

# PLIOMETRIC TRAINING

One of the methods most used in training to improve power is the so-called plyometric method, in which different types of jumps or throws are used to improve the explosive force in the desired movement patterns.

It is defined as a fast and powerful movement that uses the CEA (shortening-stretching cycle). The CEA is defined as rapid eccentric contraction (the muscle is stretching), followed immediately by a rapid concentric muscle contraction (the muscle contracts), which are coordinated in a specific time of action that allows to take advantage of the muscular elastic capacity in The concentric phase of the movement (allows you to jump more, throw more ...).

## **What can plyometry bring us?**

### Plyometric training improves:

- All the neuromuscular processes linked to the development of the force
- Muscle power.
- Our elastic energy
- Mechanical efficiency
- The ability to tolerate the highest stretching load
- All the neuromuscular processes linked to the development of the force
- Facilitates the action of inhibitory and conductive mechanisms of muscle contraction

### Performance benefits of plyometric training:

- Increases explosive strength by improving the force production gradient (RFD). It allows to apply greater force and faster.
- Increases reactive force by increasing the storage and reuse of elastic energy.
- Increases force transfer through joints and minimizes energy losses. By improving the posture by performing these exercises, we improve the balance, and by improving the balance we can produce more strength.

### Benefits of plyometric training in prevention of sport injuries:

It reduces the risk of injury thanks to a greater tolerance in the eccentric phase, at different speeds, loads and directions. Most injuries occur during unexpected landings and decelerations. Many of these injuries occur when the athlete is in a situation where he does not have a robust motor response.

Including plyometrics exercises in the routine of training runners could make the difference. This type of exercises, designed to reproduce fast, explosive and powerful movements, significantly improve the performance of the runners. It is a resistance and strength training at the same time. In addition, they are easy to perform and do not require any installation or equipment.

The plyometrics not only improves strength and speed, helping the body to obtain maximum strength in the shortest time possible, but also help improve the technique of running and even prevent injuries

But beware, these exercises are only for athletes who already have a solid training base. Since these are exercises that require explosive and rapid movements of the body, they could injure the muscles if they are not trained.

### Science confirms its benefits for runners

The plyometric exercises are based on jumps of all types: with one foot or both, rebounds, rocking and rapid horizontal and vertical displacements. First you prepare yourself, squatting lightly to, explosively and quickly, stretch your muscles later.

The Journal of Sports Science and Medicine conducted several studies over 6 weeks on a group of runners to corroborate their effectiveness; To verify how this group of athletes obtained more strength, agility and speed, in addition to being less prone to injuries than another group of similar runners who did not perform the exercises.

"There is a simple mechanical explanation about the effectiveness of these exercises. The movement charges and accumulates energy in the muscle, which serves to prompt us to perform the contraction, "the researchers determined.

One of the keys to correctly performing these exercises is the way we fall on the ground, the so-called landing phase, which should be performed smoothly and with the foot part of the foot, never with the heel, flexing the knees To better absorb the impact and to be able to re-boot faster. In addition, you must perform the plyometric exercises only once a week.

### A different classification:

Within this method we have different types of jumps and pitches that all produce an improvement in the force-velocity curve. But the "crux" of the question is how to use different types of jumps to improve a particular movement pattern. We must take into account the following components:

- Type of movement: refers to the type of jump that we will use based on the dominant movement patterns in the training that is performed that day.
- Direction of movement: based on the predominant vectors of the action that goes to work in the training.
- Initiation: will be based on the type of contraction prevailing in the session.

### **Types of movements:**

Hispanic terminology does not clearly classify different types of leaps, so we will use American terminology, much easier to understand:

- Jump: jump with 2 feet, followed by a landing with both feet.
- Bound: jump with one foot and land with the other.
- Hop: jump and land with the same foot.

### **Direction of movement:**

- Linear: includes linear-vertical (predominantly the vertical component), and linear-horizontal (predominantly the horizontal component predominates)
- Lateral: just as before we have lateral-horizontal and lateral-vertical
- Rotational: includes rotational-vertical and rotational-horizontal

### **Type of initiation:**

- No counter-movement: there is no eccentric phase of pre-jump movement, ie there is only concentric phase.
- With counter-movement: there is a rapid eccentric phase followed by rapid concentric muscle contraction (CEA).
- Double contact: before each jump there is a short and quick contact in the ground (small jump).
- Continuous: successive jumps are chained.

- Drop / depth jum or depth jumps: the eccentric phase is increased because the subject falls from a height, followed by the jump.

As we see this classification allows plyometric training to be more specific (principle of specificity), since if for example, we are going to perform an acceleration session, predominantly linear, a lot of thrust phase (predominantly concentric) and the most predominant vector is Horizontal, we will choose:

- Movements: jump, bound, hop.
- Direction: vertical and horizontal linear.
- Initiation: without counter-movement, double contact.

In this way we will direct all our efforts in improving the specific pattern, in this case, of the acceleration.

### **General guide to programming:**

- Movements: (Jump, bound, hop). From more stable to less stable.
- Direction: (Linear, lateral, rotational). From general to specific (from vertical to rotational).
- Initiation: (SCM, CM, DC, CONT, DJ). From lowest to highest strength.
- Equipment: (Low drawers, floor, vanity, high drawers). From lowest to highest strength.

It is recommended to perform the jumps at the highest possible intensity, ie, always trying to jump as high as possible, so the hopping volumes that are usually programmed are not very high a priori (40-60 jumps per session 2 times per week , Compared to 100-120 of other methodologies), but because the intensity is maximum the objective is met.

For the development of a contraction it is important the joint action of the elastic and contractile components of the muscles, which facilitate and allow the development of this type of gestures. The hallmark of plyometrics is found in the rapid succession produced by a stretch and subsequent muscle contraction, thus taking advantage of the ability of the muscles to generate energy thanks to the exaggerated action of the stretching and shortening cycle, A great resource for working force to its full potential.

The stretch generates a potential energy of elastic type, which is able to become kinetic energy when contraction occurs and its consequent muscle shortening. And not only that, also activates the myotatic reflex, defense mechanism that avoids injuries and that we use to our advantage in certain activities, as in a sprint.

Its function is to send a signal to the nervous system so that the contraction of a muscle takes place and the relaxation of its antagonist. These types of movements are very common in a large number of sports and sports gestures, as they appear in jumps, kicks and throws.

The plyometry generates adaptations faster than any other system or training method and that is another advantage to take into account to include these types of exercises within our routines.

According to studies conducted from the Australian Institute of Sport, including plyometric exercises in our training sessions can achieve an improvement in career economics, something very interesting for runners.

### **Tips:**

01.- Take caution and carry a progression of charge depending on your physical condition, starting from lower to higher demand as you progress.

02.- Choose the surface well. It is convenient that the soil is neither too hard nor too soft.

03.- Take care of technique. It is not just a matter of jumping "to infinity and beyond", but to do it well. More important than the height of the drawer, step or cliff from which we intend to jump, is to follow an evolution within the training itself. We can not start with the most demanding exercises, we need preparation and practice.

04.- Plyometric training should be a complement to our preparation. It is a great resource and will help us to improve our level of form, but not the only one. In fact, the secret to their success lies in a good combination. The most attractive way to combine our plyometric training can be to join it to routines of marked eccentric tendency, achieving a session of high quality, functional and with great results.

05.- We should not perform more than 3 plyometrics a week, even if we are professional athletes, this type of routines can overload our muscular system and lose its benefits.

06.- Being high intensity actions it is advisable to take full or almost complete breaks, around 3 minutes, that allow us to recover and access the next series with guarantees. If you are skilled or your level of fitness allows you, you can shorten the rest periods and thus adapt your body to similar loads in a future competition or training, but it is not recommended in untrained people.

If you are a runner, a good workout can be to combine eccentric work (downhill, for example) with the work of jumping fences, explosive actions of upper train (explosive push-ups), etc. You can also benefit from work in the gym, using the pulleys or tires to help transfer the power of legs to the track or asphalt.

## **To train!**

Traditionally, plyometrics has been directed to working the lower train through jumps to raised surfaces or upside down. Exercises of high explosive load intended to improve the power of athletes, with the intention of achieving an improvement in sports performance. Today we present plyometric exercises also for the upper train, that is, you can complete a session with explosive exercises, which will work your whole body. If you lack reasons to work in this sense, here are some other justification more.



When we use plyometric exercises we achieve a gain of strength, both qualitative and quantitative. In addition, we improve the speed in the process of muscle contraction and generate proprioceptive benefits. And even more, we increase the ranges of joint mobility due to the elongation processes that occur in this type of training and thus improve the technical quality of our motor gestures.

In plyometric training, body weight is usually used as a load (although we can also add external loads). So how can we control the intensity of the load? Very simple, you can regulate the work intensity according to the height of the difficulty of the jumps or the number of repetitions.

## **Intensisty of the heels**

According to our experience, level of form and objectives:

Beginner or low intensity: simple jumps that make save small obstacles, inferior to a height of about 20 cm.

Medium level: multiple jumps, but with little displacement between jumps, or jumps from a height of between 20 and 40 cm.

Expert level: multiple jumps involving wide displacements between them, or jumps from heights between 50 and 80 cm. Also included in this range are exercises with external load (light or moderate). This is the recommended height for working the explosive force and the responsiveness of the neuromuscular system. Also, if you want to work the maximum force, you'll have to go to surfaces that are around the height meter (something destined to highly qualified people).

However, these types of jobs are quite demanding and impact on joints and muscles in a significant way. It has been shown that the difference in increase in yield obtained between heights of 50 to 80 cm in a training program was not so important as to risk choosing the highest height and running a higher risk of injury. Keep this in mind before selecting heights and workload. If you choose this level, it is best not to exceed 40 jumps.



We can resort to the classic method of series and repetitions. In that case, a session could consist of about 5-10 repetitions per 3-5 sets of each exercise. If we do so, the load level is measured by the previous parameter. If we choose to design our session based on the repetitions or actions performed, these are the parameters that you should keep in mind:

Initial level session: between 50 and 75 actions / jumps

Mid-level session: between 75 and 100 actions / jumps

High level session: from 100 to 150 shares

Pro Session: 150 to 200 actions

For these sessions, the height or intensity of the jumps should be slight or moderate. It is not convenient to select an expert level, with heights of 50 to 80 cm and perform 150 actions, since, we can suffer overloads and instead of gaining potential, lose it due to an injury.

The time to stop the session will be when we lose the technique, we find ourselves tired to reach the determined height or, when we perform the second jump we notice that we have lost momentum, thus losing height.

### **Example exercises:**

#### Plyometrics for the abdomen

In this case the work will go to the muscles of the rectum. The dynamic work produced by the jump will help us to improve our strength and balance in unexpected situations. If you introduce the flex you will get a tremendously interesting and very complete exercise.

#### Plyometric flexions: the classic ones

Slapped push-ups could not be missed. If you are not yet ready, use high support. The momentum is key to achieving a good take-off. Thanks to this you will gain power and strength.

### Pneumatic push-ups with fitball

Firmly holding the ball and the position of the hands will significantly activate the entire musculature of the abdomen. In addition, the position of the body involves all the core and triceps, resulting a very complete exercise.



### Plyometric height bends

Use the steps to perform one of the most complete plyometric exercises. Vary the height depending on your fitness status. Remember to accompany with the hip the gesture to facilitate the impulse

### **Nine exercises to get more power and improve the effectiveness of the race**

Always counting on the supervision of a professional, you can do these exercises before starting your normal workout routine. Start with 10 to 12 repetitions of each exercise, although the number of repetitions depends on your fitness. If you begin to feel very heavy legs, stop. Even when you have not reached the number you proposed. On the contrary, if you notice that you can do more, you can raise the number up to 15, but not more.

01.- Standing, on one leg, take the other back, supporting the foot on a bench. Crouch slowly on the leg you hold on the ground. Retrieve the position as fast as you can.

02.- Stand, with your feet together, squat slightly and jump vertically explosively. Use a couple of seconds between leaps to stabilize.

03.- Do skipping with one leg, raising the knee as high as you can. You do not have to progress forward, but jump high, up.

04.- Standing, with your feet a short distance from each other, jump vertically, using only your ankles. Do not push yourself by bending your knees or your hips.

05.- Stand, crouch slightly and jump forward as far as you can, as in long jump. As soon as you land, I start pushing you back, staying as little time as possible in contact with the ground, as if it burned.

06.- With your hands on a railing that has a height of about 70 centimeters, jump propelling you with the tips of the feet, raising the knees and touching with the sole of the slippers the top of the rail.

07.- As if you were performing a continuous sprint, I went up stairs in step, as fast as you can.

08.- In front of a bench or a drawer of about 40 centimeters in height, crouch slightly and jump explosively with both feet at a time on the bench. Jump back and go back up to the bank as fast as you can.

09.- Jump from a bank. Raised on a bench, let yourself fall by bending your knees on the "pads" (just before the toes start) of the foot, not on the heel. As soon as you hit the ground, jump up again, to take off as high as you can.



Your physical form will be the one that tells you the speed at which you must perform each exercise.