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The Parent's thoughts

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Mobility

Mobility is the general physical fitness of a body. However, it must be added that this fitness is important as a function in time. Here is where the supplementary concepts come into play, that is oxygenation and energy management.

The main aim of a tennis player's motility is to combine motoric fitness with so-called cardio, that is the body's ability for maximum oxidization of muscle, brain and nervous system during increasing strain and fatigue. This ability is informally referred to as "condition".

Condition is measured by the VO2 max levels, that is the body's ability to absorb oxygen.

Cardio increases metabolism, the transformation of matter, influencing positively the body's energy management and cellular regeneration.

These conditions are decisive of victory on the highest level of championship. There are reasons why a tennis player starts to make foul plays in the 3rd set. He is tired, just like his opponent. But, most importantly, they are suffering from oxygen deficiency. Their breathing is becoming shallower and more labored. Their cells, both nervous and muscular, are beginning to feel the shortage of oxygen.

The aim of mobility training is intermittently applying functional and aerobic exercises, to achieve:

- the longest possible duration of oxygen strain, and delaying the mixed or oxygen-less phase as long as possible
- the quickest possible return to oxygenated functioning

The above factors are characterized by HR (heart rate).

The lower the HR, measured by rpm (rates per minute), the better the economy of heart work. The lower the HR, including the rest rate – the longer the life span. The heart is a pump, and just like a mechanical device it favors economy of operation, with no jerks, jumps and deviations.

For every organism, age and gender we may determine an HR level for oxygen work. $HR = (220 - \text{body weight}) * 0.85$

The best possible economy of operation is obtained by oxygen work to the value of a level calculated by the above equation, e.g. for a teenage boy with weight of 55kg $HR = (220 - 55) * 0.85 = 145 \text{rpm}$

Proper mobility training starts right after waking up. Here are some tips:

- Get up slowly, so as not to excite the blood circulation too much, do not jump out of bed
- Move around a bit, stretch out like a cat
- After getting up, take a few deep breaths, to oxygenate and expand your chest, reducing pressure on heart and lungs (your lungs will be very grateful to you)
- Do some gymnastics
- Eat a hearty breakfast, rich in carbohydrates, required to give you energy to train.

- There is a theory advising to start a day with a run on an empty stomach, teaching the body to burn fat. I don't stand by it, as a sportsman has little fat to start with and needs all of it for the process of vitamin absorption
- You need to give your stomach some time to digest the food before training
- Classic motblity training involves mixing functional exercises, involving coordination, stretching, dynamic, strength building with increasing intensiveness and relaxing – mainly running
- Functional exercises should raise HR to the oxygen border level, that is, in our example, to $HR = 145$, and relaxing exercises should lower the HR to, e.g., $HR = 110$
- A young person, due to undergoing development, should avoid exercises within oxygen-less zone or even mixed zone
- An adult may enter the oxygen-less zone, above mixed zone, as oxygen-less work improves the brain participation in the training process, improves technique
- Training in elevated mountainous areas, with lesser oxygen concentration, is aimed at teaching the body to absorb it efficiently
- The time of interval training is, for example, 3:1 Or 4:1, or 3:2 minutes, depending on intensiveness
- Training requires controlling the HR and time to achieve optimum effects and not have to utilize other measures in the future, medically and philosophically suspect, such as supplements to improve oxygenation, like Maria Sharapova in tennis or Marit Bjoergen in cross-country skiing
- For increasing improvement in endurance, a longer running training is recommended, based on the same principles, that is heart rate control
- Recording the results across a longer period of time allows for control of training correctness for a given body
- The aim is to increase the heart effectiveness, that is increasing the time of heart operation in the oxygenated phase, so that it can sustain longer strain and return to oxygenated work as fast as possible after exertion, that is increase of HR to mixed or oxygen-less work



*The tennis player's
most important and best
coach is... himself.*

Functional training

Should be appropriately chosen, according to a few simple rules:

- it should impact the whole muscular structure, especially the so-called muscle strips, that is not muscle in isolation, but as a whole complex
- it should emulate the moves from tennis and engage the muscle that takes part in tennis plays
- muscle parts should be trained antagonistically, that is flexors and extensors in parallel
- Muscle should contract and expand in strips, not individually
- Movements should be performed in full range, so as not to shorten the muscle
- Also stretching should not be neglected, so that the muscle doesn't get shortened
- The exercises should increase coordination and nerve conductivity, hand-eye coordination
- Strengthening of joints, tendons and ligaments must be performed slowly and over a relatively long period of time, before more dynamic training is introduced
- Massages should be applied, as they increase the blood circulation and elasticize the fascia, that is the membrane that encircles the muscle, which is subject to many strains

Locomotive training

Warm-up run, also an element of mobility.

Running is a skill:

- Before starting – take care of a balanced, stable position
- In tennis, before the opponent's play – split step for time benefits during launch reaction
- Start in the chosen direction by means of a wide and long step with the fore-leg
- Run on mid-foot
- Strong, proper arm work
- High knees
- Warm-up runs should be performed downhill
- Endurance work should be performed uphill
- Running in tennis is frequent changes in direction
- More important than getting to the incoming ball is returning to starting position
- You should run not only forwards, but also diagonally and backwards

Training periodization

Training must be varied and intensified, for various reasons:

- For building muscle – larger loads and shorter sets
- Proportional “wrapping up” of a player's skeleton with muscle strengthens them, but also builds up a larger reservoir of energy, in form of a carbohydrate reservoir
- For building power – first building muscles and then making them dynamic over time
- For pre-game dynamics, perform quick, repetitive sets
- For getting rid of effects of overtraining, perform light, relaxing workouts and disciplines.

Some of those workouts take months, such as building mass, and must lead to periodical decrease of tennis skills.

Sore muscles

The side-effect of intensive training is muscle acidification, that is production of lactic acid in muscles. Energy in cells (in cytoplasm and mitochondria) comes from break-down of glucose, with oxygen activity: $C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O + \text{Energy}$. Lactic acid results from glucose break-down in muscles without oxygen.

The chemical reaction in this case looks like this: $C_6H_{12}O_6 + 6O_2 \Rightarrow CO_2 + \text{lactic acid without Energy}$.

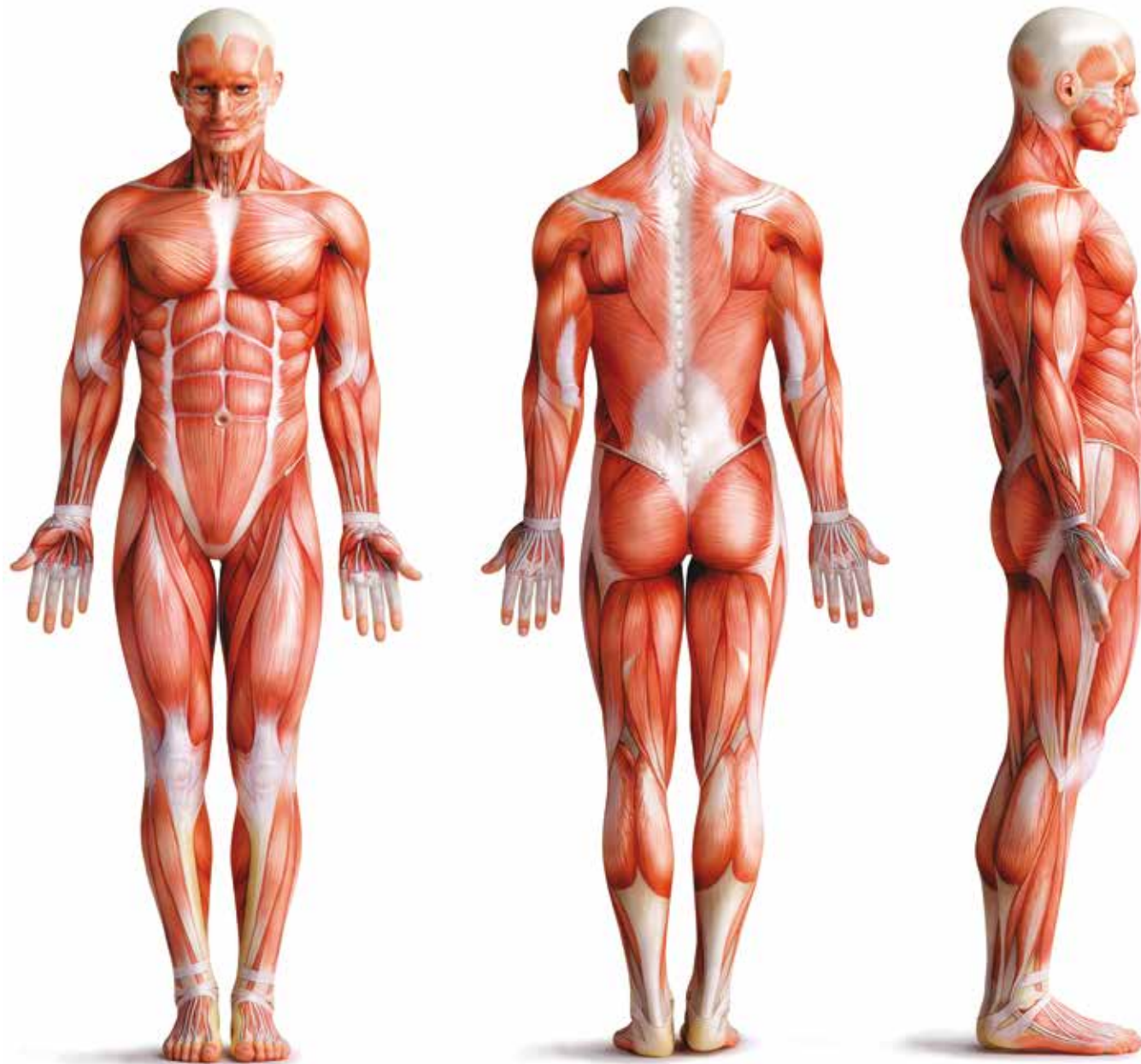
There are two adverse results of this:

- Break-down of glucose gives less energy, only 1/40 compared to oxygenated reaction
- The break-down of lactic acid requires oxygen consumption, but the process does not produce energy

Thus, the level of muscle acidification needs to be minimized. Controls may be performed, using an appropriate apparatus.

How to counteract sore muscles?

- After an intense workout, jog for 10-15 minutes at a slow pace, with oxygen-zone HR of about 110
- Dip in cold water for better circulation afterwards
- Massages
- Eat grapes after a workout



Breathing

An old Chinese wisdom says „Longer breath-longer life“. Breathing is very important for:

- calming down the heart rate
- oxygenation!

A shortened breath doesn't oxygenate or remove CO_2 . Diaphragm plays a large role in carbon dioxide removal.

Proper breathing exercises strengthen the diaphragm, e.g. breathing in and pushing the stomach out at the same time.

Emotions and the nervous system also influence breathing and heart rate. The ability to relax and control emotions in the context of cardio work should also be trained.

Control and measurements

For the proper evaluation of mobility training effects, anthropological measurements and evaluation of stance is also necessary.

A hunched-up tennis player is a too common sight, as this is not fully appreciated. Faulty stance, deformities from wrong foot and leg positioning, lack of corrective shoe inserts are very common.

Medical examinations.

These should be routine. Blood examinations offer loads of information important for a sportsperson, e.g.:

- is there no excess production of bilirubin in the liver, suggesting overload
- does the body not "eat up" proteins and calcium, needed for building muscle and bones, causing deficits

What is the number of red blood cells, responsible for oxygen transportation:

- Is there no excess of toxins
- Is the blood pressure on a proper level
- What is the level of hydration, etc.

Of course, visiting a sports physician is the most important, but it is worth to observe and understand your own body. I think that a tennis player's most important and best coach is ... himself. He should also be his own "foremost physician".

The matters of a sportsman's health are very much up to their diet, which we'll talk about in the next chapter.

