

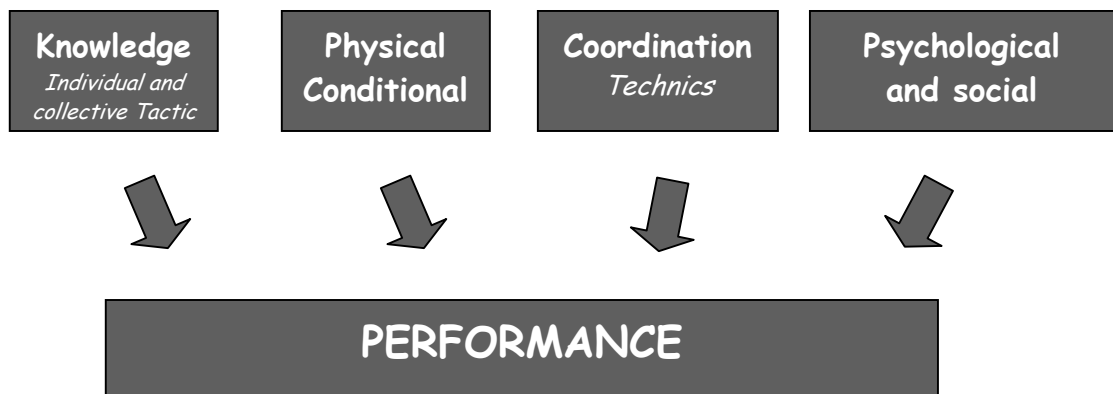


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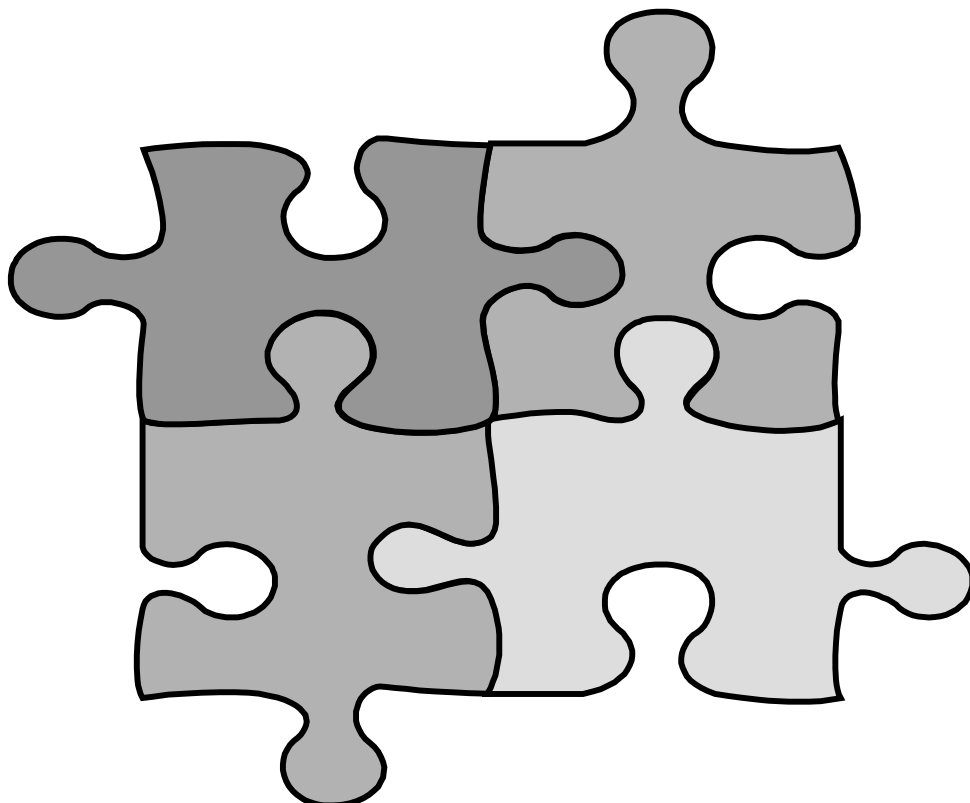
DEVELOPMENT OF PHYSICAL CONDITON
Special attention to strength and endurance

Concept

Classic: Independent factors of Technique and Tactics



Current: Areas of the integrated training that help us to:

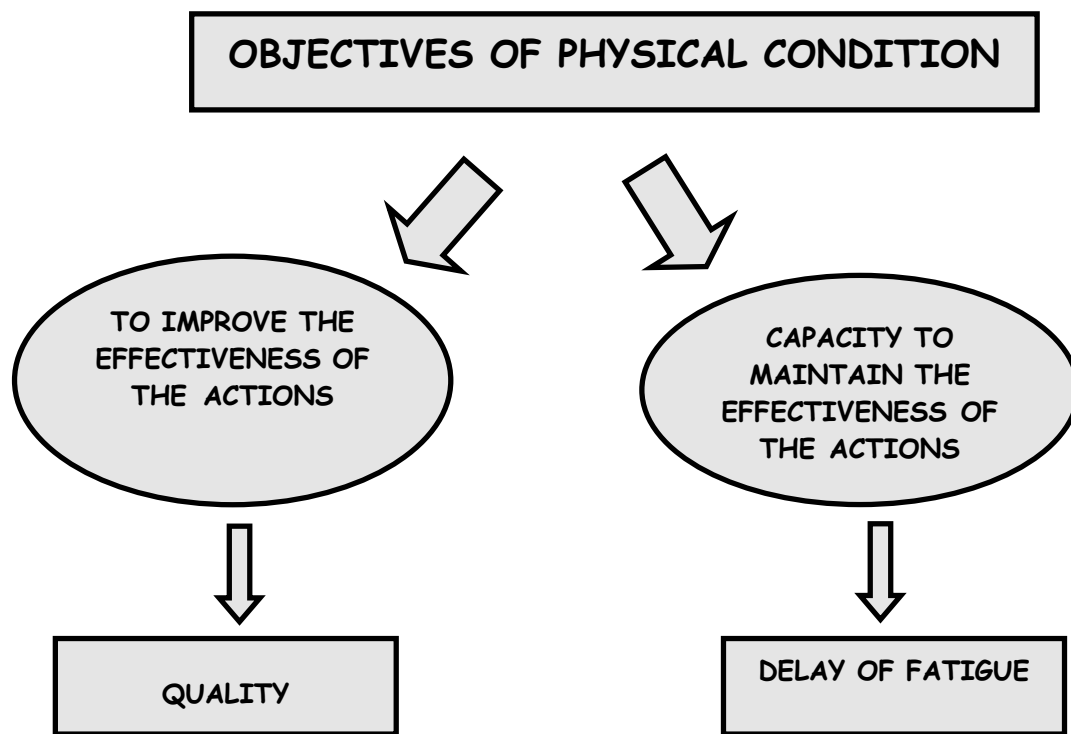




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Objectives of physical condition

- ↳ To improve the effectiveness of the performance characteristics of Handball.
- ↳ To retard the building of fatigue, to maintain the effectiveness for the longest time possible.



The problem is not to be more and more strong, quick or resistant but:

TO PLAY BETTER HANDBALL

According to that we can determine the following operative objectives:

- ↳ To improve the specific actions in handball: jumps, displacements, contacts, etc.
- ↳ To improve the appropriate speed to execute those actions
- ↳ To retard the building of fatigue in the game of handball



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What activities does a Handball player carry out?

We all know that the actions in handball are quite complex. Contrary to other sports, the **environment has a great influence in the development of the game and, even more, it is changing continuously**. That forces the player to adapt all actions according to the situation in each and every moment. Therefore it is very difficult to predict these actions.

In general the classic analyses don't help us too much. They **just show general parameters** such a total distances, relative velocities. We give some example of different studies:

Global distances in handball

Year	Autor	Distance
1991	Latiskevits	5.600 – 6.000 m.
1990	Jewtushenko	6.000 m.
1968	Konzak y Schäcke	4152 m.
(?)	Cappuccini	4.300 m.

Distance covered by the different positions and percentages of used speed

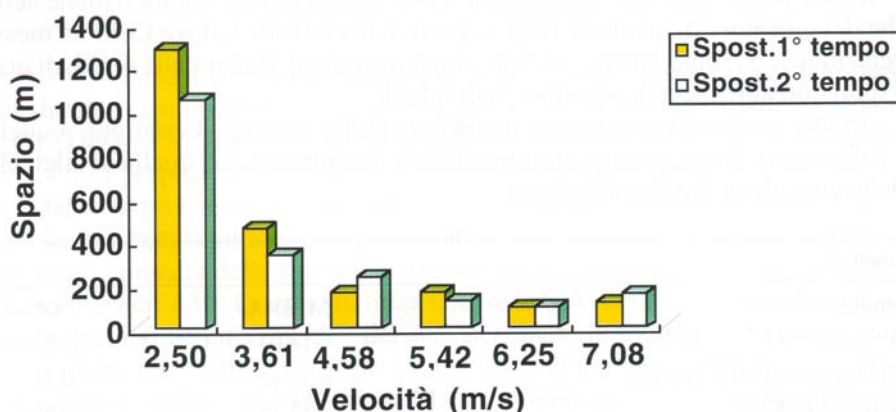
(García Cuesta 1983)

TOTAL DISTANCE						
	Left wing	Right wing	Left back	Right back	Lineplayer	AVERAGE
	3.557 m.	4.083 m.	3.464 m.	2.857	3.531	3.498 m.
PERCENTAGE OF SPEED USED						
SPEED (m/s)	Left wing	Right wing	Left back	Right back	Lineplayer	AVERAGE
0 – 2	78	80	76	82	83	80.4
2 - 4	15	12	17	15	11.5	13.7
4 – 6	3.8	5	4.5	2.3	3.6	3.9
6 - 8	2	1.5	1.5	0.8	1.2	1.4
+ 8	0.9	1.1	0.97	0	0.1	0.6

(Cervar, 1998)



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**Types of actions carried out by a player in a handball match.
(Latiskevits 1991)**

OFFENSE		DEFENSE	
Kind of action	Number	Kind of action	Number
Passes	94-102	Tackles	144-150
Goal shots	8-14	Collective footwork in defense	90-100
Fakes	90	Blocks	20-22

As for the delay of the fatigue it is quite easy to control the load that has been taken: heart rate meters, check systems to control the lactic acid

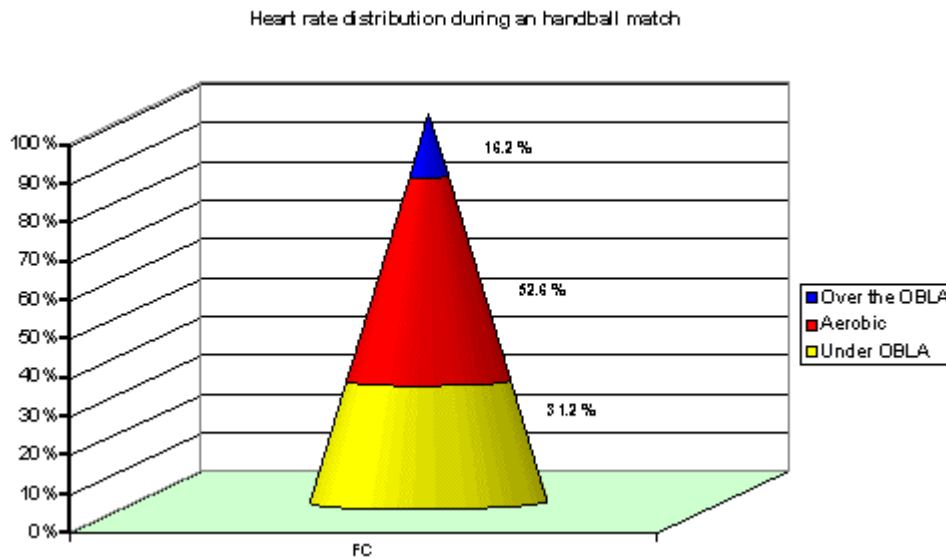
Heart rate of handball players during the game

Year	Autor	Heart rate
1996	Lupo y Seriacopi	145-180
1997	Wallace y Cardinale	170-190
1983	Ignaterra (important games)	170-200
1983	Ignaterra (not important games)	160-180



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Heart frequency expressed as percentage of the FCUA
in handball players during a match.
(Colli et to the one. 1998 in Cervar, 1998)



As we can see, this type of studies don't really explain us important things to understand what happens in a handball game. For example the cadence of different types of velocity and distances, or what happens (kind of actions) between a displacement and the next, etc.

I believe that this should be the focus of future investigations. We should try to **investigate what exactly happens during the competition**. We must not forget that the main **objective of the training is to prepare the players to improve their performance in the competition**.

Right now we are working under the idea of dividing the competition into small units and to analyze these units deeply. Then we try to find out what kind of relationship between all that units can be found.

In any case I am convinced that the only chance at this point in time is to look for a type of research **matching the circumstances that are given in the competition**.



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Manifestation of strength in handball

According to the manifestation of Gonzalez Badillo (1993) we try to define the general objectives of the strength training:

- ⇒ To be able to produce the biggest **useful force**
- ⇒ To develop the maximum force **according to the requirements of the sport or specific action**
- ⇒ The important thing is not to increase the maximum force or any other isolated parameter, but to **improve the specific yield**
- ⇒ To be able to continue producing high levels of power when the reduction speed increases.

We already know concepts of strength, different types etc. So we will focus on in which are the specific requirements in handball and how to improve them.

In a quick revision of the typical actions of our game, we can determine the different manifestations of power necessary for handball. So we need strength:

- For **jumps and displacements**
- For **shooting**
- For **infighting**

For carrying out the work in practice, we won't follow the habitual terminology of using the different types of force (Maximal Force, Explosive Force, etc.) like work rules, but rather we will use an approach, methodologically oriented at the kind of strength required in the competition.

We can distinguish four levels in order to meet the needs of the competition:

- **General Strength** : To establish the base or the support
- **Directed Strength**: First approach to the elements of the game:





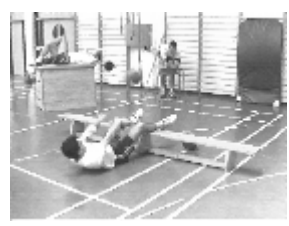






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- ➔ **Specific Strength:** Typical activities of handball under high load
- ➔ **Strength of Competition:** Characteristic handball elements under match-alike conditions.

The combination of the different manifestations with the methodological approach, will give us the elements to develop in the practice the necessary strength in Handball.

In the next graphic we will see a series of examples of each one of the mentioned elements:

	JUMP AND DISPLACEMENTS	SHOOTING	FIGHTS
GENERAL	 <p style="text-align: center;">Manabres squat</p>	 <p style="text-align: center;">Full over</p>	 <p style="text-align: center;">2 tiempos</p>
DIRECTED	 <p style="text-align: center;">Multisaltos</p>	 <p style="text-align: center;">Full over</p>	 <p style="text-align: center;">Rosquillas</p>
SPECIFIC	 <p style="text-align: center;">Multisaltos</p>	 <p style="text-align: center;">Full over</p>	 <p style="text-align: center;">3 simulados con sobrecarga</p>
COMPETITION	All kind of exercises specific for handball		



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We can find authors who establish three single phases of the approach. Although in the practical work it is almost identical.

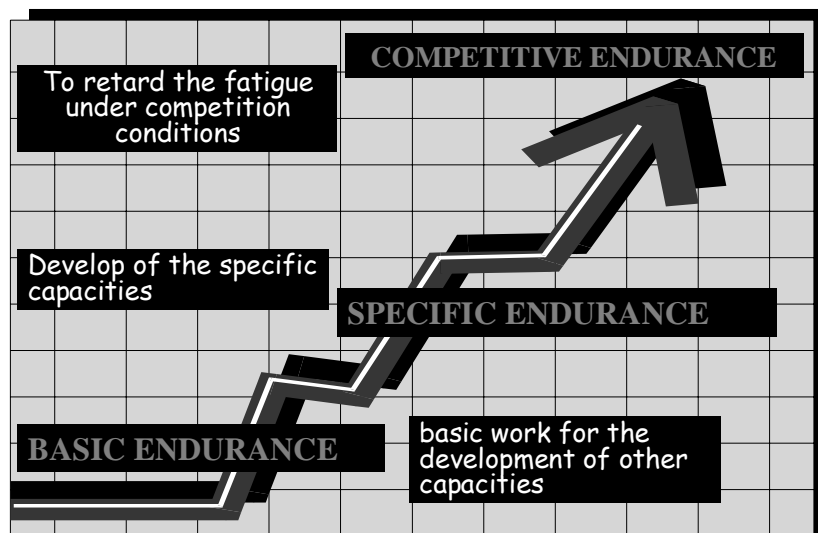
We can develop 2 or 3 types of strength in each session, depending on the phase of the preparation we are in.

We will see some video as demonstration.

How to develop the endurance in handball

kind of endurance work in sport team specialty

(Navarro 1993)



Now we analyze the characteristics of endurance necessary in handball and the methods to develop every single one.

Basic endurance: (Method: Continuous variable)

- Specific actions of handball: displacements, jumps, launchings, technical individual tactics.
- Heart rate between 130 and 180
- Low Intensity and variable. Short pause, or without pause
- Approach to the matches blocks (2*36). Recommended blocks of 12', to maintain the adapted intensity.



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We will show an example

Specific endurance: (Method: Half Extensive Interval 60"-90")

- ↳ Different actions alike to the Handball
- ↳ Pulsations in the threshold anaerobic (170-180)
- ↳ Variable high half Intensity. Pauses of low activity 20" 30"
- ↳ Same idea of match-alike approach blocks

The physical - technical circuit represents an example

Endurance of competition (Method: competition rhythm)

- ↳ Use of collective tactical elements. (2:2,... 6:6), fundamentally related with our tactical system, but always maintaining a high rhythm.
- ↳ Two blocks of work of 32' - 35' with 7' - 8' of active break
- ↳ Superior efforts than those of the competition
- ↳ Picks of 8" - 10" of maximum intensity
- ↳ To manage methodological resources to maintain the work rhythm, especially in the game 6:6.

An experience of evaluation of the training based on the control of the heart rate (Sánchez 1993)

POSITION OF THE WORK AND METHOD USED

There was a long time that we did this kind of trainings, those that we called rhythm-competition. The problem was to know the real work that our players were executing.

For that reason we tried to carry out an experiment. We decided to compare the registrations of the heart rate of our players in friendly matches and in the rhythm-competition trainings.

We decided to do the experiment with four players. For picking them we kept in mind the tests of maximum effort that we had carried out frequently. We decided to pick one player that reached the nº of pulsations higher, the lower one and two that coincided just in the middle.

A group of officials took the data, on one hand in 4 trainings and on another in 3 friendly parties.

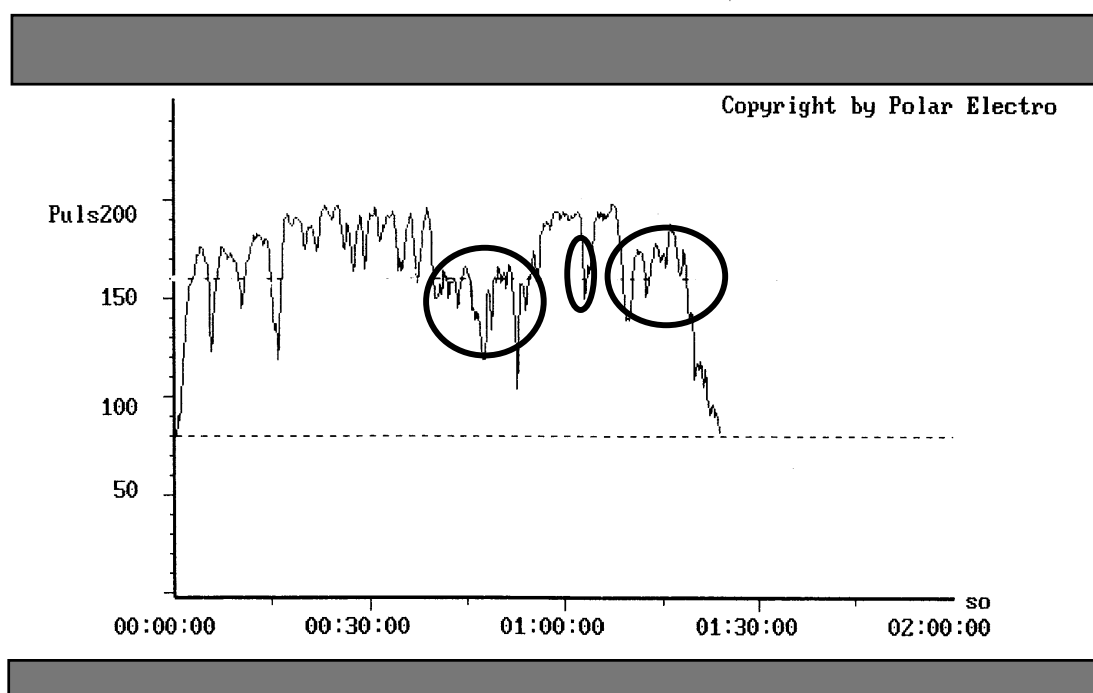


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OBTAINED RESULTS

To the margin of the data that interested us for our experience, we have to point out that the study of the curves of the heart rate, provided us with many references that helped us to evaluate the work developed for the players during the training and the relationship with our previous planning of the training.

TRAINING player number 2



To establish a comparison more real possible, we used the possibilities of statistical study that was offered to us by the software of Polar-4000. We did the following processing of the data:

⇒ We fixed a general cluster of trainings and of matches. We used only the real work, eliminating the superfluous.



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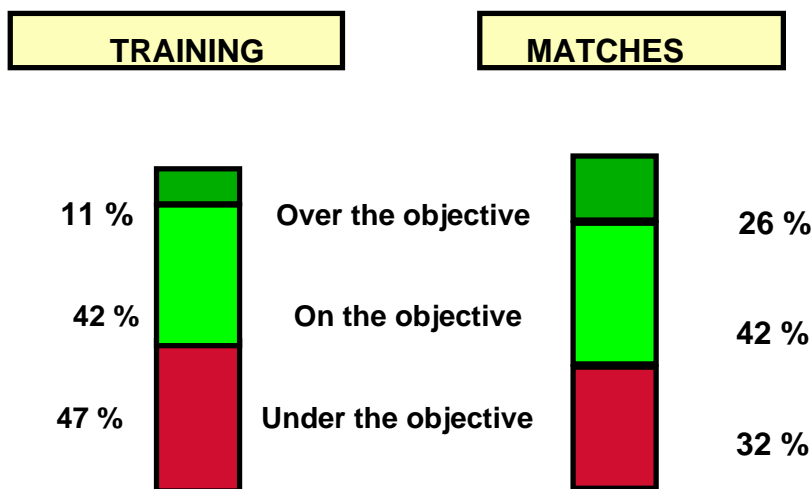
⇒ Accepting that handball, in terms of energy supply, is a threshold sport, we established, just for reference, the stocking of the threshold anaerobic of our team (172 in that moment) and we fixed a work objective that had a slight oscillation up and down. The fringe settled down in 165-180 pulse exactly.

The final result is shown in the two graphs in the following:

Comparison graphics of the final results

- Only real times of working

- Objective fixed between 165 - 180 heart rate



CONCLUSIONS

The previous simple observation of the graphics takes us to the conclusion that we have not been able to mimic in the training the conditions that are given in the competition. The intensity has been approximately 15% higher in the matches than in the rhythm-competition trainings.

In spite of trying by all possible means to maintain a very high rhythm in the trainings, we have verified that the competition, even a friendly



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match, has variables that do differ a lot from what we try to reproduce in training sessions.

Anyway we evaluate the experiment very positively, since it has allowed us to carry out a control of effectiveness of a kind of training difficult to execute under regular conditions.

Recommendations to reduce the incompatibility of the work of strength and endurance (Gonzalez Badillo 1993)

- Not to create coincidence in the same phase of a cycle between the hypertrophy training with that of resistance against maximum metabolic stress.
- Preferably, not to take drills of 8-10 repetitions for series with the character of maximum effort at any moment
- To create coincidence within a cycle, between training sessions of aerobic endurance up to the threshold and training sessions of power with 6-8 repetitions per series. But with a character of the load them preferably half of the maximum or even somewhat higher, but never up to the maximum.
- When the metabolic stress in the resistance training is high (above the anaerobic threshold), the training of force should not be more than 2-4 repetitions per series, the character of the load ends up being high, but not the maximum.
- To reduce the number of sessions of force and the number of repetitions of the series when the resistance training inclines to go to maximum demand.
- To separate the sessions of training of force and of resistance as much as possible when they are done on the same day. And, if it is possible, to carry them out on different days.