Module 1. Definition of an athlete, types of training, classification of sports

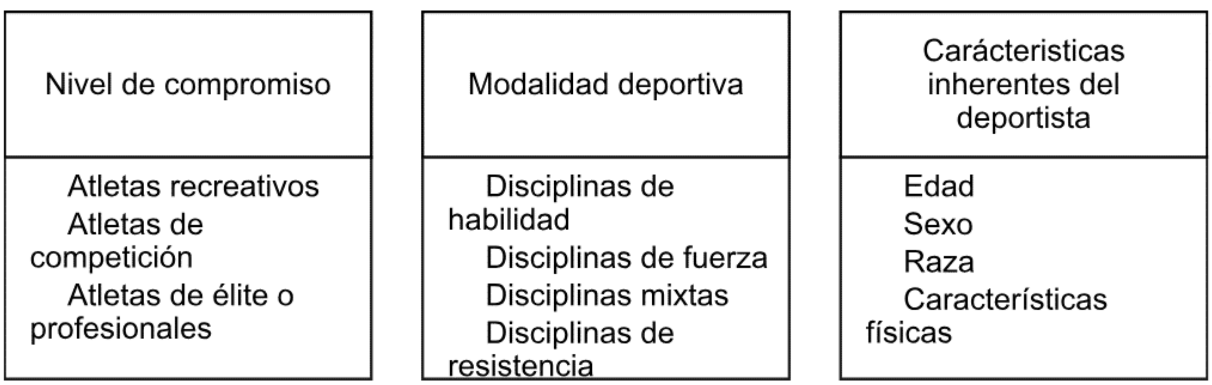
Unit 1.1 Definition and types of athletes

The word “athlete” comes from the Greek term athlos, meaning “achievement” (Araujo, 2016). In medical literature, the term has been used with multiple definitions, without an agreement having been reached between international societies. In Spanish, the appropriate term is “deportista”, and this will be used as a synonym for athlete. In general, an athlete is considered to be an individual with outstanding physical abilities in a specific physical activity (Maron et al. 2015).

The ESC (European Society of Cardiology) defines an athlete as an individual of any age, amateur or professional, who performs regular physical activity for training or competition (cited in Pelliccia et al., 2005). On the other hand, the AHA (American Heart Association) defines an athlete as an individual who performs regular physical activity (usually intense), with emphasis on competition or physical performance in individual or team activities. The definition of athlete includes individuals of all ages and all categories, from amateur athletes who are starting out in physical activity to international elite athletes.

The ESC classifies athletes according to the number of hours they train per week. In this sense, they are divided into three groups: elite or Olympic athletes, who perform physical activity 10 or more hours per week; competitive athletes, who perform physical activity for more than 6 hours per week; and recreational athletes, who perform more than 4 hours per week. This cut-off is arbitrary, and should not be taken strictly, since some recreational athletes train more than 10 hours per week. Therefore, it is important to individualize each case to make a correct evaluation (Pelliccia et al., 2005).

Figure 1. Classification of athletes according to training hours per week



Source: own elaboration

Translation of Fig. 2:

Level of Commitment

Recreational Athletes

Competitive Athletes

Elite or Professional Athletes

Sport Modality

Skill Disciplines

Strength Disciplines

Mixed Disciplines

Endurance Disciplines

Characteristics Inherent to the Athlete

Age

Sex

Race

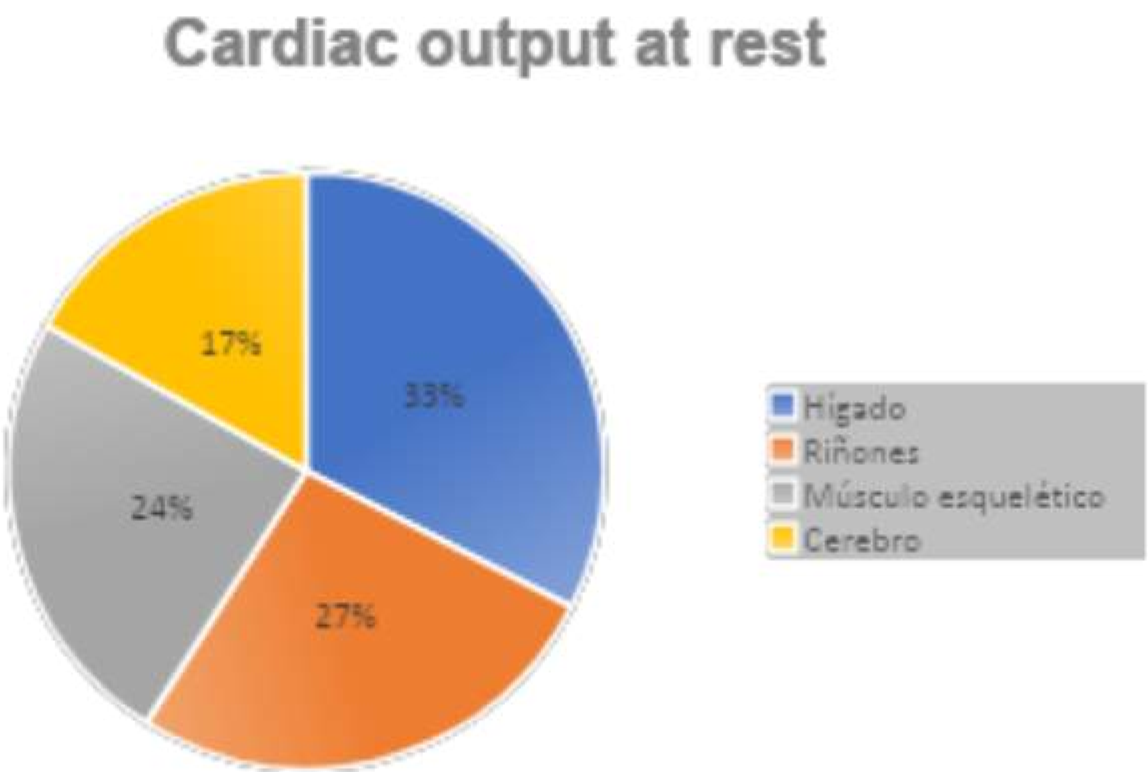
Physical Characteristics

CONTINUE

Unit 1.2 Exercise physiology

Exercise physiology incorporates the study of both acute responses and chronic adaptations of the human body to physical activity. The resting cardiac output of a 70 kg individual is approximately 5 liters per minute. The liver, kidneys, skeletal muscle and brain require the greatest amount of blood volume: approximately 27%, 22%, 20% and 14%, respectively. However, during exercise, cardiac output is able to increase to 25-35 liters per minute, with 84% of this being used by skeletal muscle for the formation of Adenosine triphosphate (ATP) and carbon dioxide removal.

Figure 3. Relationship of cardiac output of an individual at rest



Source: own adaptation based on Laughlin, 1999

Translation of Fig. 3:

Liver (33%)

Kidneys (27%)

Skeletal Muscle (24%)

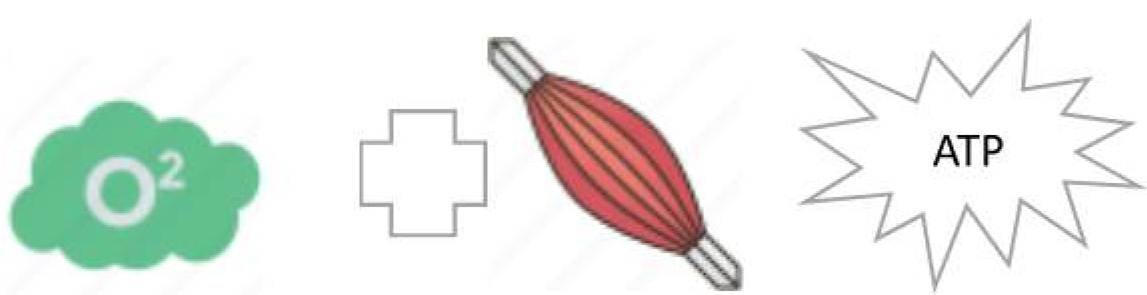
Brain (17%)

Athletes are able to maintain elevated cardiac output during prolonged exercise due to chronic adaptations, which will be reviewed in the following modules. With training, the heart is able to adapt in structure and function to maintain the demands of a progressively greater load. However, cardiac output will be the most important limiting factor for oxygen delivery to the tissues.

Exercise is an energetic process that reflects the regulation of the oxidation of a metabolic substrate in order to maintain physical activity. Oxygen facilitates oxidative reactions to create ATP, the molecule necessary for energy. Exercise requires that chemical energy be transformed into kinetic energy at a rapid rate and scale.

In striated muscle, ATP is necessary to release energy and generate mechanical force through the interaction between myosin and actin, this large-scale process being responsible for muscle contraction.

Figure 4. Aerobic metabolism



Source: own elaboration.

At the onset of physical activity, regardless of whether it was of sudden or gradual onset, there should be no delay in the generation of the ATP needed to maintain physical activity. This is possible through phosphocreatine stores, which are rapidly hydrolyzed to release inorganic phosphate and generate ATP. As these stores are rapidly depleted, however, sustained exercise depends on the aerobic oxidation of metabolic substrates, predominantly glycogen and fatty acids, for the continued generation of ATP.

Human skeletal muscle contains approximately 15-18 g of glucose per kilogram of stored glycogen, which, for utilization, can be metabolized to glucose via glycogenolysis. The liver also has a reserve of glycogen that can be converted to glucose if necessary; furthermore, during prolonged and intense exercise, the liver maintains blood glucose levels by converting non-carbohydrate precursors via gluconeogenesis. These mechanisms are stimulated by circulating adrenaline. When glucose is metabolized via aerobic glycolysis, 36 molecules of ATP are obtained, 6 molecules of oxygen are consumed, and 6 molecules of carbon dioxide are produced for each molecule of glucose.

Fatty acids are also catabolized for energy; their metabolism is, nonetheless, more "expensive" in terms of oxygen consumption.

Therefore, under conditions of intense or prolonged exercise, muscle metabolism preferentially consumes carbohydrates, which provide ATP 4 times faster than fatty acid oxidation (Laughlin, 1999).

When exercise is intense and prolonged, oxygen delivery to the mitochondria of muscle cells becomes a limiting factor, as they are unable to maintain the production of ATP necessary for consumption. At this point, the metabolism is able to continue generating energy for muscle contraction in the absence of oxygen through anaerobic glycolysis, involving a higher metabolic cost due to the development of lactic acidosis. Cell homeostasis is of vital importance, so the body regulates pH through *buffering mechanisms*, including bicarbonate ion transport and carbon dioxide removal through the lungs.

At the onset of physical activity, energy is produced by the most efficient method: aerobic glycolysis. As exercise increases, a point is reached where transport to muscle cells is insufficient to maintain the required demands, and anaerobic metabolism is initiated. After this anaerobic threshold, oxygen debt accumulates and lactic acid is produced. In this phase, oxygen consumption continues to increase, persisting until the resting phase, when the oxygen debt must be replenished. The maximum value of oxygen consumption is called peak oxygen consumption, and this is a key determinant of physical performance, as it reflects adequate function of muscle metabolism, oxygen transport by the cardiovascular system and pulmonary ventilation.

At rest, a large proportion of muscle capillaries have low or limited blood flow. The role of these vascular beds is to vasodilate during strenuous exercise, allowing increased diffusion of oxygen and nutrients to the working muscles. Vasodilation is initiated by tissue oxygen depletion, which stimulates the release of vasodilatory substances such as adenosine, potassium ions, ATP, lactic acid, and carbon dioxide.

Local vasodilation is accompanied by activation of the sympathetic nervous system, resulting in a sustained increase in cardiac output and blood pressure. At the onset of exercise, the brain initiates movement from the motor cortex simultaneously with the activation of the vasomotor center, which activates the sympathetic nervous system. This results in increased cardiac chronotropism and inotropism (heart rate and force of contraction). Cardiac output increases secondarily to increased stroke volume and heart rate.

Sympathetic vasoconstriction through arterioles allows the redirection of blood flow to muscle tissue. Approximately two-thirds of the total blood volume is found in the venous capillaries and their capacitance vessels. Vasoconstriction of these capillaries allows an increase in systemic venous filling pressures, which in turn increases venous return to the heart.

The heart, for its part, increases cardiac output by increasing its stroke volume and heart rate. The increase in venous return causes an increase in the distensibility of myocardial cells (preload) with its consequent increase in the force of contraction through the Frank-Starling mechanism. In addition, positive inotropy—dependent on the myocardial fiber—is stimulated by the adrenergic system through its B1 receptors.

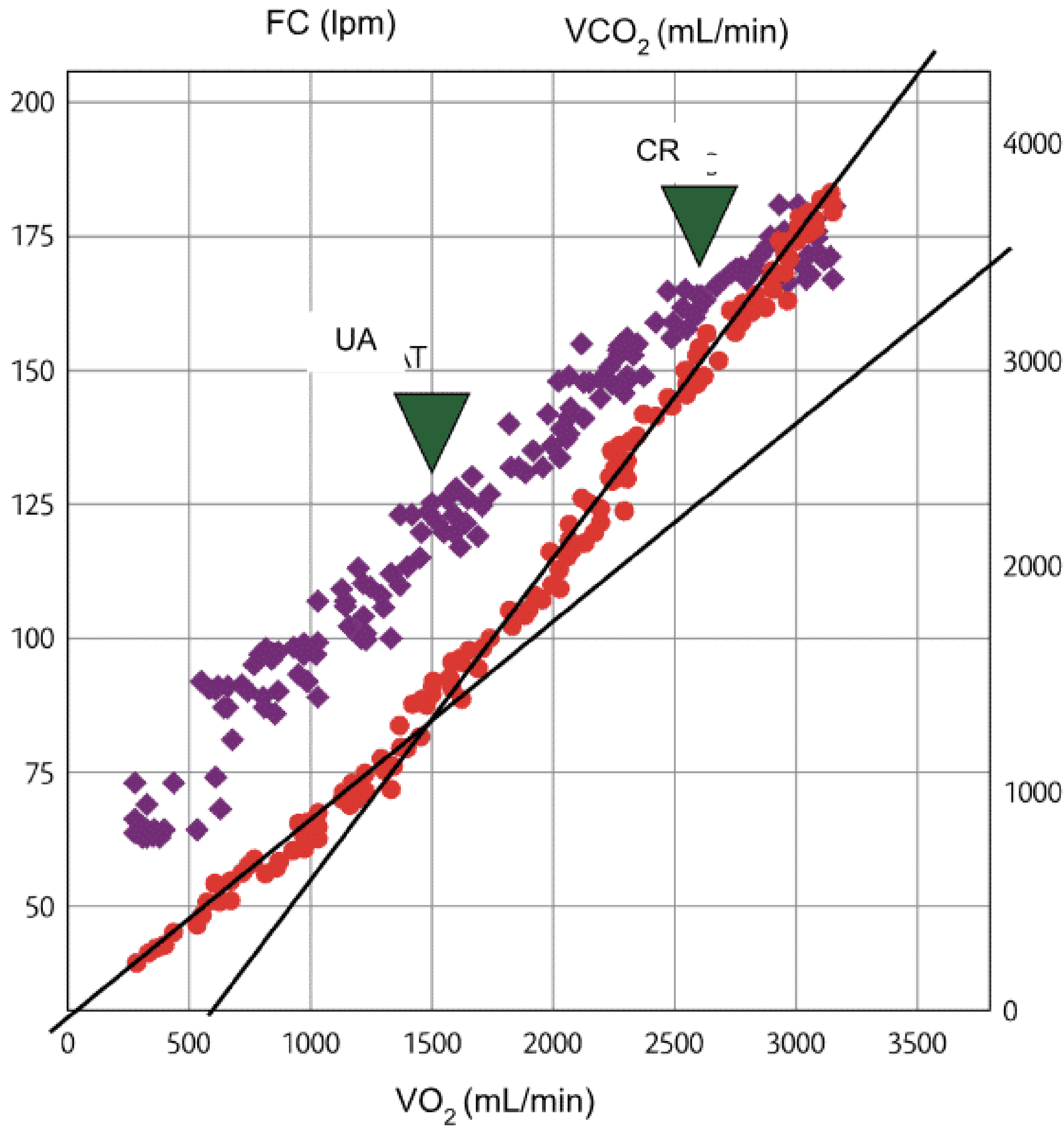
Ventilation is a crucial factor in providing an adequate amount of oxygen and removing the carbon dioxide produced in order to maintain an optimal acid-base balance. In a healthy individual, the lungs are capable of increasing their ventilatory rate from approximately 6 liters per minute at rest to 100 liters per minute. This is done at maximum effort by increasing the depth and frequency of ventilation.

Accumulation of lactic acid beyond the anaerobic threshold is initially compensated for with bicarbonate ions. This, in turn, increases carbon dioxide production. This increase is sensed by chemoreceptors located in the carotid bodies, stimulating increased ventilation through the respiratory center. During strenuous activity, once the compensatory capacity is exceeded, blood pH falls. This is a potent stimulus for massive hyperventilation.

Gas exchange is performed more efficiently during exercise, through an increase in pulmonary capillary perfusion and an increase in alveolar recruitment. Pulmonary perfusion and alveolar ventilation increase during exercise, improving the perfusion-ventilation relationship (McArdle et al., 2014; Jones et al., 2000).

Physical activity reflects the body's ability to activate multiple regulatory and counter-regulatory mechanisms, which, through proper functioning, allow an increase in energy generation, oxygen consumption and carbon dioxide elimination, modulating the response according to the imposed demand.

Figure 5. Exhaled carbon dioxide (VCO_2) and heart rate (HR) vs. oxygen consumption (VO_2)



Source: Own adaptation based on Pellicia et al., 2019

Carbon dioxide elimination increases linearly with oxygen consumption, with a slope of 1 up to the anaerobic threshold (AT). Once the AT is crossed, exhaled CO2 shows a rapid, vertical rise up the slope, depending on lactic acid buffer capacity. The respiratory compensation threshold (RT) is shown.

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Unit 1.3 Exercise prescription

It is recommended to prescribe exercise using the FITT rule, as indicated by the ESC. This rule is based on the FITT acronym, which includes frequency, intensity, time and type.

1.3.1 Type of exercise

Conventionally, exercise types have been described in binaries (aerobic vs. strength, or aerobic vs. anaerobic). This allows us to classify exercise types in a simple way; however, we must understand the simplistic nature of these classifications, since all training—to a greater or lesser extent—combines several types of exercise.

1 **Aerobic or dynamic training**

Aerobic training is characterized by physical activity at a low to moderate intensity, which allows energy to be obtained through aerobic glycolysis. Aerobic exercise incorporates dynamic movements and is therefore associated with high energy expenditure and increased heart rate. Classically, this training is performed at a constant intensity; the heart rate is kept constant in a range between 65 and 85% of the maximum heart rate achieved in a stress test, which we call continuous aerobic training (Mezzani et al., 2013).

2 Interval training

This combines high intensity exercise intervals (80-100% of maximum HR) of 30 seconds to 4 minutes, interspersed with low intensity exercise (40-60% of maximum HR), of 1 to 4 minutes (Tanaka et al., 2001). In this way, the aim is to avoid a complete cardiovascular adaptation to high intensity exercise, despite maximal muscle stimulation. High intensity interval training has shown to benefit greater cardiopulmonary, metabolic, peripheral and general physical capacity in individuals (Tjonna, 2008). These benefits have been related to the increase in type 4 glucose transporters in the muscles, as well as to the improvement in the aerobic adaptation of individuals, through increased mitochondrial metabolic capacity.

This type of training seems quite promising in patients with cardiovascular or pulmonary disease (COPD) and its associated limitations. It is recommended that the peak of exercise should not last too long, thus avoiding chronic cardiorespiratory compensation.

Currently, there is no consensus on the duration and intensity of the peak of exercise, nor on the number of peaks of exercise that should be performed.

The last decade has seen an increase in the amount of information we have regarding interval training. In this regard, a meta-analysis demonstrated that interval training, as compared to continuous training, brings about an increase in maximum oxygen consumption in patients with coronary disease and patients with heart failure with decreased ejection fraction (Pattyn et al., 2018). In addition, in these patients, an increase in maximum respiratory capacity, quality of life and maximum HR has been demonstrated.

There is also evidence supporting interval training in patients with heart failure with preserved ejection fraction. A 4-week pilot study demonstrated improvement in maximal oxygen consumption and diastolic dysfunction assessed by transthoracic echocardiography in these patients (Angadi et al., 2014).

Interval training is a short-duration, high-intensity workout characterized by intermittent periods of intense aerobic physical activity, alternating with periods of light activity or active recovery. It has been shown to be safe and effective in patients with cardiovascular and pulmonary pathology. Further studies are required, however, to recommend duration and specific characteristics for each individual.

3 Static or strength training

Strength/static training is a type of anaerobic exercise that uses repeated movements against resistance. The goal is to increase contracting muscle strength. It is often prescribed using the term one repetition maximum or RM. One repetition maximum is the greatest amount of weight a person is able to lift through the range of motion for one repetition. The use of 1 RM has been shown to be a safe method for strength assessment and no adverse cardiovascular events have been reported related to its use (Gordon et al., 1995). In addition, the use of multiple RM or 5 RM has been shown to be a good surrogate for an athlete's strength.

Performing less than 20% of 1RM is considered to be primarily aerobic training, while above 20% it is considered that the muscle capillaries are compressed during contraction, resulting in a hypoxic stimulus dependent on the anaerobic pathway. The number of repetitions should be inversely proportional to the intensity of the exercise, with moderate training being considered 30-50% of 1RM with 15-30 repetitions, and intense training being 50-70% of 1RM with 8-15 repetitions. The latter is ideal for muscle gain.

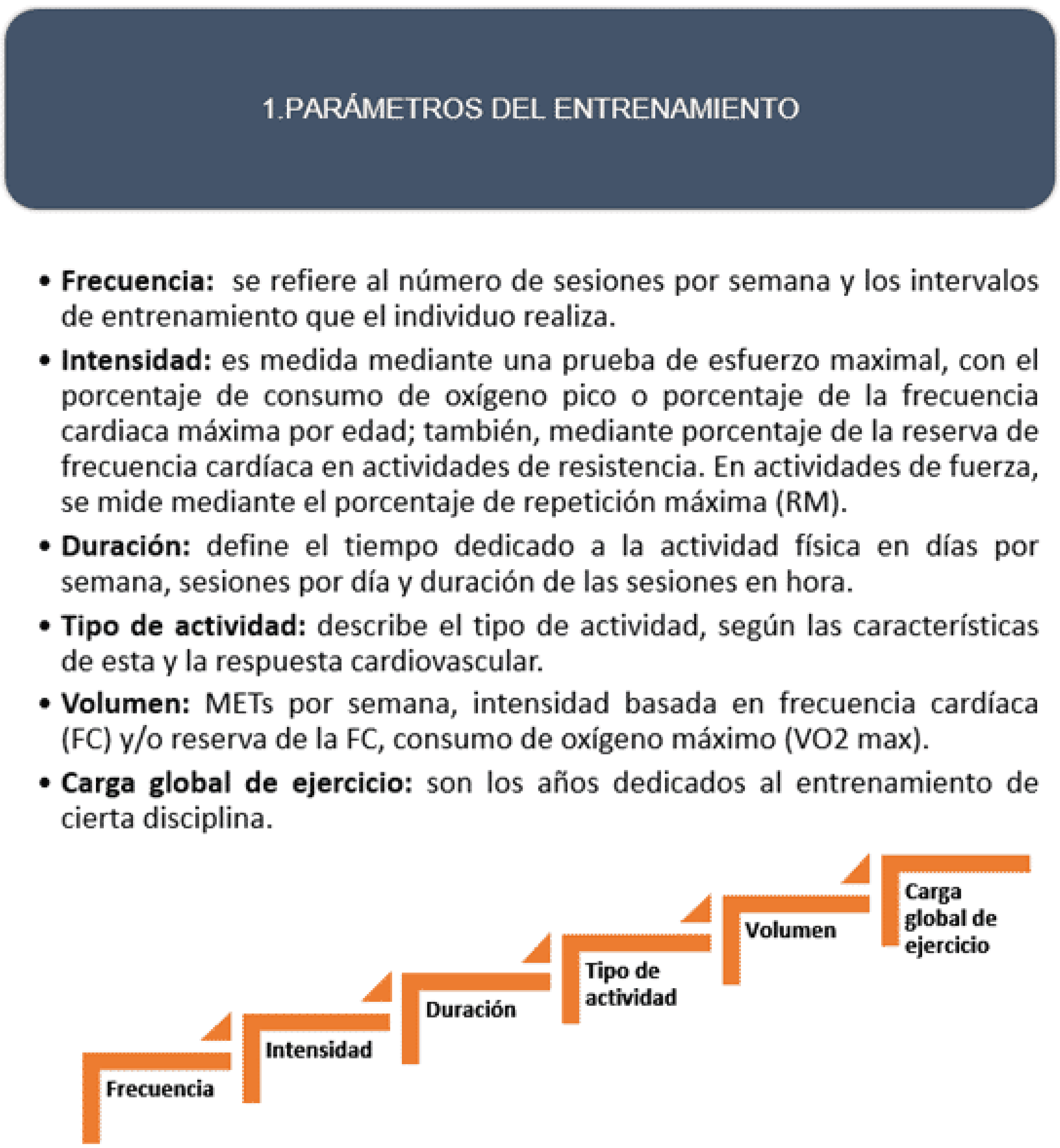
Optimal muscle hypertrophy occurs when strength/endurance training is performed 2-3 times per week in circuit, or station, routines. It is recommendable to perform 1-3 rounds of 8-15 repetitions, including flexions and extensions of each muscle group. Between 8 and 10 strength exercises should be prescribed, covering most muscle groups. Strength is best maintained with rest intervals of 3-5 minutes and no less than 1 minute.

Strength training can be isometric (without changes in muscle length or joint movement) or dynamic (contraction with changes in muscle length and joint movement). Isometric activity usually induces a Valsalva maneuver, which in turn causes variations in blood pressure. Conversely, dynamic activity maintains variable resistance during movement, avoiding these changes in blood pressure.

It is important to emphasize that there are various sports that combine both types of training, thus underscoring the importance of individualizing each athlete, defining the activity they perform, in order to prescribe exercise appropriately. On the other hand, when evaluating competitive and elite athletes, it is important to consider that training is not limited to the specific competitive event or physical activity they perform, but that a certain aerobic capacity and strength ability are required to enable performance at the highest competitive level.

1.3.2 Exercise characteristics

Figure 6. Parameters to be taken into account during the evaluation of an athlete and the degree of training



Source: own elaboration

Translation of Fig. 6:

Training Parameters

Frequency: refers to the number of sessions per week and the training intervals to be performed by the individual

Intensity: This is measured with reference to a maximal exercise stress test, with the percentage of peak oxygen consumption or the percentage of cardiac frequency, by age. Also, in endurance activities, via percentage of the heart rate reserve. For strength activities, the measurement is determined by the percentage of the one-repetition maximum (1RM).

Duration: defines the amount of time to be dedicated to physical activity in days per week, sessions per day, and hours per session

Activity Type: describes the type of activity, according to activity characteristics and cardiovascular response

Volume: metabolic equivalent of tasks (METs) per week, with the intensities based on heart rate and/or heart rate reserve along with maximal aerobic capacity ($\dot{V}O_2$ max)

Total training load: refers to the years to be dedicated to training for a certain discipline

1.3.3 Assessing exercise intensity

In order to measure the intensity of physical activity, the recommended method is the direct measurement of physiological responses to exercise, through a maximal exercise test with gas analysis. For exercise prescription, heart rate reserve, percentage of maximum heart rate, or percentage of maximum oxygen consumption can be used. Some indirect methods for measuring physical activity intensity are heart rate-related formulas; the most commonly used is maximum HR = 220 – age. However, this formula may overestimate maximum HR, so absolute measures of exercise intensity using oxygen consumption are preferred (Ainsworth et al., 1993).

Table 1. Exercise intensity in endurance sports based on maximal effort testing and training zones

Intensity	$VO2_{max}$ (%)	Max HR (%)	RFC	Perceived Exertion Scale	Training area
Light low intensity	<40	<55	<40	10-11	Aerobic

exercise					
Moderate intensity exercise	40-69	55-74	40-69	12-13	Aerobic
High intensity exercise	70-85	75-90	70-85	14-16	Aerobic + lactate
Very high intensity exercise	>85	>90	>85	17-19	Aerobic + lactate + anaerobic

Source: Own adaptation based on Peliccia et al., 2021

The measurement of perceived effort is carried out indirectly, by estimating the intensity of the exercise. The Borg scale allows, in a quick and simple way, to estimate the effort perceived by the patient, scoring from 1 to 10, with 10 being the maximum effort (Borg, 1974) and also being the moment at which the test should be stopped (Noble et al., 1983).

Another method to assess the effort exerted is the speech test (Persinger et al., 2004), which is based on the premise that exercising below the ventilatory and anaerobic threshold allows one to speak fluently during a conversation. This test allows for an objective and rapid assessment of the individual during the exercise.

Table 2: Borg Scale (allows subjective assessment of perceived effort)

0	Repose
1	Very, very light
2	Very light
3	Light
4	Somewhat heavy
5	Heavy
6	Heavier
7	Very heavy

8	Very, very heavy
9	Maximum
10	Extreme

Source: own elaboration

Training volume assessment

Training volume is the number of hours that an athlete performs physical activity per week; it is estimated by individual energy expenditure (METs). Training volume increases progressively, depending on the level of competition, and for elite athletes can be 10,000 METs per week, or more, although this will vary based on the sport discipline. The following table shows the METs associated with different sport disciplines. Using this table, it is possible to calculate training volume, knowing the hours/day that the athlete performs activity and the METs per activity (Ainsworth et al., 2000; Ainsworth et al., 2011).

Table 3. Energy consumption according to physical activity

Sport/activity	Intensity	METs
Sport Climbing	Moderate	5.8
Hiking	Hiking, cross country	6.0
Cycling	Vigorous	10.0
	Mountain	14.0
Conditioning exercise	Resistance 8.15 repetitions	3.5
	Stationary Rowing	6.0
Running	Jogging	7.0
	Marathon	13.0
Basketball	Moderate	6.5
Soccer	Competitive	8.0
Ice hockey	Moderate	8.0
Tennis	General	7.3

Swimming	Recreational	5.3
Skiing	Recreational	7.0

Source: Adapted by the author based on Pressler and Niebauer, 2020

CONTINUE

Unit 1.4 Classification of sports

1

Mitchell's Classification

The Mitchell classification was developed with the aim of determining whether an athlete with heart disease was capable of participating in competitive sports. In this sense, the classification differentiates activities according to:

- the type and intensity;
- the risks of injury due to bodily collision;
- the risk and consequences of syncope.

Sports are categorized dichotomously, depending on the predominant type of activity. Some are predominantly static, while others are dynamic. This depends on the degree of displacement involved and the mechanical action of the muscles involved in the activity. Physical activity with a predominance of dynamic activity involves changes in muscle length through contractions, which are usually associated with displacement. Static exercise, on the other hand, is characterized by greater relative force with little displacement.

This classification divides sports based on the predominance of activity types involved, characterizing different activities according to their proportion of dynamic and/or static activity. Thus, different subgroups with similar proportions are differentiated. The objective of this classification was to define whether the changes found in an athlete were related to the type of discipline they performed, in addition to determining whether an individual with a certain heart condition could perform a competitive activity.

It is important to note that Mitchell's classification (et al., 2005) does not take into account the degree of physical fitness of the athletes, which entails a significant risk: it underestimates the real intensity of an activity and simplifies the predominance of an activity, differentiating it according to its type. In addition, it is common for elite athletes to carry out other training associated with their base discipline, and as the characterization of the physical activity is sometimes unclear, other parameters should be taken into account.

Figure 7. Mitchell classification

Incremento del componente estático	I. Bajo (<40% Max O_2)	II. Moderado (40-70% Max O_2)	III. Alto (>70% Max O_2)
III. Alto (>50% MVC)	Pruebas de campo (lanzamiento), trineo, gimnasia, artes marciales, navegación, escalada deportiva, esquí acuático, levantamiento de pesas, *surf* a vela.	Levantamiento de pesas, Esquí alpino, monopatinaje, snowboard, lucha libre.	Boxeo, canotaje, ciclismo, decatlón, remo, patinaje de velocidad, triatlón.
II. Moderado (20-50% MVC)	Tiro con arco, automovilismo, buceo, deporte ecuestre, motociclismo.	Futbol americano, eventos de campo (salto), patinaje artístico, rodeo, *rugby*, atletismo (*sprint*), *surf*, nado sincronizado.	Básquetbol, hockey sobre hielo, esquí de fondo, *lacrosse*, atletismo (media distancia), natación, balonmano.
I. Bajo (<20% MVC)	Billar, bolos, críquet, golf, tiro con rifle, *curling*.	*Baseball*, esgrima, tenis de mesa, voleibol.	Bádminton, esquí de fondo (clásico), hockey sobre césped, orientación, caminata de carrera, *squash*, atletismo (larga distancia), *soccer*, tenis.

Incremento del componente dinámico →

Source: own elaboration

Translation of Fig. 7

Intensification of Static component

Low (<20% MVC)

Moderate (20-50% MVC)

High (>50% MVC)

Intensification of Dynamic component

Low (<40% Max O_2)

Moderate (40-70% Max O_2)

High (>70% Max O_2)

[casilla superior izquierda]

Throwing sports, Sledding, Gymnastics, Martial arts, Boating, Sport climbing, Water skiing, Weightlifting, Windsurfing

[casilla superior centro]

Weightlifting, Alpine skiing, Skateboarding, Snowboarding, Wrestling

[casilla superior derecha]

Boxing, Canoeing, Cycling, Decathlon, Rowing, Speed skating, Triathlon

[casilla centro izquierda]

Archery, Auto Racing, Scuba Diving, Equestrian sports, Motorcycling

[casilla centro centro]

American Football, Field Events (High jump), Figure skating, Rodeo, Rugby, Track events (Sprinting), Surfing, Synchronized swimming

[casilla centro derecha]

Basketball, Ice hockey, Cross-country skiing (Skate skiing), Lacrosse, Track events (Middle-distance running), Swimming, Handball

[casilla inferior izquierda]

Billiards, Bowling, Cricket, Golf, Sport shooting (Rifle), Curling

[casilla inferior centro]

Baseball, Fencing, Table tennis, Volleyball

[casilla inferior derecha]

Badminton, Cross-country skiing (Classic), Field hockey, Orienteering, Race walking, Squash, Track events (Long-distance running), Soccer, Tennis

This classification is based on the dynamic and static components achieved during the competition.

- MVC: maximum voluntary contraction
- Max O_2 : maximum oxygen consumption

2 Cardiovascular classification of sports

Another form of classifying sports is according to the predominance of activity type; in this way, they are divided into isotonic and isometric sports. Each activity has associated cardiovascular adaptations. Introduced in 2018 by the EAPC, this classification has been validated in multiple studies, and is today one of the most used in daily practice. Isotonic exercise includes those activities that predominantly involve a change in muscle length, while isometric sport increases tension. Another important characteristic of this classification is that it takes into account whether the discipline in question requires technical skills, and their corresponding complexity; for example, the skill needed to perform archery or horse riding.

It is important to recognize that this classification does not take into account the physiological components of each sport, and is based purely on imaging results that facilitate the evaluation of the athlete.

Figure 8: Classification of Olympic sports, according to their isometric and isotonic components, as well as cardiovascular adaptations

	Destreza	Fuerza	Mixtas	Resistencia
Frecuencia cardiaca	+/++	++	++/´+++	+++
Presión arterial	+	+++	++	++
Gasto cardiaco	+	++	++/+++	+++
Volumen de entrenamiento	-	+	++	+++
Remodelado cardiaco	-	+	++	+++

Destreza	Fuerza	Mixtas	Resistencia
·Tiro con arco ·Carreras en auto ·Curling ·Equitación ·Golf ·Navegación ·Tiro deportivo ·Tenis de mesa	·Esquí alpino ·Bobsled ·Lanzamiento de disco/jabalina ·Lanzamiento de peso ·Snowboarding ·Carrera de velocidad ·Esquí acuático ·Levantamiento de pesas ·Lucha libre	·Basquetbol ·Criquet ·Esgrima ·Fútbol ·Balonmano ·Hockey hielo/hierba ·Rugby ·Soccer ·Tenis ·Waterpolo ·Voleibol	·Canotaje ·Esquí de fondo ·Ciclismo ·Natación de mediana distancia ·Atletismo de mediana distancia ·Pentatlón ·Remo ·Triatlón

Source: Own adaptation based on Pelliccia et al., 2017

Translation of Figure 8

Skill

Strength

Mixed

Endurance

Heart rate

Blood pressure

Cardiac output

Training volume

Cardiac remodelling

Archery

Auto racing

Curling

Equitation

Golf

Boating

Sport shooting

Table tennis

Alpine Skiing

Bobsled

Throwing sports (Discus/Javelin)

Snowboarding

Sprinting

Water skiing

Weight lifting

Wrestling

Basketball

Cricket

Fencing

American Football

Handball

Hockey (Ice//Field)

Rugby

Soccer

Tennis

Water polo

Volleyball

Canoeing

Cross-country skiing

Cycling

Middle-distance swimming

Middle-distance track events

Pentathlon

Rowing

Triathlon

3 Other classifications

Metabolic classification divides sports activities into aerobic and anaerobic. Aerobic activities are those performed at a constant intensity, which allows the metabolism of stored energy through aerobic glycolysis over fat metabolism (B-oxidation). Some examples of these activities are athletics, cycling and low-intensity swimming. On the other hand, anaerobic activities are those in which movement is performed at an excessive rate, in which metabolic consumption is unsustainable through aerobic glycolysis and anaerobic glycolysis is thus necessary. Weight training, as previously mentioned, is an example of this activity.

To date, we lack a universal classification for all athletes. It is for this reason that evaluation is an individualized, continuous process that requires multiple perspectives that take into account the stage and objective of the training.

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