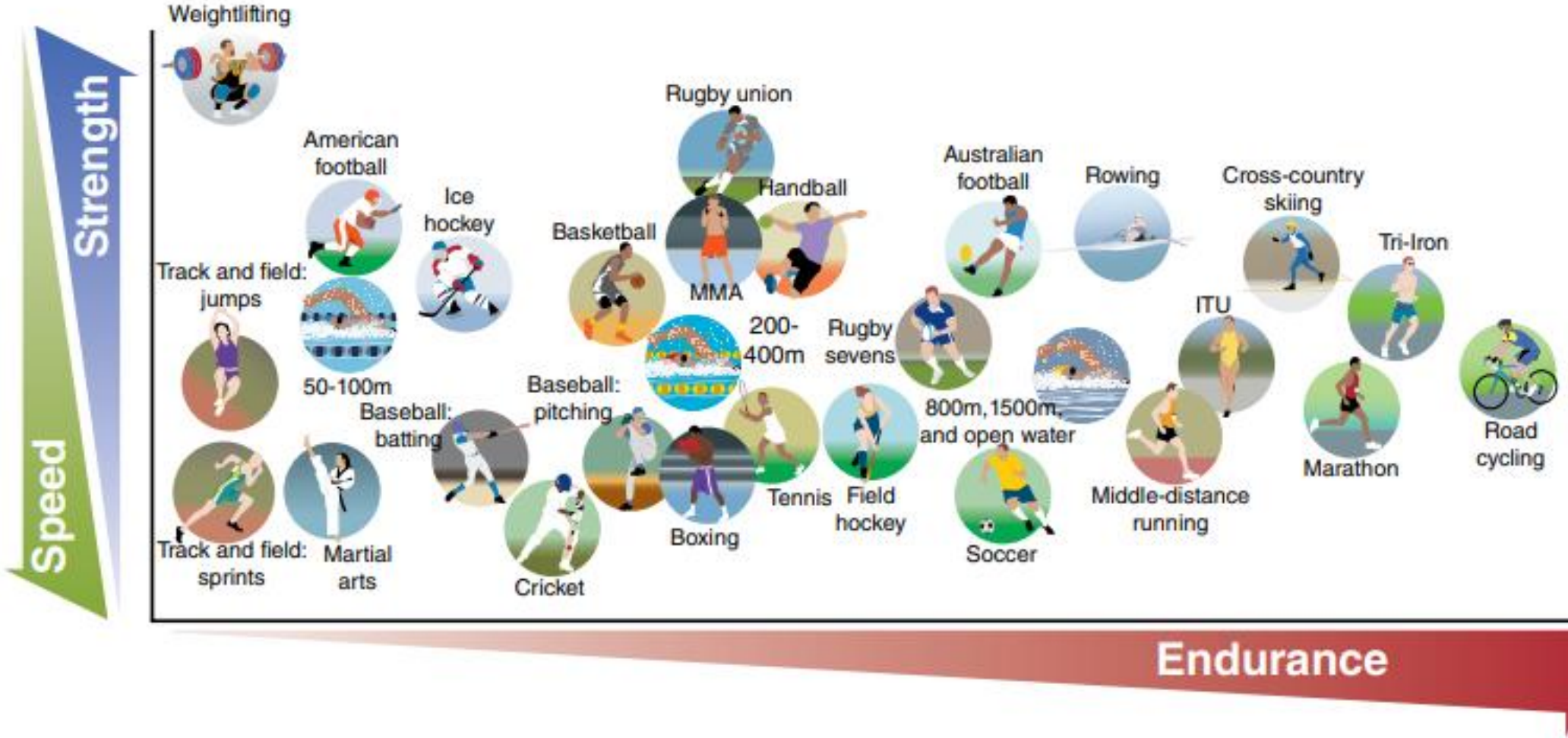
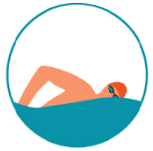


Figure 1.6 Various sports, their physical demands relative to needed speed, strength, and endurance.

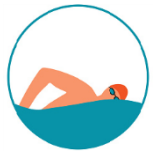
Adapted from G.A. Nader, "Concurrent Strength and Endurance Training: From Molecules to Man," *Medicine & Science in Sports & Exercise* 38, no. 11 (2006): 1965-1970.

Physical abilities that dominate in swimming

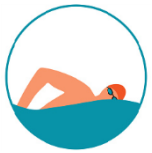
Strength



speed



Specific endurance

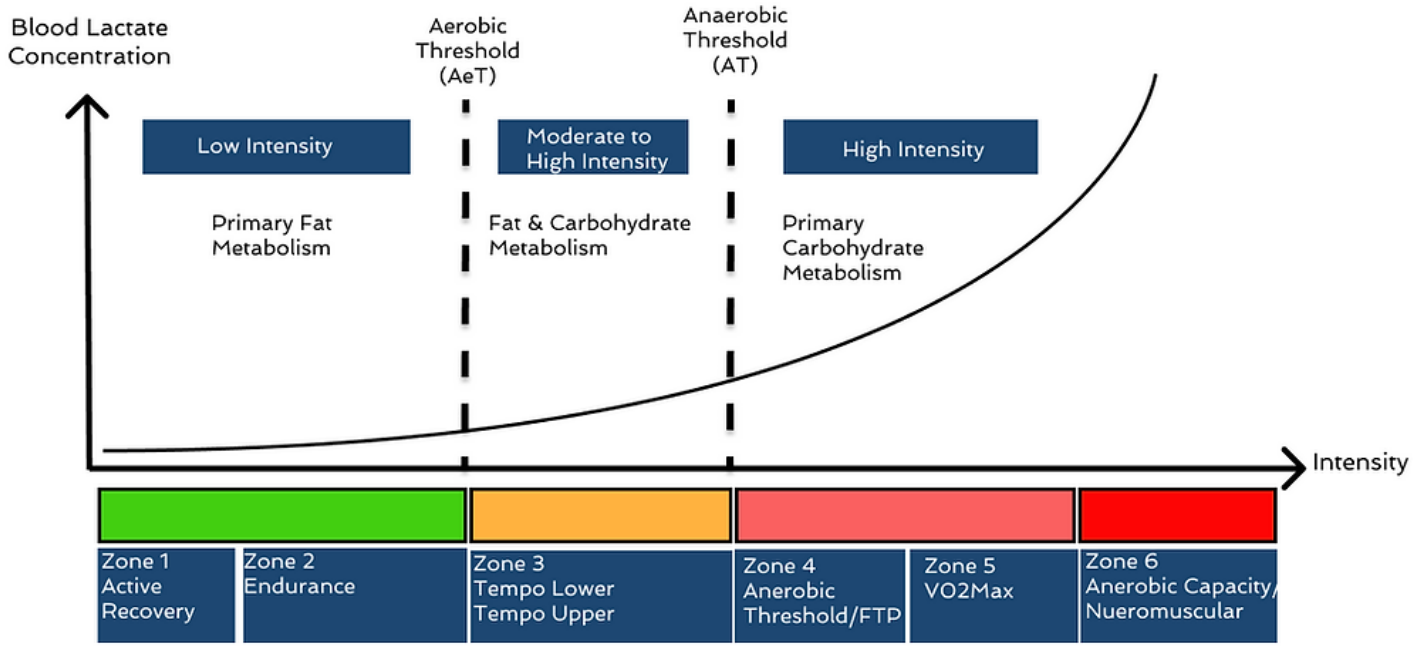


Flexibility and stretching

C-The training methods

Aerobic threshold

As part Of The Anaerobic Threshold Theory of Training, A Second Threshold called the Aerobic Threshold, Has Been Postulated By Some Exercise Scientists To Quantify The Minimum Speed That Will Produce An Improvement In The Aerobic Endurance Of Slow-twitch And Some Low-threshold Fta Muscle Fibers, Proposed This Minimum Training Speed At Which Blood Lactate First Increased Noticeably Above Resting Levels



Anaerobic threshold

The anaerobic threshold is the highest exercise intensity that you can sustain for a prolonged period without lactate substantially building up in your blood,

The anaerobic threshold (AnT) is defined as the highest sustained intensity of exercise for which measurement of oxygen uptake can account for the entire energy requirement. At the AnT, the rate at which lactate appears in the blood will be equal to the rate of its disappearance.

Several tests have
been developed to determine the intensity of exercise associated with Ant: maximal lactate steady state, lactate minimum test, lactate threshold, OBLA, individual anaerobic threshold, and ventilatory threshold

What is V·O2max and its Testing?

The body's maximal ability to take up, transport, and use oxygen is called maximal oxygen consumption or VO2max.

VO2 max is typically measured in absolute terms (e.g., liters of oxygen consumed per minute) or normalized to the athlete's size and expressed in milliliters of oxygen consumed per kilogram of body mass per minute (ml · kg–1 · min–1). Because oxygen consumption is linked to the production of energy, and energy is necessary to perform muscular contractions during exercise, VO2 max indicates the body's upper limit to perform aerobic work. For this reason, VO2 max is considered an important determinant of endurance performance.

What is lactic acid

Lactic acid has played an important role in the traditional theory of muscle fatigue and limitation of endurance exercise performance. It was thought that once exercise intensity exceeds the rate of maximal oxygen consumption (Vo2max), then an "oxygen debt" occurs and metabolism switches from aerobic to anaerobic. This switch to anaerobic metabolism was thought to lead to an abrupt increase in blood lactate levels, resulting in metabolic acidosis. This lactic acidosis was believed to impair muscle contractility and, ultimately, lead to fatigue, exhaustion, and cessation of exercise. The uncomfortable feelings within muscles working at these near-maximal efforts were believed to be directly associated with this lactic acidosis, as was the soreness that developed during subsequent days (now commonly referred to as delayed-onset muscle soreness). Thus, lactic acid was believed to be little more than a metabolic waste product, the result of pushing our systems beyond our capacity to deliver an adequate oxygen supply to our working muscles. This line of thought led to the establishment of training programs that sought to increase maximal oxygen capacity through high-volume, lower-intensity exercise and led many persons to be wary of exposing the body too frequently to bouts of lactic acid–producing intensity.

Training Method	Set Distance	Repeated Distance	Rest		Speed
			Sets	Reps	
Basic Endurance	600m to +2000 (8mins-15mins)	+200m (+2 mins)	1 to mins	5s to 1m	Lower AT 75% to 85%
Threshold Endurance (AT)	2000m to 4000m (20min to 45 mins)	200m (2mins)	1-2 mins	5s to 1m	85% (4-6mml)
Overload Endurance (Vo2max)	1200m-2000m (15mins to 20mins)	400m to 2000m	2 mins	5s to 2 mins	Above AT 90%
Lactic Tolerance	300m to 1200m Sprint swimmers (400-800m)	(100m 200m) (25m to 400m)	3-10 mins	15s to 2mins	Above AT 90%
Race Pace	200 to 1500m	½ to ¼ short dis ¼ to 1/16 long dis	Allow the swimmer to repeat the race pace		Race pace
Lactic Production	300m to 600 m	25m to 50m	3mins	1mins to 5mins	100%
Power	50m to 3oom	10m to 25m	2mins to 3 mins	45s to 2mins	100%

Race-Pace Training

Race-pace training consists of sets of underdistance repeats swum at present or desired race pace. The repeat distance is usually half the race distance or less. The rest intervals are usually short, but their length is a secondary concern. The major concern is that swimmers perform the repeats at race speed. The rest intervals should be the shortest length that will allow the athletes to swim at those speeds.

Table 14.7 Examples of Race-Pace Sets

REPEAT DISTANCE	NUMBER OF REPEATS	REST INTERVAL
For 50 events		
12.5	1 to 3 sets of 6–8 repeats	20–30 sec between repeats; 2–3 min between sets
25	1 to 3 sets of 4–8 repeats	30 sec to 1 min between repeats; 2–3 min between sets
For 100 events		
25	1 to 4 sets of 6–12 repeats	15–30 sec between repeats; 3–5 min between sets
50	6–16	30–45 sec between repeats
For 200 events		
25	3 to 5 sets of 12–20 repeats	5–10 sec between repeats; 3–5 min between sets
50	2 to 4 sets of 8–10 repeats	20–30 sec between repeats; 3–5 min between sets
100	8–12	45–90 sec between repeats
For 400 m/500 yd events		
50	20–40	10–20 sec between repeats
100	10–15	30–45 sec between repeats
200	4–8	1–3 min between repeats
For 1,500 m/1,650 yd events		
50	30–60	10 sec between repeats
100	15–30	10–20 sec between repeats
200	10–15	30–60 sec between repeats
400/500	2–3	2–5 min between repeats

Effects of Race-Pace Training

Primary

- Improves the interaction of aerobic and anaerobic metabolic processes so that the energy for swimming at race pace is supplied faster and more economically
- Improves the ability to sense and maintain race pace in competition
- Improves the ability to swim with the most efficient combination of stroke rate and stroke length during competition
- Improves the motivation and confidence of athletes in their ability to maintain a particular race pace in competition

Secondary

- Increases $\dot{V}O_2max$
- Increases buffering capacity
- Increases aerobic muscular endurance
- Increases anaerobic muscular endurance

Summary of Guidelines for Constructing Race-Pace Repeat Sets

- Set distance: 200 yd or m to 1,500 m or 1,650 yd.
- Repeat distances: Any distance that will allow athletes to repeat at race speed. A distance of 1/2 to 1/4 of the race distance is usually required for events of 200 yd or m and less. Repeats that are 1/4 to 1/16 of the race distance work best for longer events.
- Rest intervals: The shortest period that will allow the swimmers to repeat at race speed. Intervals of 10 to 30 sec usually work well with repeats of 100 yd or m and less. Intervals may be 1 min for longer repeats.
- Speed: Training speed should be equivalent to present or desired race speed.

Speed tests

Event-distance timing
- **50m,100m – 1500m**

Maximum speed
- **2-3x25m**

Anaerobic power
- **6x25m / 4x50m**

Race pace
12x50m / 8x100m

For example; 4x50m freestyle

- The Intensity must be at maximum effort
- The rest interval should be long to allow for the elimination of much of the lactate produced each swim

1st 50 = 0:31:80
2nd 50 = 0:32:02
3rd 50 = 0:32:30
4th 50 = 0:32:20

The AVG speed
- 0:31:80 + 0:32:02 + 0:32:30 + 0:32:20 = 128:32sec
- 128:32sec ÷ 4 = 32:08 sec per 5om

Traditional

4x400
30 sec
FR @ 85%

Interval

Fast-slow / slow-fast
800m FR
(50m fast-100m easy)

Descending

8x200

- **Speed;**
- 1st 2nd 90% , 3rd 4th 85%, 5th 6th 80%, 7th 8th 75%
- **Rest interval;**
- 1st 2nd 50sec, 3rd 4th 40sec, 5th 6th 30sec, 7th 8th 20sec

Mixed

- Distance
- Strokes
- Speed
- Tools

Pyramid

1500m

• 100m	• 500m
• 200m	• 400m
• 300m	• 300m
• 400m	• 200m
• 500m	• 100m

Broken

2x200 (100-50-50)
1x200 (2x50-4x25)

Send-off

inc. the time and rest

- 5x100 FR 90% 1:40

British Swimming Training Classification

Relationship between different training classification systems[1]

Training zones	British Swimming	Description	HR[2] (bbm)	Log book (simplified)	Sweetenham and Atkinson[3]		Maglischo[4]	Olbrecht[5]
1	A1	Aerobic Low Intensity	>50	Aerobic	Zone 1	A1	EN1	AEC
	A2	Aerobic Maintenance	40-50			A2		
2	AT	Anaerobic Threshold	30-40			A3	EN2	
			20-30		Zone 2	AT		
3	VO_2	Aerobic Overload	10-20	Race Pace	Zone 3	MVO_2	EN3	AEP
4	LP	Lactate Production	0-10		Zone 4	LP	SP2	ANC
	LT	Lactate Tolerance	0-10			LT	SP1	ANP
5	Speed	Basic Speed ATP-PC	N/A	Race Speed	Zone 5	Sprint	SP3	Sprint

1. This document simplifies training terminology and should be used as a guideline.
2. Individual maximum heart rates should be used to calculate HR (beats below maximum).
3. Sweetenham, B. and Atkinson, J. (2003). *Championship Swim Training*. Human Kinetics, Leeds, UK.
4. Maglischo, E. (2003). *Swimming Fastest*. Human Kinetics, Leeds, UK.
5. Olbrecht, J. (2000). *The Science of Winning: Planning, Periodizing and Optimising Swim Training*. Swimshop, Luton, England.

Chapter three

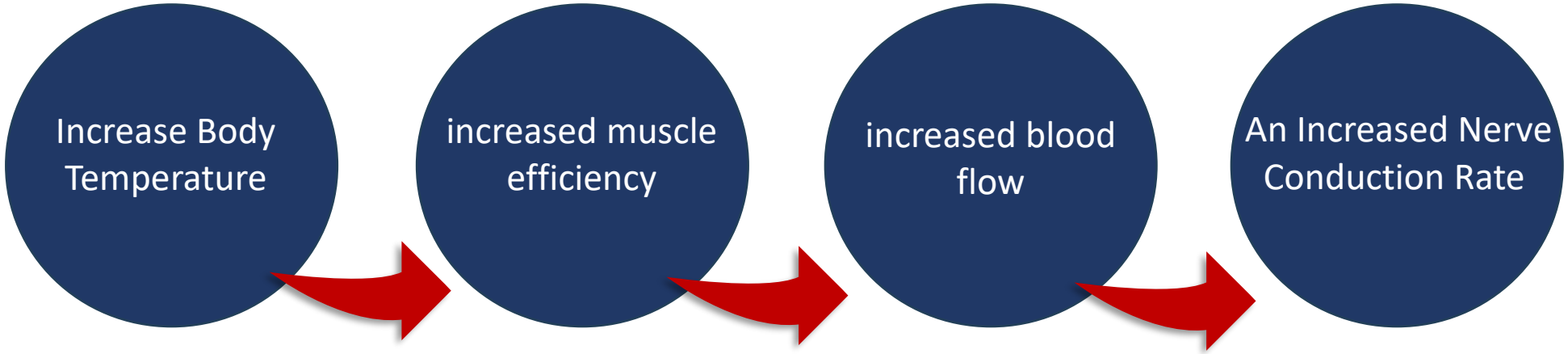
A-The warming-up (in pool and in dry-land)

B-Testing (in pool and in dry-land)

C-Periodization

A- The warming-up (in pool and in dry-land)

These activities are intended to



The effect of warm-up on performance speed and endurance

Warm-up for Sprint Swimming: Race-Pace or Aerobic Stimulation? A Randomized Study

Henrique P. Neiva,[1,2] Mário C. Marques,[1,2] Tiago M. Barbosa,[2,3] Mikel Izquierdo,[4] João L. Viana,[2,5] Ana M. Teixeira,[6] and Daniel A. Marinho[1,2]

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Journal of Functional Morphology and Kinesiology

MDPI

Systematic Review

Effects of Warm-Up on Sprint Swimming Performance, Rating of Perceived Exertion, and Blood Lactate Concentration: A Systematic Review

Olivia Czelusniak, Emily Favreau and Stephen J. Ives *

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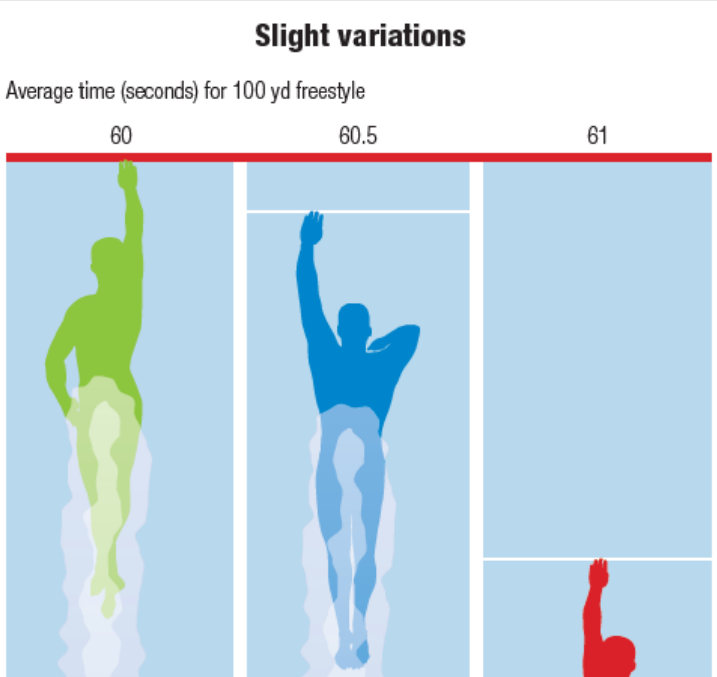

Effects of in-water and dryland warm-ups on 50-meter freestyle performance in child swimmer

Fatih Kaya[1a], Mustafa Said Erzeybek[2], Bilal Biçer[3], and Tuncay Meral[4]

[1]Faculty of Education, Department of Physical Education and Sports, Erzincan University, Turkey
[2]School of Physical Education and Sports, Dumlupınar University, Turkey
[3]School of Physical Education and Sports, Mustafa Kemal University, Turkey
[4]Erzincan Municipality Sports Club, Erzincan, Turkey

Abstract. In this study, effectiveness of 3 warm-up (WU) modes on 50m free style on child swimmers has been evaluated. In repeated-measures counterbalanced design, 10 male swimmers of a local sports club (10-12 ages) have tried out 50m freestyle after each WU on different days. Each WU took 15 minutes and the intensity of WU has been checked over by Borg's rating of perceived exertion (RPE) 15-point scale. a) no warm-up (NWU): the swimmers sat or laid down for 15 minutes, b) dryland warm-up (DWU): continuous rope-jumping at RPE 12 for 5 minutes, 2 sets 10x15s calisthenics with 15s breathing spaces and continuous rope-


WARM-UP Principles
RAISE
Raise heart rate & body temperature
ACTIVATE
Activate key muscle groups required for the upcoming session
MOBILISE
Mobilise key joints to improve acute range of motion
POTENTIATE
Potentiate performance through explosive activities that prime the CNS
Jeffreys (2007)
@strength_conditioning_science

For example, warm-up in the pool

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	Endurance workout	Speed workout	Test workout
Raise	Aerobic continuous sets 800m freestyle		
Activate	Specific stroke: fr, bk, bs, fly, kick , pull 500m 150 bk- 100 kick- 100 pull		
Mobility	Skills drills: accessories Streamline, glide 4x50 breast 3 times glide	Skills drills: accessories Starts, turns 4x25 SP1, mid-pool, turns	
Potentiate	Nervous-power sets 4x15m IM all out	Nervous-power sets IM & Specific stroke 5x25m SP1 all out	

Race day warm-up

The warm-up protocol during race day for (sprint and endurance events)

• Finish the main warm-up at least 30 minutes before the race.

• If possible, get back in the water 10 to 15 minutes before the race.

• Use mostly moderate-intensity swimming at 50 to 65 percent effort.

• Gauge the intensity of effort while warming up before an event. Swim hard enough to warm the body but not so hard that fatigue sets in before stepping on the blocks.

• Finish the pre-event warm-up as close to the start of the event as possible, ideally within 5 minutes of when the race is set to begin.

Dryland Warm-Up

- ***Warming aerobic + injuries prevention ex***
- ***Dynamic mobility + stretching***
- ***Activate by resistance***
- ***Potentiate***

B-Testing (in pool and in dry-land)

Protocol Anaerobic Threshold Test

By a given distance

- T-3000
- T-2000
- T-1000

By a given time

- 30mins
- 12mins

By a given set

- 12x100m
- 5-7x200m

T-3,000 Test

3,000 swim time = 35 min (2,100 sec)

Pace per 100 m = 2,100 ÷ 30 = 1:10

Pace for other repeat distances = 1:10 × (distance in 100s)

Example: Time for 400 m = 1:10 × 4 = 4:40

Correction factors: 200s = T-3,000 time – 2 sec

100s = T-3,000 time – 1.5 sec

50s = T-3,000 time – 1 sec

Figure 16.18 The procedure for calculating a threshold training speed from a 3,000 m swim. The time for the swim, in seconds, is divided by 30 (the number of 100s swum), and the threshold pace per 100 m is the quotient.

EN1 Repeat Distance							
Threshold	50	75	100	150	200	300	400
0:55	0:26	0:40	0:54	1:22	1:51	2:47	3:44
	0:27	0:42	0:58	1:27	1:57	2:57	3:58
0:56	0:26	0:40	0:55	1:24	1:53	2:50	3:48
	0:28	0:43	0:59	1:29	1:59	3:00	4:02
0:57	0:27	0:41	0:56	1:25	1:54	2:53	3:52
	0:28	0:44	1:00	1:31	2:02	3:04	4:07
0:58	0:27	0:42	0:57	1:27	1:56	2:56	3:56
	0:29	0:44	1:01	1:32	2:04	3:07	4:11
0:59	0:28	0:43	0:58	1:28	1:58	2:59	4:00
	0:29	0:45	1:02	1:34	2:06	3:10	4:16
1:00	0:28	0:43	0:59	1:30	2:00	3:02	4:04
	0:30	0:46	1:03	1:35	2:08	3:14	4:20
1:01	0:28	0:44	1:00	1:31	2:02	3:05	4:08
	0:30	0:47	1:04	1:37	2:10	3:17	4:25
1:02	0:29	0:45	1:01	1:32	2:04	3:08	4:12
	0:31	0:48	1:05	1:39	2:13	3:20	4:29
1:03	0:29	0:45	1:02	1:34	2:06	3:11	4:16
	0:31	0:48	1:06	1:40	2:15	3:24	4:34
1:04	0:30	0:46	1:03	1:35	2:08	3:14	4:20
	0:32	0:49	1:08	1:42	2:17	3:27	4:38
1:05	0:30	0:47	1:04	1:37	2:10	3:16	4:24
	0:32	0:50	1:09	1:44	2:19	3:30	4:43
1:06	0:31	0:47	1:05	1:38	2:12	3:19	4:28
	0:33	0:51	1:10	1:45	2:22	3:34	4:47
1:07	0:31	0:48	1:06	1:40	2:14	3:22	4:32
	0:33	0:52	1:11	1:47	2:24	3:37	4:52
1:08	0:32	0:49	1:07	1:41	2:16	3:25	4:36
	0:34	0:52	1:12	1:49	2:26	3:41	4:56
1:09	0:32	0:49	1:08	1:43	2:18	3:28	4:40
	0:34	0:53	1:13	1:50	2:28	3:44	5:01
1:10	0:33	0:50	1:09	1:44	2:20	3:31	4:43
	0:35	0:54	1:14	1:52	2:30	3:47	5:05
1:11	0:33	0:51	1:10	1:45	2:22	3:34	4:47
	0:36	0:55	1:15	1:54	2:33	3:51	5:10
1:12	0:33	0:52	1:11	1:47	2:23	3:37	4:51
	0:36	0:56	1:16	1:55	2:35	3:54	5:14
1:13	0:34	0:52	1:12	1:48	2:25	3:40	4:55
	0:37	0:56	1:17	1:57	2:37	3:57	5:19

Speed tests

Event-distance timing
- **50m,100m – 1500m**

Maximum speed
- **2-3x25m**

Anaerobic power
- **6x25m / 4x50m**

Race pace
12x50m / 8x100m

For example; 4x50m freestyle

- The Intensity must be at maximum effort
- The rest interval should be long to allow for the elimination of much of the lactate produced each swim

1st 50 = 0:31:80
2nd 50 = 0:32:02
3rd 50 = 0:32:30
4th 50 = 0:32:20

The AVG speed
- 0:31:80 + 0:32:02 + 0:32:30 + 0:32:20 = 128:32sec
- 128:32sec ÷ 4 = 32:08 sec per 5om

Dry land tests •

1R

1. Instruct the athlete to warm up with
2. Provide a 1-minute rest period.
3. Estimate a warm-up load that will all
   - 10 to 20 pounds (4-9 kg) or 5% to
   - 30 to 40 pounds (14-18 kg) or 10%
4. Provide a 2-minute rest period.
5. Estimate a conservative, near-maxin titions by adding
   - 10 to 20 pounds (4-9 kg) or 5% to
   - 30 to 40 pounds (14-18 kg) or 10%
6. Provide a 2- to 4-minute rest period.
7. Make a load increase:
   - 10 to 20 pounds (4-9 kg) or 5% to
   - 30 to 40 pounds (14-18 kg) or 10%
8. Instruct the athlete to attempt a 1RM
9. If the athlete was successful, provid failed, provide a 2- to 4-minute rest p
   - 5 to 10 pounds (2-4 kg) or 2.5% t
   - 15 to 20 pounds (7-9 kg) or 5% to

   AND then go back to step 8.

Continue increasing or decreasing the load technique. Ideally, the athlete's 1RM will b

FIGURE 17.1 A 1RM testing protocol.
Reprinted, by permission, from Earle, 2006 (18).

TABLE 17.7 Percent of the 1RM and Repetitions Allowed (%1RM–Repetition Relationship)

%1RM	Number of repetitions allowed
100	1
95	2
93	3
90	4
87	5
85	6
83	7
80	8
77	9
75	10
70	11
67	12
65	15

Data from references 9, 49, 54, and 65.

STANDING LONG JUMP TEST

Purpose

The standing long jump (also called the broad jump) test measures lower-body horizontal explosiveness or power.

Outcomes

Horizontal jump distance in centimeters or inches

Equipment Needed

Adhesive tape; measuring tape

Before You Begin

Place a 1-meter (3 ft) strip of adhesive tape on the ground to mark the starting line. A standardized warm-up, including three to five practice jumps performed at moderate intensity (approximately 50% of estimated maximal effort), followed by three to five minutes of rest and recovery, should be conducted prior to beginning the assessment.

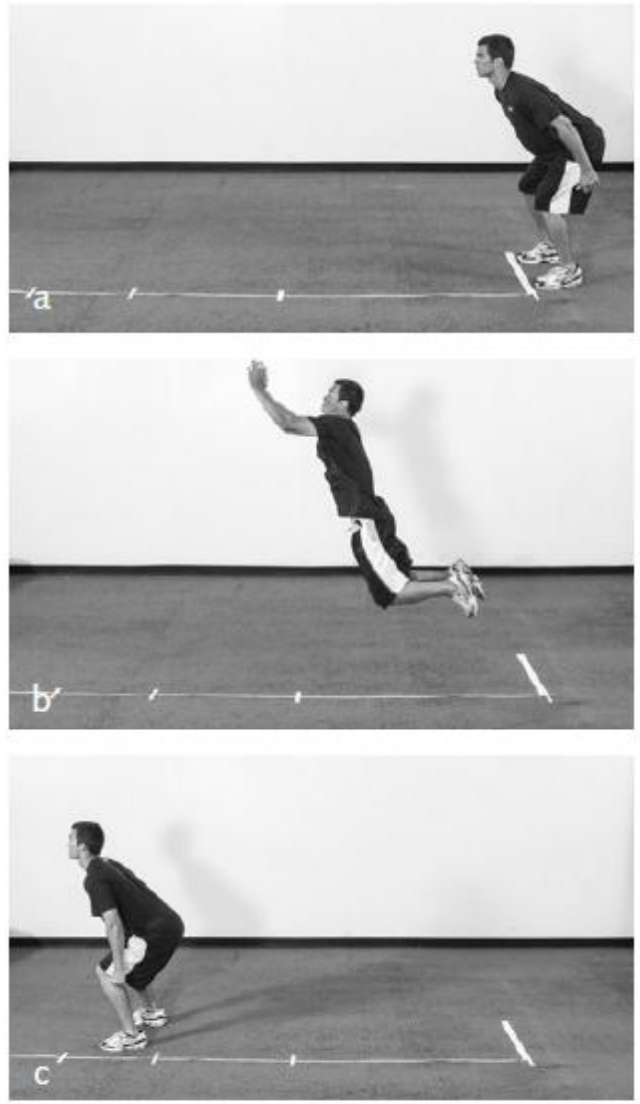

Figure 7.11 Standing long jump test.

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MEDICINE BALL CHEST PASS TEST

Purpose

The medicine ball chest pass test measures upper-body explosiveness or power during a pushing movement.

Outcomes

Horizontal throwing distance in centimeters or inches

Equipment Needed

Adhesive tape; measuring tape; bench with 45-degree incline; adequate vertical and horizontal clearance to safely complete the assessment; medicine ball (6 kg [13.2 lb] for females, 9 kg [19.8 lb] for males); spotter

Before You Begin

Extend a measuring tape at least 25 feet (7.6 m) out from the starting point where the medicine ball would contact the client's or athlete's chest prior to a throwing attempt. Secure the measuring tape on the floor under the front support beam of the bench and lay it out in the direction of the throw. A standardized warm-up, including upper-body specific movements and practice throws performed at moderate intensity (approximately 50% of estimated maximal effort), followed by three to five minutes of rest and recovery, should be conducted prior to beginning the assessment.

Figure 7.18 Medicine ball chest pass.

How to Test ?

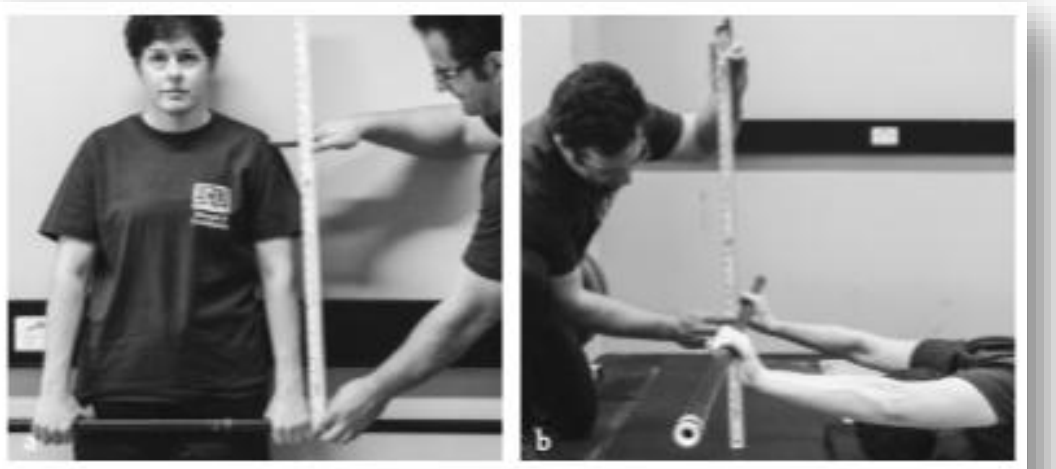


Figure 5.12 Shoulder elevation test.

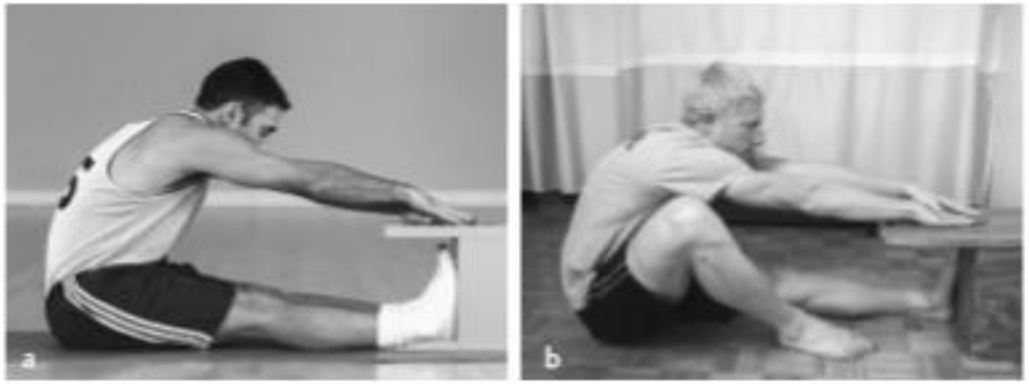
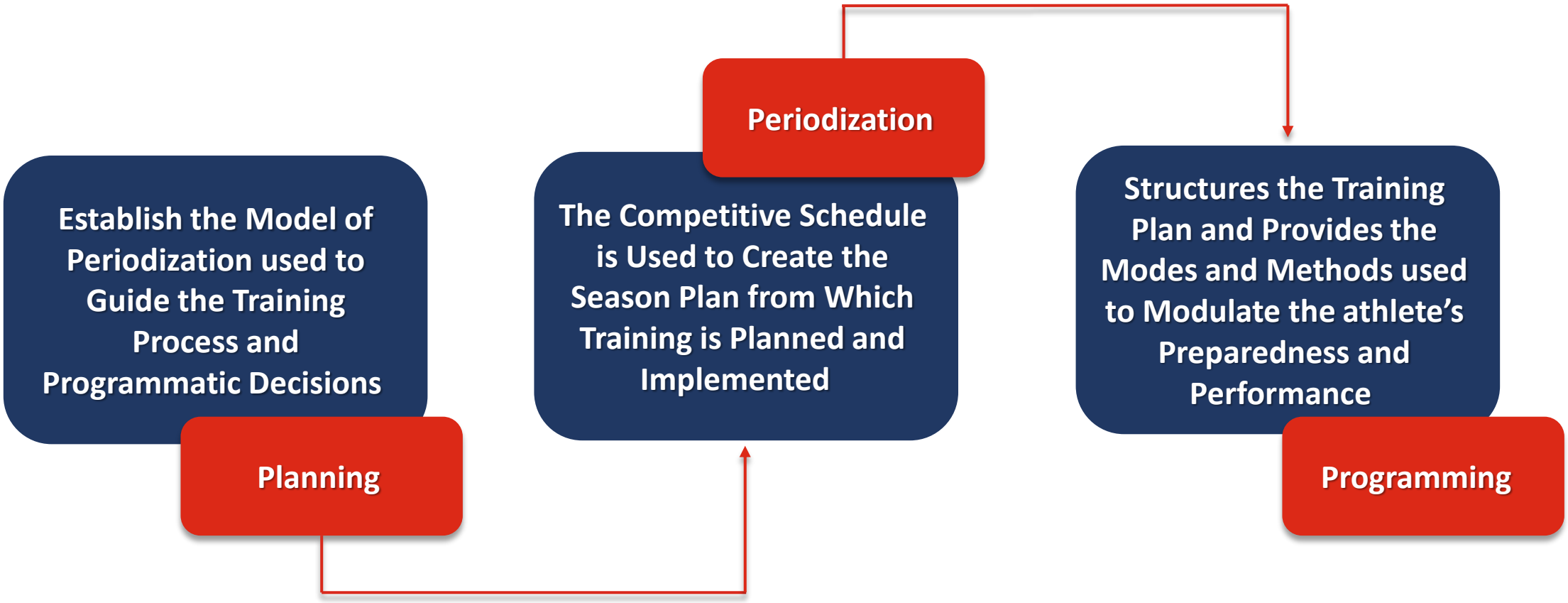


Figure 5.2 (a) Sit-and-reach and (b) modified back-saver approach.

C-The periodization


Establish the Model of Periodization used to Guide the Training Process and Programmatic Decisions
Planning
Periodization
The Competitive Schedule is Used to Create the Season Plan from Which Training is Planned and Implemented
Structures the Training Plan and Provides the Modes and Methods used to Modulate the athlete's Preparedness and Performance
Programming

Structure of a Typical Swimming Season

Macrocycle #1: General preparation period—4 to 12 weeks

Macrocycle #2: Specific preparation period—4 to 8 weeks

Macrocycle #3: Race preparation period—4 to 6 weeks

Macrocycle #4: Taper period—2 to 4 weeks

Macrocycle #5: Break—1 to 2 weeks

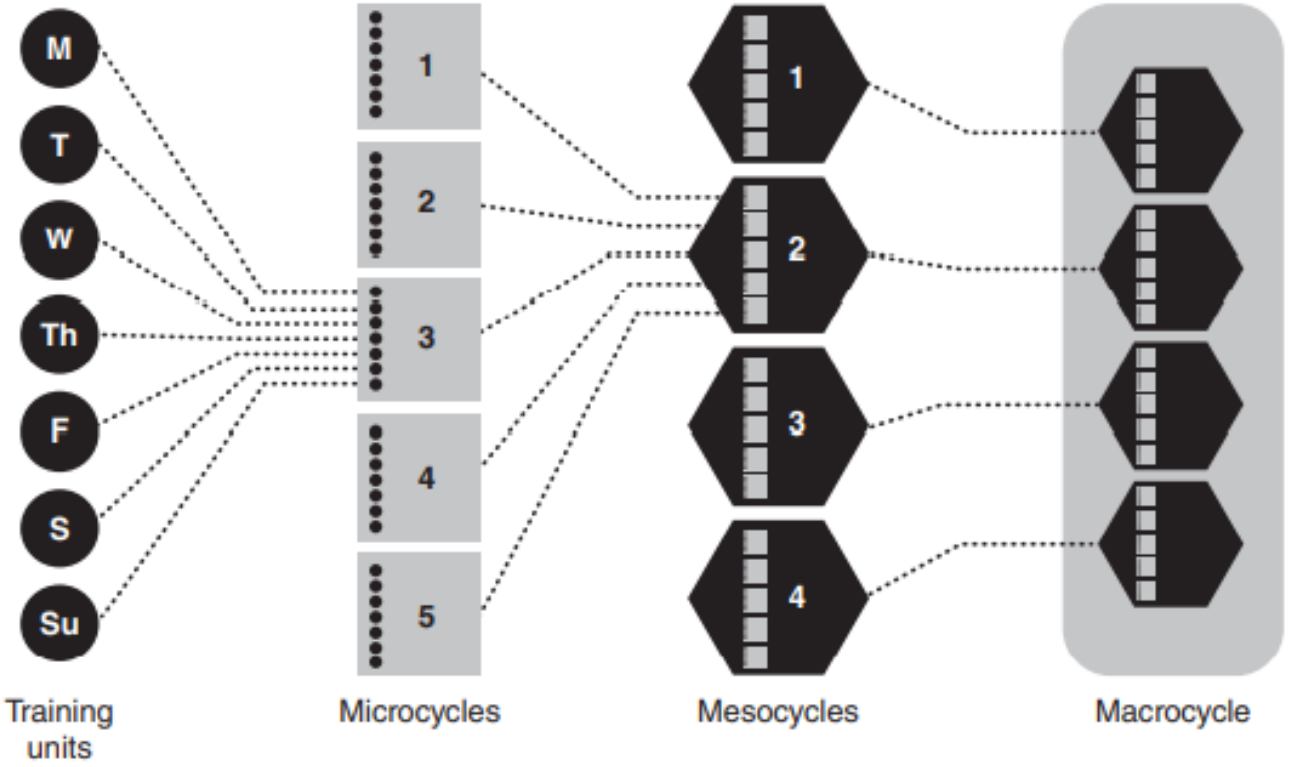
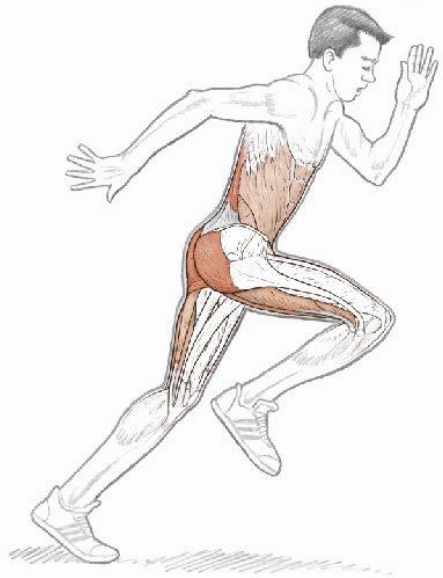
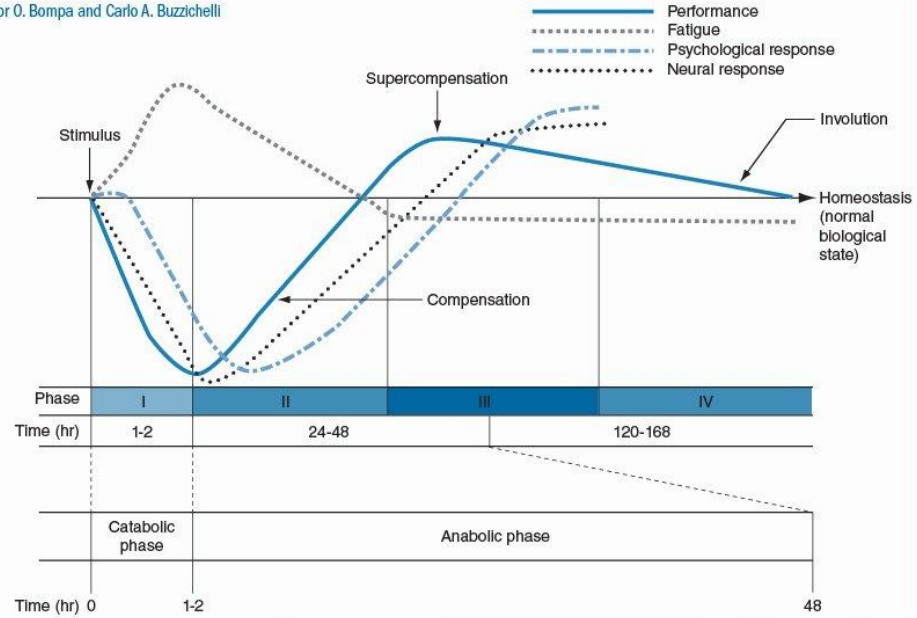


Figure 19.5 Training fits into microcycles, which fit into mesocycles, which make up the macrocycle.

Adapted from *Periodization: Theory and Methodology of Training*, by Tudor O. Bompa and Carlo A. Buzzichelli





Supercompensation Cycle

Supercompensation is a relationship between work and regeneration that leads to superior physical adaptation as well as metabolic and neuropsychological arousal before a competition.

For the best training adaptations to occur, training intensities, training volumes, and bioenergetic specificity have to be systematically and rationally alternated in a sequence of phases.

PHASE I *Fatigue*

1 to 2 Hours

Central fatigue
- Reduced neural activation of muscle
- Increased brain serotonin

Peripheral fatigue
- Impaired neuromuscular transmission, impulse propagation
- Substrate depletion

PHASE II *Compensation*

24 to 48 Hours
- ATP and PCr restored
- Increased oxygen consumption
- Elevated energy expenditure
- Increased protein synthesis rate

PHASE III *Supercompensation*

36 to 72 Hours
- Force-generating capacity and muscle sorenes return to baseline
- Psychological supercompensation
- Glycogen restored

PHASE IV *Involution*

3 to 7 Days
- Without optimal stimuli, physiological benefits of supercompensation decrease
- Alternating high- and lower-intensity training can produce new levels of homeostasis

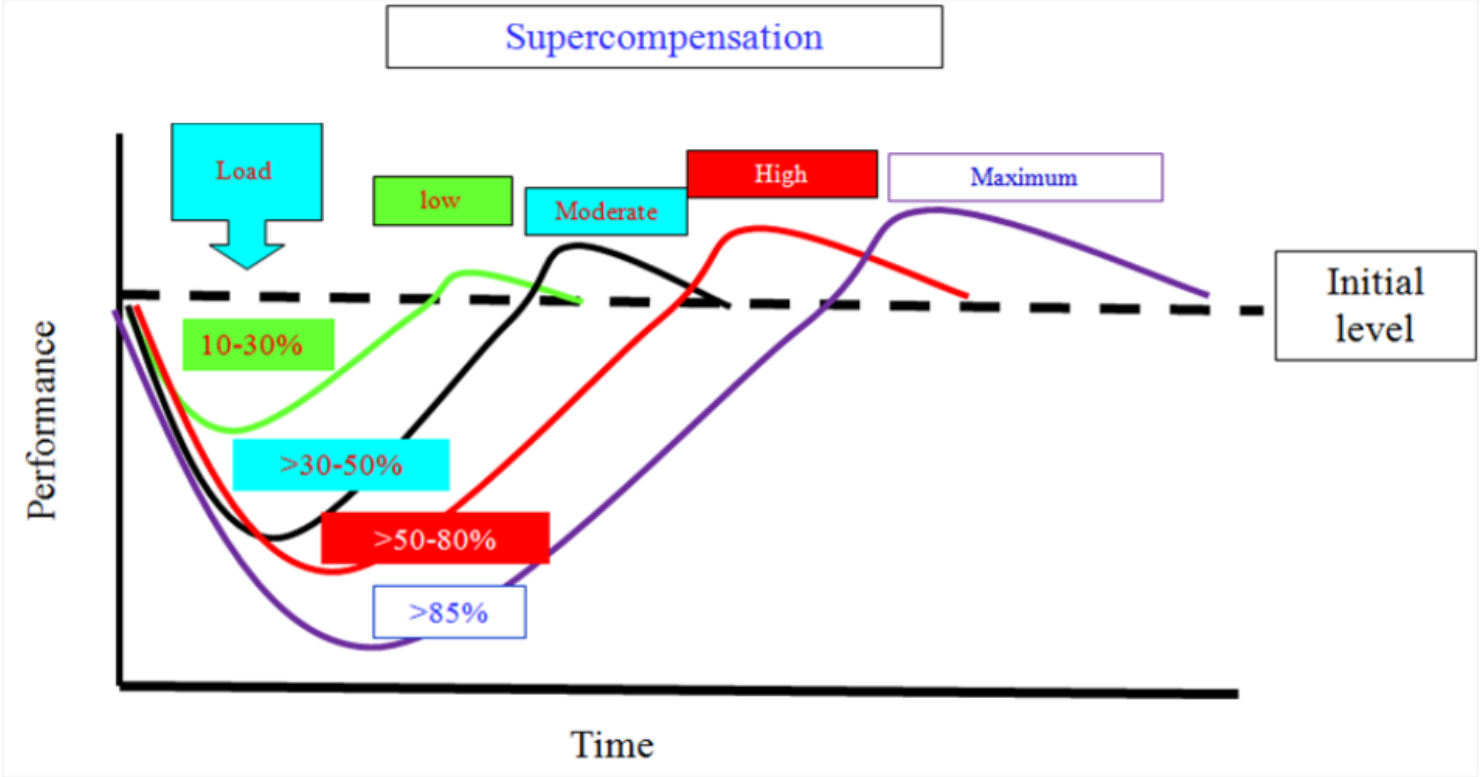
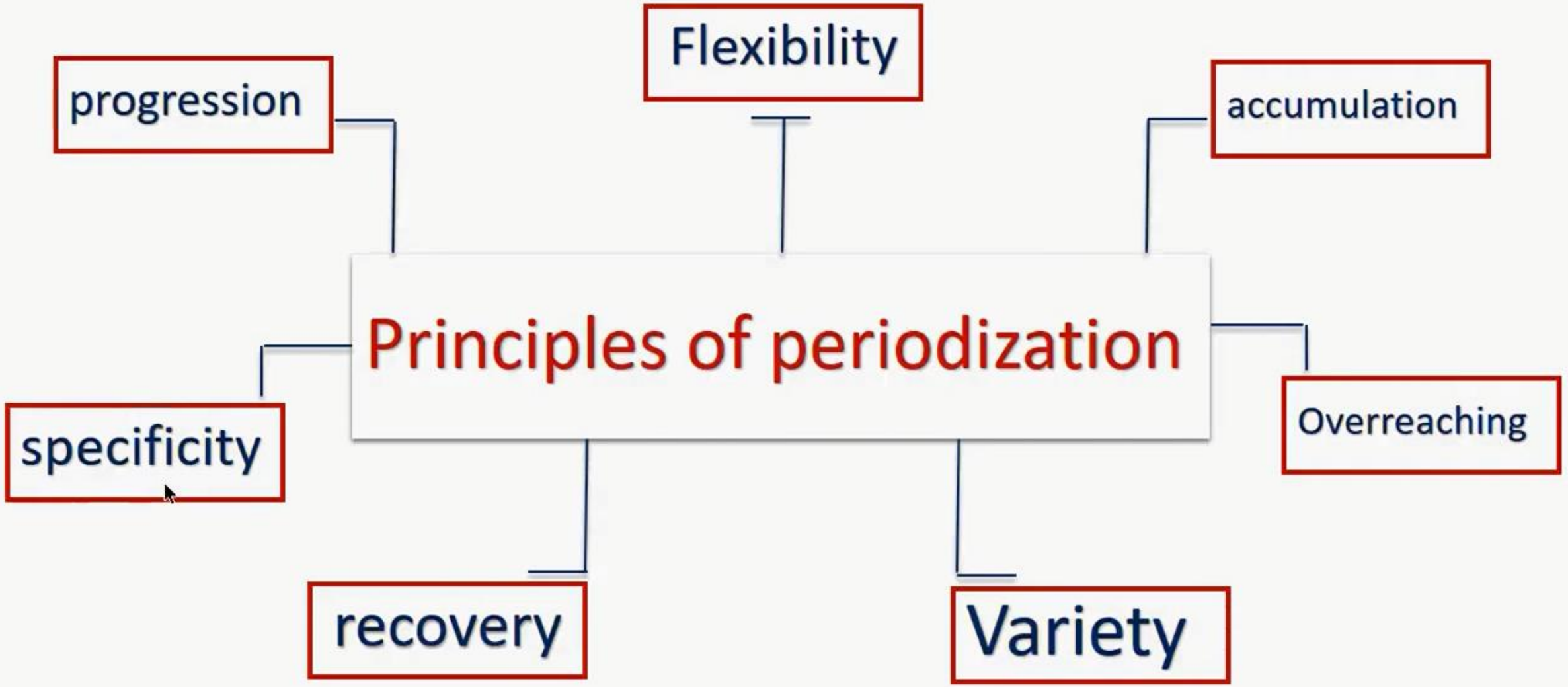


Figure 4. *Theoretical effect of low, moderate, high and maximum volume session on performance.*


Flexibility
progression
accumulation
Principles of periodization
specificity
Overreaching
recovery
Variety

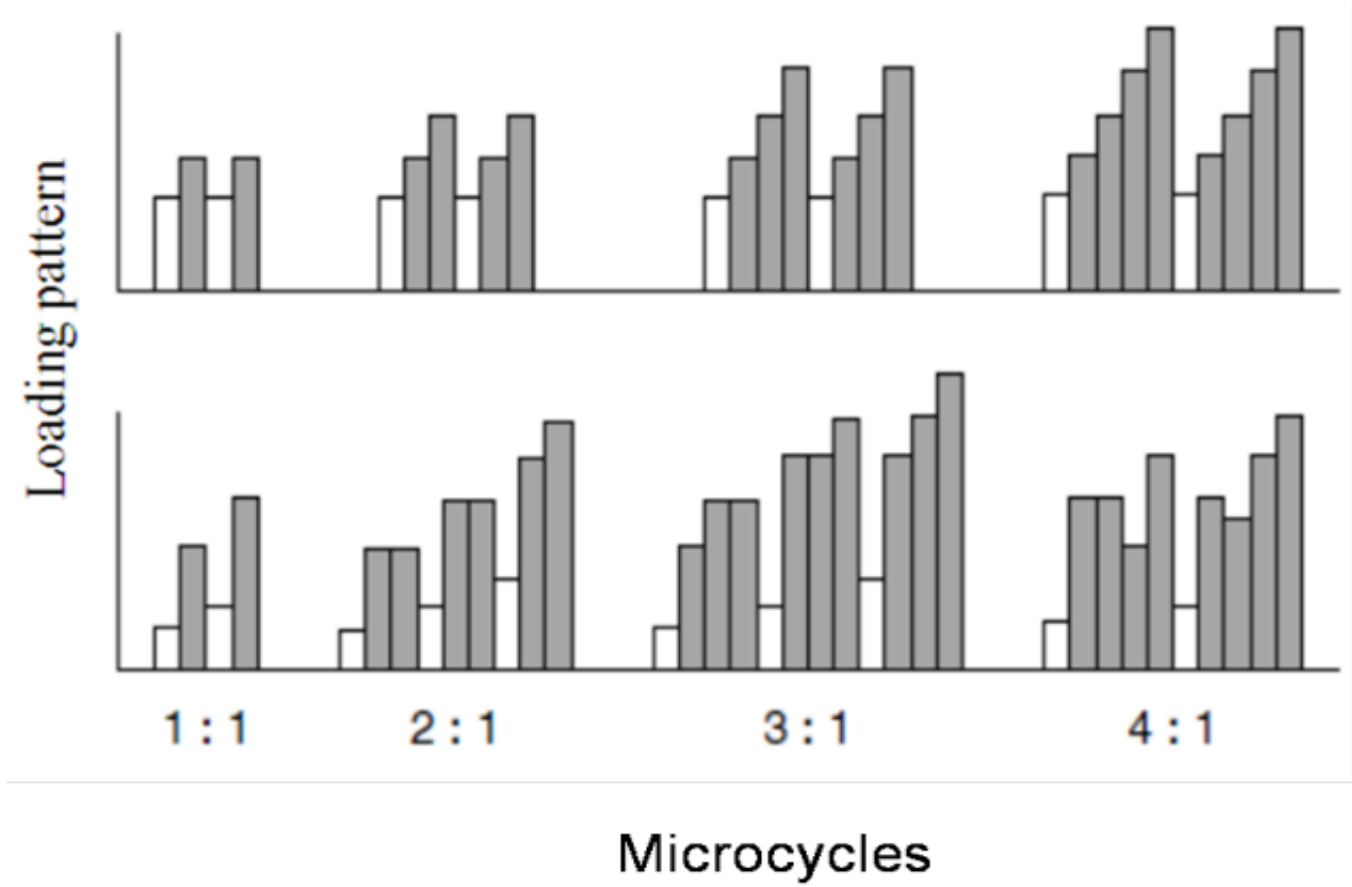

Loading pattern
1 : 1
2 : 1
3 : 1
4 : 1
Microcycles

Table 9.1 2000-2001 Seasonal Plan for Michael Phelps (NBAC)

	Months	September				October						November				December					January				February			
Dates	Microcycle				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Week Begins				25 September	2 October	9 October	16 October	23 October	30 October	6 November	13 November	20 November	27 November	4 December	11 December	18 December	25 December	1 January	8 January	15 January	22 January	29 January	5 February	12 February	19 February	26 February
Calendar of Meets	Domestic																											
	International																											
	Location											World Cup			Christmas Meet					Atlanta	World Cups							
Periodization	Training phase	Transition period				Building base										Intensity phase				Competi-tion			Specific					
	Strength	Rehabilitation				Progressive										Power				Mainte-nance			Progressive/ Power					
	Endurance	Maintenance				General progressive										Mixed				Mainte-nance			Specific					
	Speed	Maintenance				Maintenance										Progressive				Maximum			Progressive					
Testing Dates																												
Medical Control																												
Volume					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	100																											
	90																											
	80																											
	70																											
	60																											
	50																											
	40																											
	30																											
	20																											
	10																											

	Months	March				April					May				June				July					August				
Dates	Microcycle	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	Week Begins	5 March	12 March	19 March	26 March	2 April	9 April	16 April	23 April	30 April	7 May	14 May	21 May	28 May	4 June	11 June	18 June	25 June	2 July	9 July	16 July	23 July	30 July	6 August	13 August	20 August	27 August	3 September
Calendar of Meets	Domestic																											
	International																											
	Location	All-Star		World Championships Trials								Ann Arbor			Local Seniors			Santa Clara				World Championships			U.S. Nationals			
Periodization	Training phase	Competiton				Intensity					Specific				Peaking											T	Break	
	Strength	Maintenance				Progressive					Power				Maintenance											M		
	Endurance	Maintenance				Mixed					Specific				Maintenance											M		
	Speed	Maximum				Maintenance/ Progressive					Progressive				Maximum											M		
Testing Dates																												
Medical Control																												
Volume		24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	100																											
	90																											
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	70																											
	60																											
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	10																											

Courtesy of Bob Bowman.

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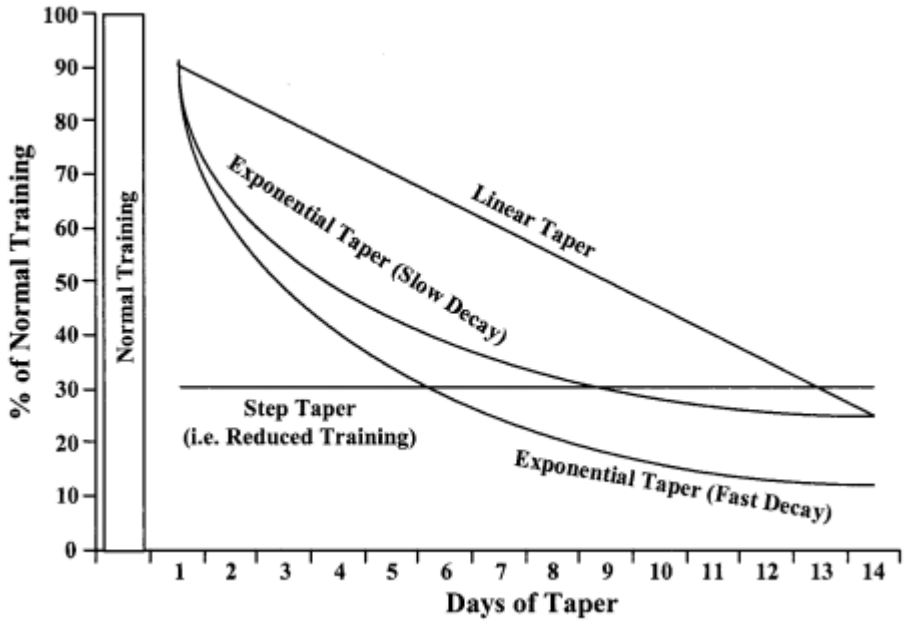
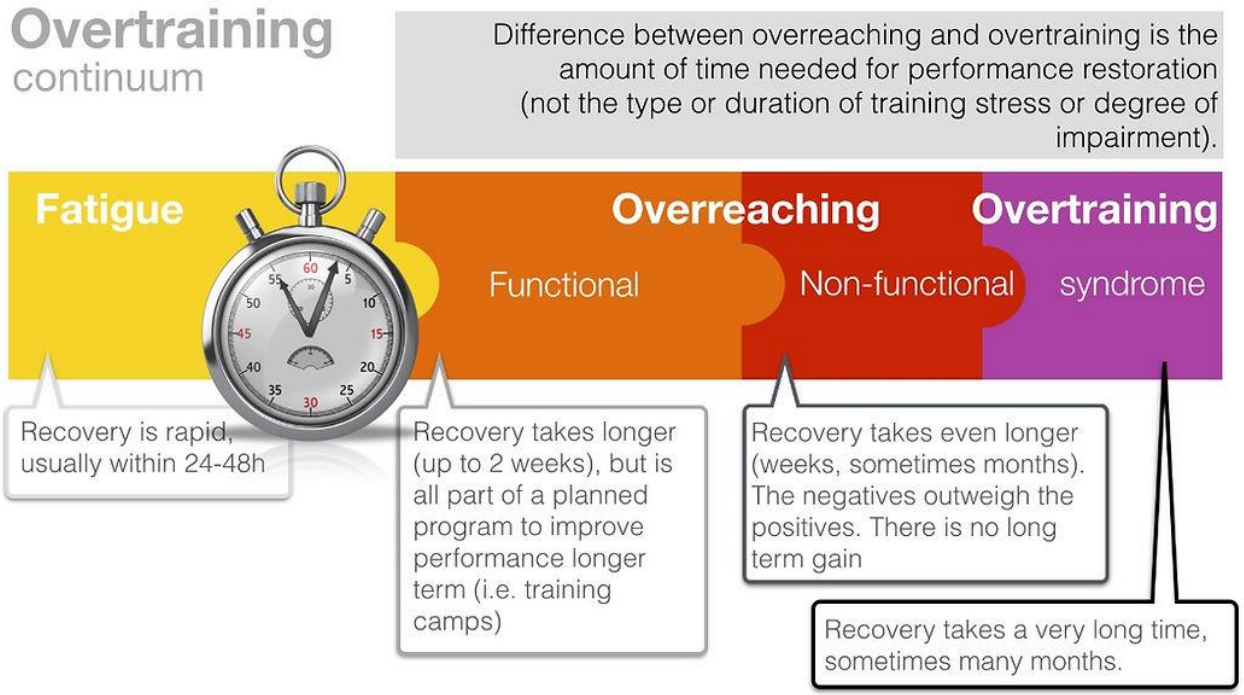


الشكل بتاع ال overreaching



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