



Patient and family
education guidelines

REHABILITATION AFTER MYOCARDIAL INFARCTION

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Myocardial infarction is a disease that affects the heart when one or more coronary arteries become closed.

The coronary arteries carry oxygenated and nutrient-rich blood to the heart. When there is a sudden occlusion of an artery, the blood cannot reach a part of the heart muscle, called myocardium, consequently there is ischemia and a part of the heart will become necrotic.

WHY ARE THE CORONARY ARTERIES OCCLUDED? Coronary arteries become occluded for various reasons which can be traced back to **CARDIOVASCULAR RISK FACTORS**.

Have you ever heard of it? Has your doctor already told you that you need to change your lifestyle? Are you aware of the need to reduce your cardiovascular risk?

Leading a healthy lifestyle and avoiding these risk factors means significantly reducing the possibility of suffering from a myocardial infarction.



What are the immutable risk factors?

Over the years it is inevitable that the heart and the circulatory system undergo progressive deterioration and aging. The walls of the heart lose elasticity favoring the formation of atherosclerotic plaques. The risk of coronary heart disease increases with age: men are considered to be at risk over the age of 55, women over 65.

Gender

Women have a lower cardiovascular risk than men of the same age, thanks to the beneficial effects exerted on the cardiovascular system by the hormone estrogen. With menopause, protection is progressively reduced and towards the age of 75, mortality is similar in both sexes:

- cardiovascular diseases are the most frequent diseases in women;
- 40% of female deaths are due to heart attack and stroke;

- far more women die from cardiovascular disease than from all cancers combined, including breast cancer;
- the lengthening of life expectancy leads cardiovascular diseases to represent an emergency for women's health.

Family history

There is a genetic predisposition for which, other environmental conditions being equal, some persons are at greater risk of developing coronary atherosclerosis than others.

In particular, the weight of family history should not be ignored when there is a history of myocardial infarction or sudden death before the age of 55 in the father or in male relatives, or before the age of 65 in the mother or in female first-degree relatives.

What are modifiable risk factors?

Smoking

Smoking causes a series of extremely heavy damages to the heart and arteries, especially over time. It causes the number of heartbeats to increase, inducing tachycardia and an increase in blood pressure, thus causing the onset of a real hypertensive state. The heart is, in fact, forced to work harder and runs the risk of "wearing out". It decreases the amount of oxygen in the blood inside the arteries, prompting a greater demand from the peripheral tissues. The effort endured by the heart is thus always greater while the blood arriving from the coronary arteries decreases. This mechanism affects the resistance of the myocardium over the years.

Nicotine favors the narrowing of the arterial caliber and modifies the normal component of fats in the blood.

Hypertension

When blood pressure gets too high and stays that way over time, it can damage arteries and delicate organs, such as the kidneys, heart, brain, and eyes. In addition, high blood pressure can overwork the heart and lead to heart changes such as hypertrophy ("hardening of the walls").

When this happens, it is easier for fat and cholesterol to settle in the arteries, eventually blocking them.

Each 5-10 mmHg increase in diastolic blood pressure is associated with an increased risk of stroke by 40% and heart attacks by about 25%.

Blood pressure is expressed as a pair of values: systolic pressure (the "maximum") and diastolic pressure (the "minimum"). The value is usually expressed as maximum pressure/minimum pressure (for example "130/80" or 130 on 80 millimeters of mercury or mmHg).

Dyslipidemias

Hypercholesterolemia (high cholesterol levels) is one of the most common conditions affecting people of any age. It consists of a higher than normal level of cholesterol in the blood. It is a very common condition affecting millions of people around the world. It is a general rule that a cholesterol level above 200 mg/dl increases the risk of heart disease, although nowadays there is a tendency to also consider the lipid subfractions (LDL cholesterol also called "bad", HDL cholesterol called "good") and triglycerides.

Diabetes mellitus

Diabetes is a metabolic pathology which is characterized by a high level of glucose, of "sugars", in the blood (fasting glucose greater than 126 mg/dl).

The normal value of fasting glucose should be less than 110 mg/dl.

Obesity

It is associated with an increased risk of coronary artery disease, as well as numerous other harmful health conditions.

How does myocardial infarction manifest itself?

The most common symptom of myocardial infarction is chest pain which can also radiate to the left arm or both arms, jaw, neck, shoulders. It can be associated with:

- nausea and/or vomiting,
- sweating,
- difficulty breathing,
- sense of anguish.

NB : These symptoms can occur all together or more often only partially.

There are cases in which some patients, usually diabetics, may have an asymptomatic myocardial infarction, i.e. without the presence of any specific symptoms. So if you are diabetic you have to pay attention to even mild signs and symptoms; In your case, the symptoms may be mild or none at all.



[Sites of chest pain]

HOW SHOULD YOU BEHAVE IN THE EVENT OF MYOCARDIAL INFARCTION?

When oppressive, burning pain in the chest occurs, usually broad and not limited to the tip of a finger, which does not change with

breathing or movement and is thought to be of cardiac origin, it is necessary to take (if available) a nitroglycerin tablet and wait for the pain to disappear, preferably lying down. If after 3-5 minutes the pain has not disappeared, it is necessary to take a second tablet. If the pain has not gone within 3-5 minutes and 6-10 minutes have passed since the pain started, please [call the emergency number 112.](#)



PS: Time is precious, the sooner you arrive at the hospital, the sooner you are given therapies to reduce heart damage; do not put your life at risk by waiting for the arrival of some relative or even worse by driving your own car to reach the hospital. The safest method is to call the emergency number 112; only the health personnel alerted by your call to the emergency number 112 are able to intervene with professionalism and competence and to prevent the situation from worsening.

WHAT HAPPENS IN THE HOSPITAL?

You went to the emergency room for chest pain radiating to the arms and throat, the electrocardiogram (ECG) showed that there was a heart attack. You have most likely been transferred to the Cardiac Intensive Care Unit (Coronary Unit) and they have offered you to perform coronary angiography as quickly as possible. The examination showed that there was an obstructed coronary artery, therefore thanks to the use of a balloon (inflated and deflated repeatedly), the staff of the hemodynamics room reopened the

coronary artery by compressing the plaque against the wall (angioplasty) and by applying a small metal mesh (stent).

Angioplasty is a procedure used to reopen blocked arteries, by compressing the plaque on the walls. After local anesthesia, a balloon catheter is inserted through an artery in the groin (femoral artery) or arm (radial artery). The catheter is then pushed into the blocked artery of the heart. The balloon is repeatedly inflated and deflated in order to compress the plaque against the walls, reopen the artery, and restore blood flow. Once the balloon has deflated, the stent can be positioned inside the artery: a small metallic mesh (made of steel, nickel, titanium, etc.) which is dilated and adheres to the internal edges of the coronary artery and reduces the probability of a new obstruction at that point.

If this procedure is performed from the femoral artery, it is necessary to stay in bed for 24 hours until the compression bandage is removed from the groin. If the procedure is performed from an artery in the arm, you can get up earlier, but your doctor will tell you when.

The doctor has allowed you to mobilize, at this point a physiotherapist from the Cardiology Department will take care of you and offer you some active exercises by checking your vital parameters. If you experience chest pain, difficulty breathing (dyspnoea), dizziness or just tiredness during these exercises, talk to your physiotherapist. The purpose of this treatment is to recover both cardiac and global functional capacity as soon as possible so that you can be discharged from hospital safely, but early.

Patient rehabilitation is considered therapy in all respects as much as pharmacological therapy; for this reason it is started as early as possible, compatibly with the clinical situation.

During hospitalization it is essential to investigate the heart through various tests with the aim of assessing the extent of the heart damage and the presence of residual problems.

The most common tests and procedures are:

- **ELECTROCARDIOGRAM (ECG)**: it records the electrical impulses of your heart at rest. It may show no alteration outside of pain and rarely be negative even during pain;
- **ECHOCARDIOGRAM AT REST**: it detects the shape and movement of the heart muscle, uses ultrasounds that are not harmful and can be repeated even after a short time;
- **DYNAMIC ELECTROCARDIOGRAM ACCORDING TO HOLTER**: the recording of the electrocardiogram for 24/48/72 hours allows to highlight silent ischemic alterations (i.e. in the absence of pain) of the electrocardiogram, it also allows to record arrhythmias (both ventricular and supraventricular) often present in the first hours after a heart attack;
- **CHEST RADIOGRAPHY**: it is used to evaluate the volume of the heart and its profile, the lungs, the pleurae, the aorta;
- **STRESS TEST**: measures the heart's response to effort and can also highlight the existence of coronary artery obstructions by means of electrocardiogram changes during effort performed on an exercise bike or on a treadmill;
- **STRESS ECHOCARDIOGRAM**: it is performed while you make a physical effort or in some cases the effort is simulated using some medicines allowing you to highlight if your heart pumps regularly during physical effort;
- **MYOCARDIAL SCINTIGRAPHY**: it can highlight coronary artery disease. A radioactive liquid (thallium or technetium) is injected into a vein while you are at rest or while your heart is under strain by injecting medicines that increase the heart rate. The liquid is temporarily absorbed by the heart muscle and allows a photographic scanning device to acquire some images of your heart in order to verify its perfusion;
- **ANGIOGRAPHY (CORONOGRAPHY)**: it allows to identify possible blockages of the coronary arteries. A long, thin tube called a catheter is introduced into an artery in the groin or arm

and advanced to the heart. A special contrast agent (radio-opaque substance) is then injected through the catheter into the heart. In this way, X-rays can provide images of the inside of the heart and coronary arteries.

- If the haemodynamic doctor finds an obstruction to a single coronary artery, s/he can proceed to dilate it by inflating a balloon placed at the end of the catheter and to place, if s/he deems it useful, a small metal mesh (steel, nickel, titanium, etc. ...) called a stent, so as to reduce the probability of a new obstruction at that point. This procedure is universally known as **CORONARY ANGIOPLASTY**.
- **CORONARY AORTERY BYPASS SURGERY**: if the coronary angiography has highlighted a critical coronary disease of several coronary arteries, surgery with by-pass may be offered to you. It is a surgery that is performed under general anesthesia and involves a sternotomy; it is used to create a new path for blood to flow around the clogged arteries of your heart. A piece of blood vessel from the leg (vein) or chest (artery) is attached below the blocked coronary artery. Using the new route, blood can easily reach the heart and shunt around the blocked part of the artery.

WHAT HAPPENS AFTER INFARCTION?



IT'S TIME TO GO HOME!

You have received the **HOSPITAL DISCHARGE LETTER** where you will find your medical history, performed tests, suggestions on lifestyle and food, prescribed pharmacological therapy, the referral clinic and follow-up program.

THE FIRST MONTH AFTER THE INFARCTION is a period of convalescence and for this reason the complete recovery of the various activities of daily life should be postponed after this period. During this month it is advisable to gradually increase physical activity and perform the simple exercises described below and recommended after discharge from hospital, at least until you enter the rehabilitation phase of effort training, so as to allow you to return to your former life.

FOR THIS PURPOSE IT IS INDICATED TO CARRY OUT THE FOLLOWING EXERCISES EVERY DAY.

WHEN?

It is recommended to perform the exercises away from meals and wait at least 2 hours after lunch or dinner.

HOW LONG?

It may be sufficient to perform a cycle of exercises, it is implied that the cycle can be repeated or integrated with a brisk walk.

WHEN TO STOP?

There may be signs that it is necessary to suspend the exercises. These signals are:

- chest pain resembling pain felt at the time of hospitalization, although much milder
- difficult breathing
- dizziness or lightheadedness
- nausea
- severe fatigue
- too fast or irregular heartbeat

WHAT TO DO BEFORE STARTING?

Before starting the exercises it is advisable to check heart rate and blood pressure.

HOW TO CHECK YOUR HEART RATE?

Different methods can be used, it is up to you to choose the one you like the most:

- a) by placing the tip of the index and middle finger of the right hand on the left wrist at the base of the thumb, one can feel the pulsations which are the reflection of the contractions of the heart and count the number of beats in one minute.
- b) gently place the tip of the index and middle finger of the right hand on the neck on the right or left side of the "Adam's apple", feel the heartbeat and count the number of beats in one minute.
- c) place the palm of the hand on the chest at heart level, feel the heartbeat and count the number of beats in one minute.

The normal resting heart rate can range from 55 to 90 beats per minute.

NB: During physical activity it is advisable not to exceed the initial heart rate by 30 beats per minute, nor to decrease by 10.

If this happens it is advisable to stop and rest, to resume only after the heart rate has dropped to the initial values.

HOW TO CHECK YOUR BLOOD PRESSURE?

It is necessary to have a device called a sphygmomanometer in order to check blood pressure.

There are different types of appliance for sale and they are very simple to use, often it is enough to wrap the arm with a sleeve and press the start button; it is sufficient to follow the instructions of the manufacturer. Normal blood pressure values should be below 140/90 millimeters of mercury, 130/80 if you are diabetic. If you exceed this threshold you are hypertensive.

HOME EXERCISES AFTER DISCHARGE FROM HOSPITAL



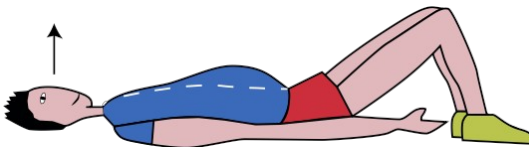
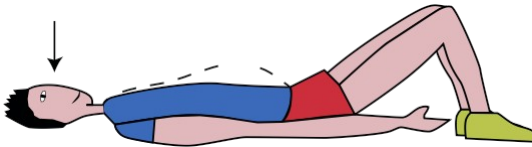
Before starting the exercises check your heart rate and possibly blood pressure and write them down.

Lying position
arms at sides and knees bent

Exercise No. 1

Inhale through the nose by inflating the belly and blow the air through the mouth by deflating the belly. To feel the movement in the abdomen, it may be useful to place a hand at belly level. The chest should not move and in order to check this, place the other hand over the ribs and be careful that it does not move.

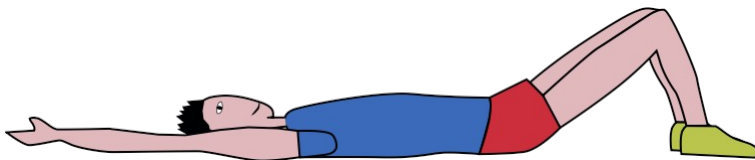
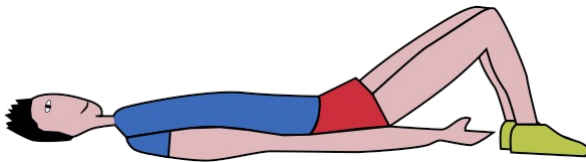
Repeat 10 times



Exercise No. 2

Bring both arms up and back until they touch the ground inhaling through the nose, bring them back to the starting position by blowing the air through the mouth.

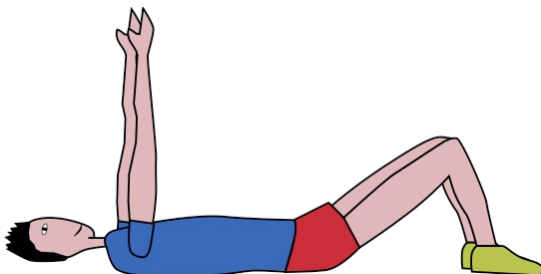
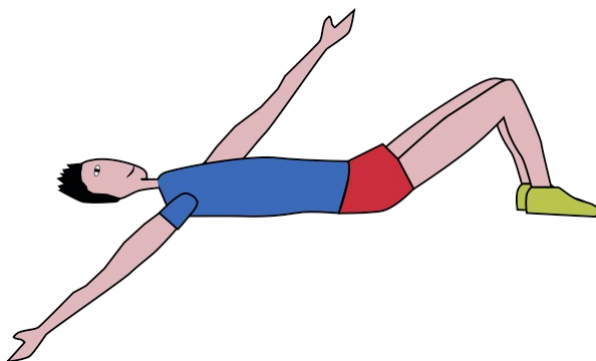
Repeat 10 times



Exercise No. 3

Extend your arms at 90°, from this position bring them up by blowing the air out and bring them back to the starting position by inhaling.

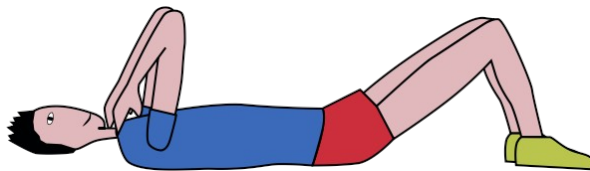
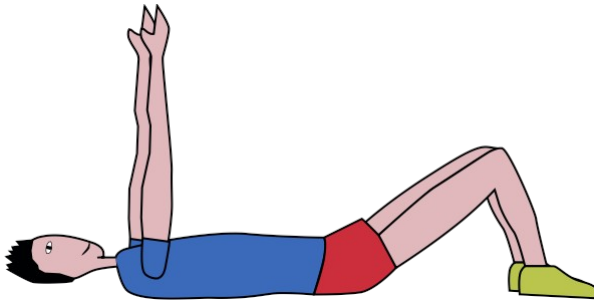
Repeat 5 times



Exercise No. 4

Start with arms extended at elbows, hands joined above head; go and touch the shoulders by bending the elbows and inhaling; return to the starting position while exhaling.

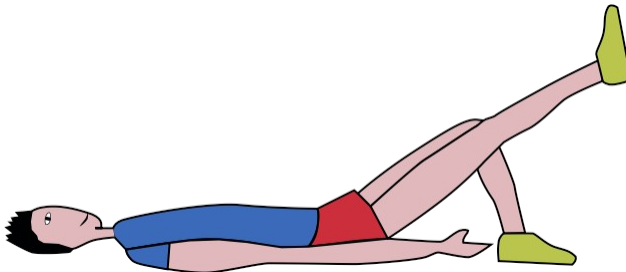
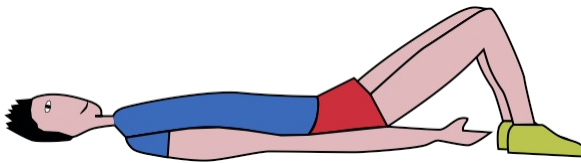
Repeat 10 times



Exercise No. 5

Stretch one leg by extending the knee, return to the starting position and repeat with the other leg; free breathing.

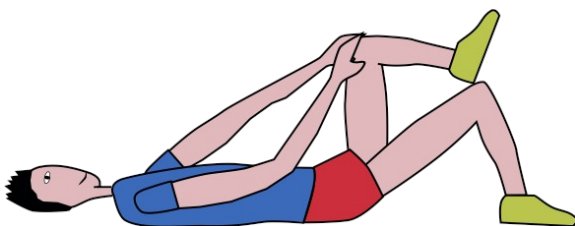
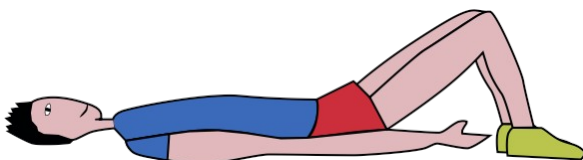
Repeat 10 times



Exercise No. 6

Bring one knee to your chest and hug it by blowing the air out; bring it back to the starting position by inhaling. Repeat with the other leg.

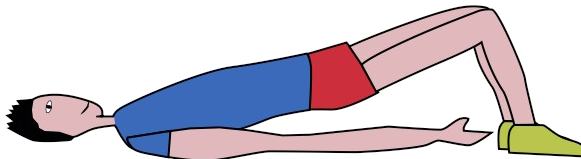
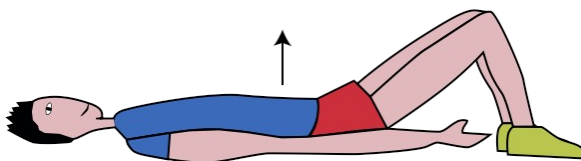
Repeat 5 times



Exercise No. 7

Lift the pelvis upwards by detaching the buttocks from the ground while inhaling; return to the starting position while exhaling.

Repeat 5 times

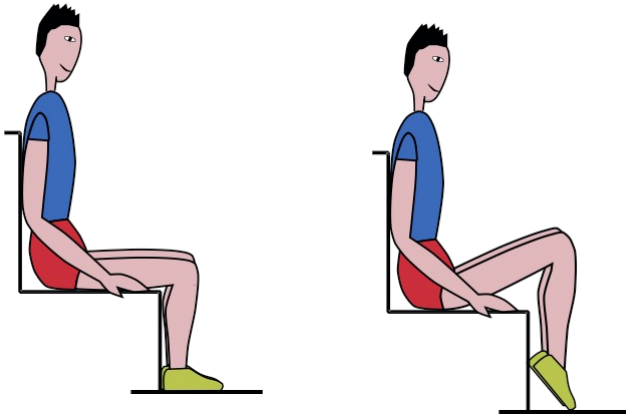


Sitting position

Exercise No. 8

Feet resting well on the ground, lift your heels while inhaling;
place them on the ground while exhaling.

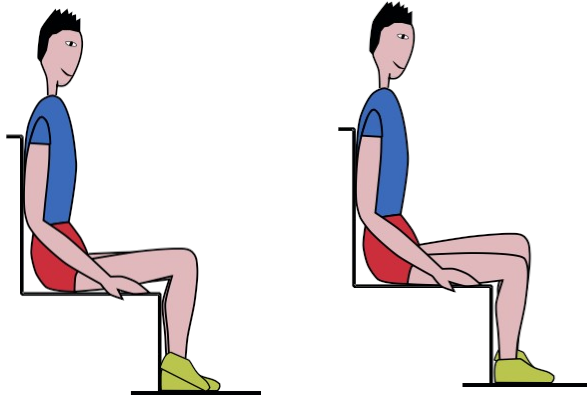
Repeat 10 times



Exercise No. 9

Feet flat on the ground, alternately lift one heel at a time simulating a jog.

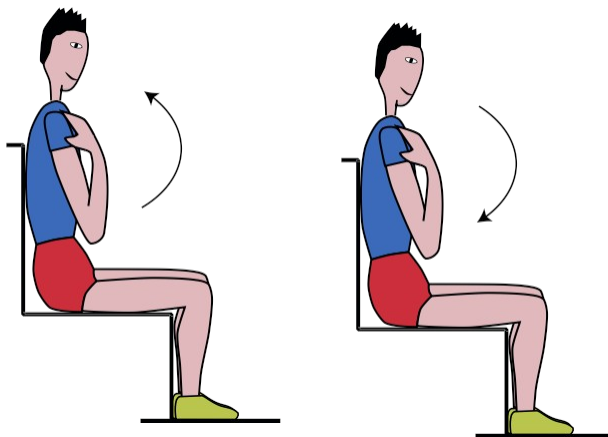
Repeat 10 times



Exercise No. 10

Put your hands on your shoulders, draw with your elbows the side circles as large as possible.

Repeat 10 times

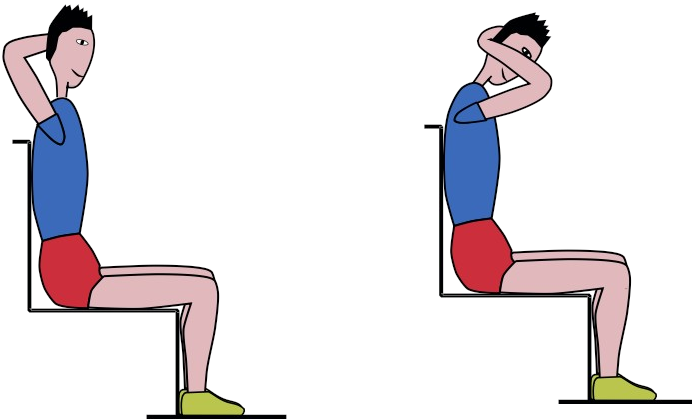


Exercise No. 11

Place your hands behind your neck, bend your head forward and bring your elbows together while exhaling.

Open your elbows, lift your head and return to the starting position by inhaling.

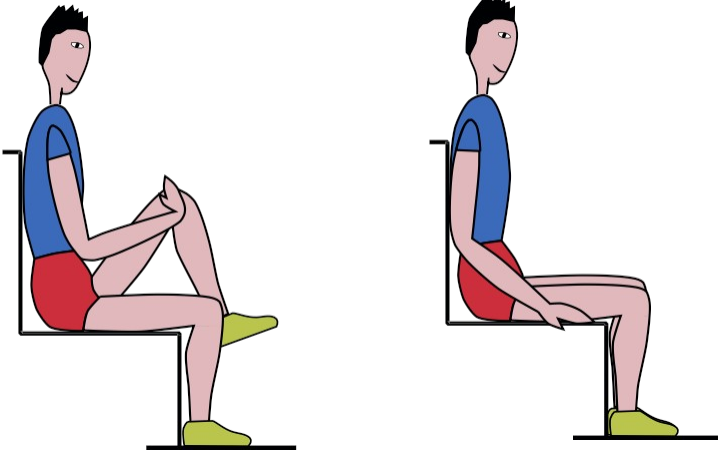
Repeat 5 times



Exercise No. 12

Hands resting on the sides, lift one knee towards the chest and embrace it with both hands while exhaling; return to the starting position by inhaling.

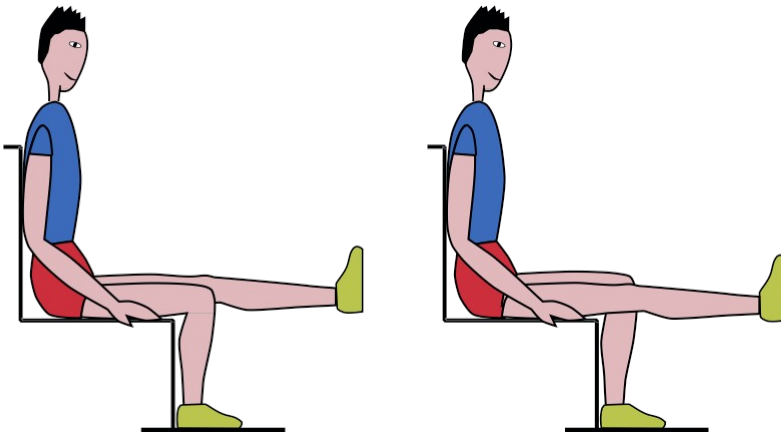
Repeat 5 times



Exercise No. 13

Hands resting at sides, straighten one knee at a time.

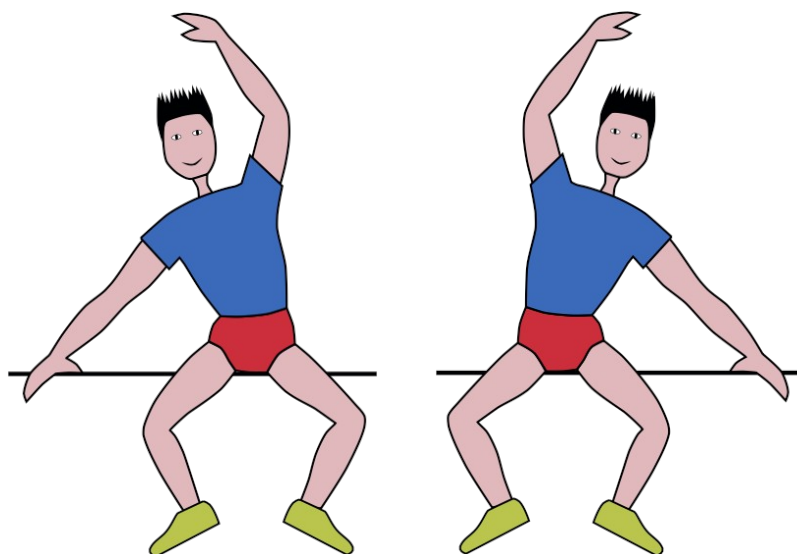
Repeat 10 times



Exercise No. 14

Sitting on the edge of the bed, one hand resting on the side and the other extended upwards, tilt the trunk to the side while inhaling, return to the starting position by blowing the air out.

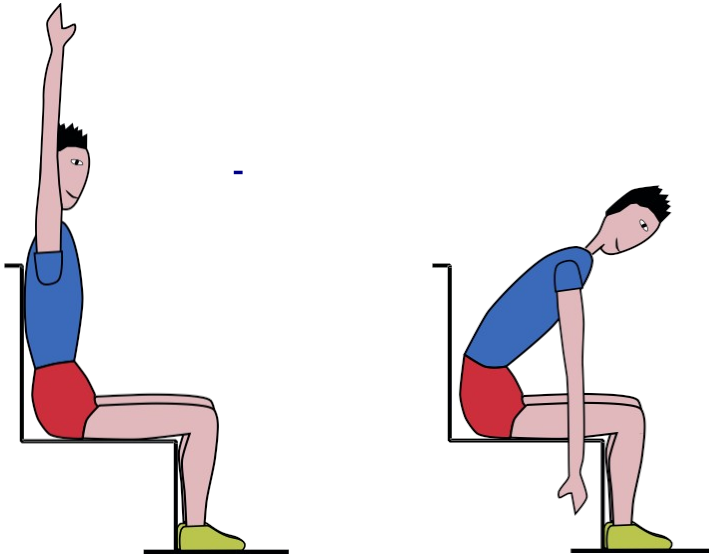
Perform 5 reps on each side



Exercise No. 15

Arms raised at the top with elbows extended, while exhaling bend the trunk forward bringing the hands towards the ground. Inhaling return to the starting position.

Repeat 5 times



And now...

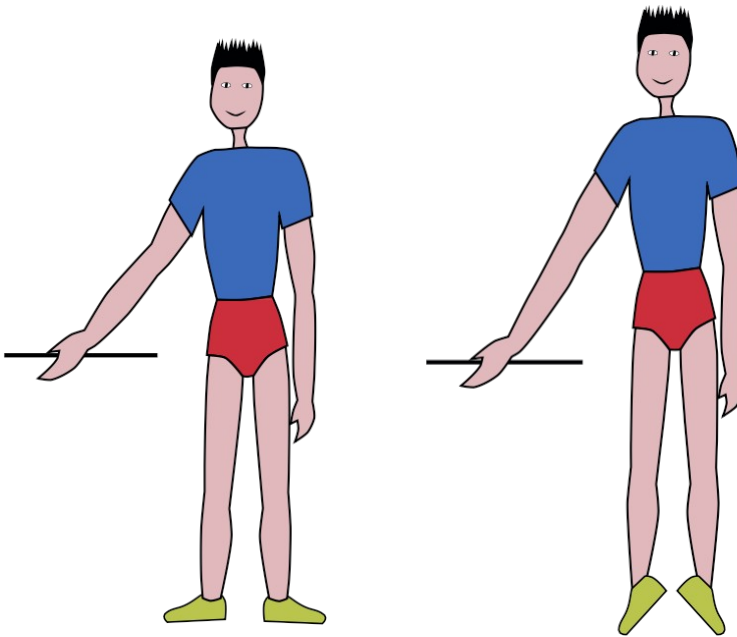


...Stand up

Exercise no. 16

Keep one hand on the edge of the bed or on a table (be careful that the object you are leaning on is stable and safe!), stand up on your toes while inhaling.

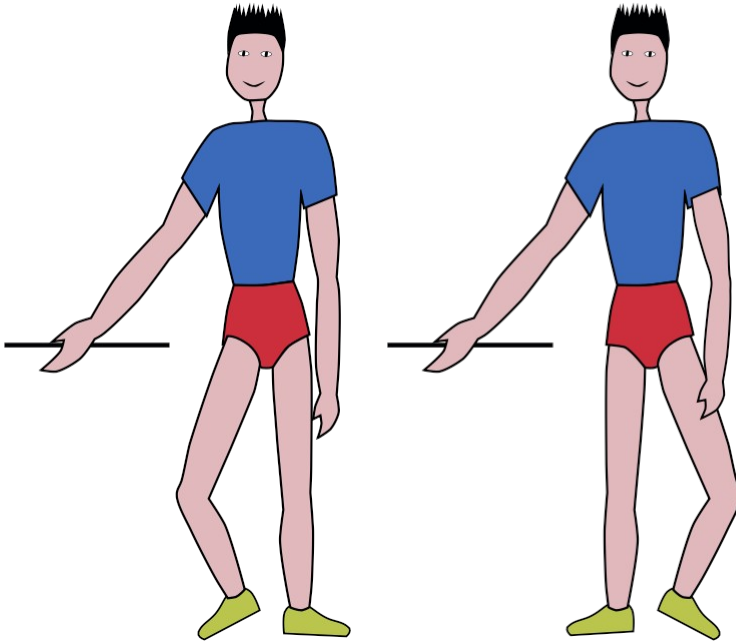
Repeat 10 times



Exercise no. 17

Holding one hand on the edge of the bed or on a table, lift one heel at a time simulating a jog.

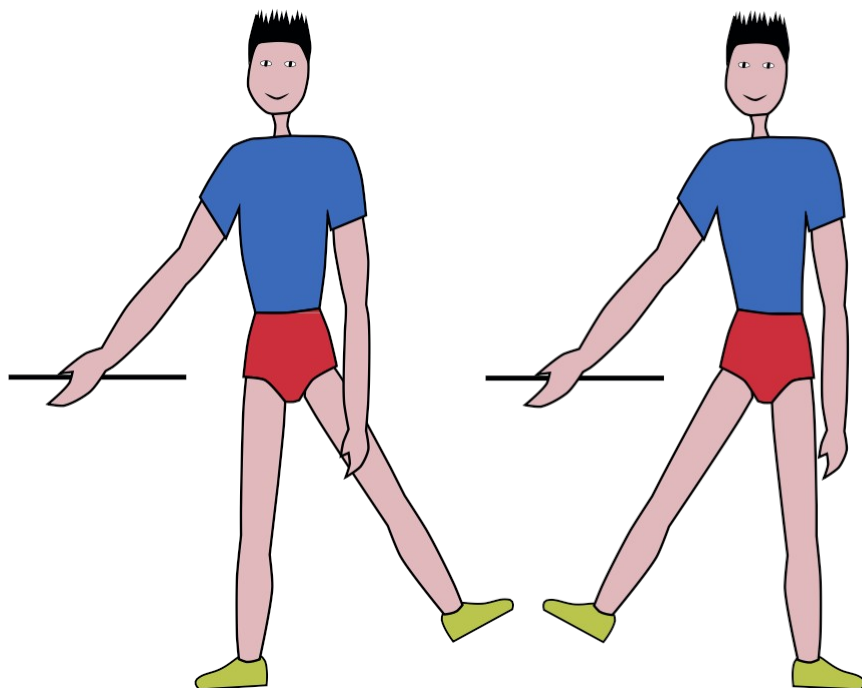
Repeat 10 times



Exercise No. 18

Resting both hands on the edge of a table, bring one leg out at a time keeping the knee extended.

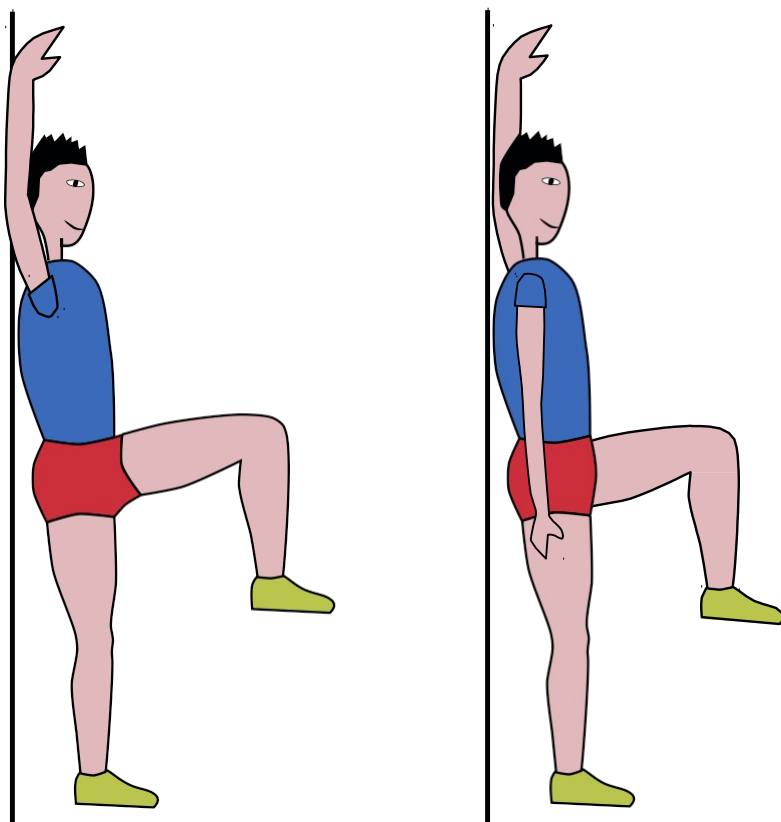
Repeat 10 times



Exercise No. 19

Leaning with your back against a wall, bring your right arm up and together flex your left knee, do the same with your left arm and right knee.

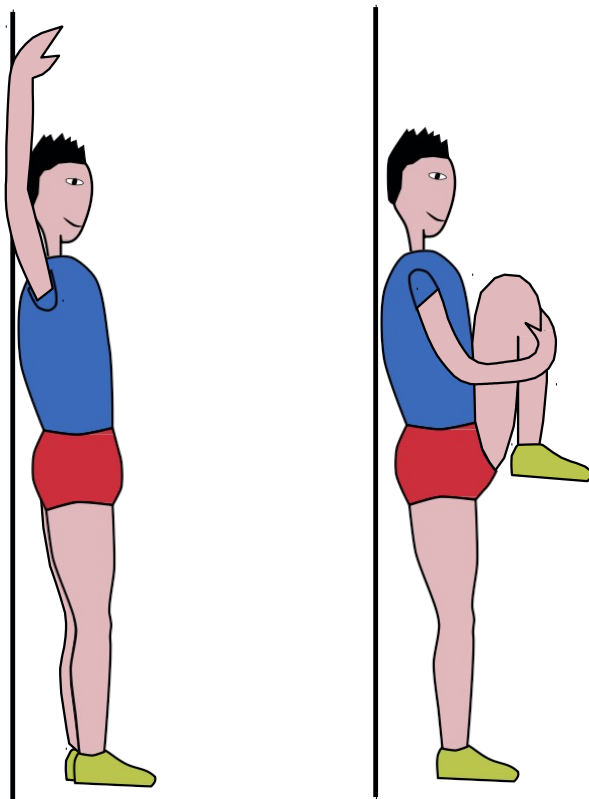
Repeat 10 times.



Exercise No. 20

Lean your back against a wall, arms up, bend one knee and embrace it with both hands while exhaling, return to the initial position while inhaling.

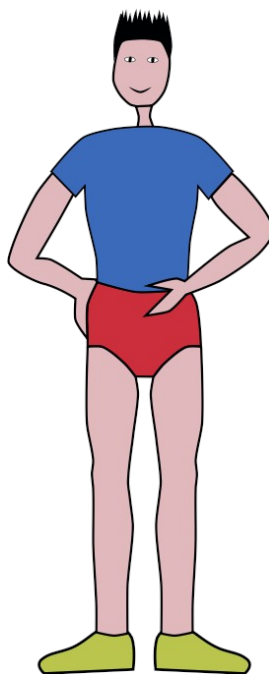
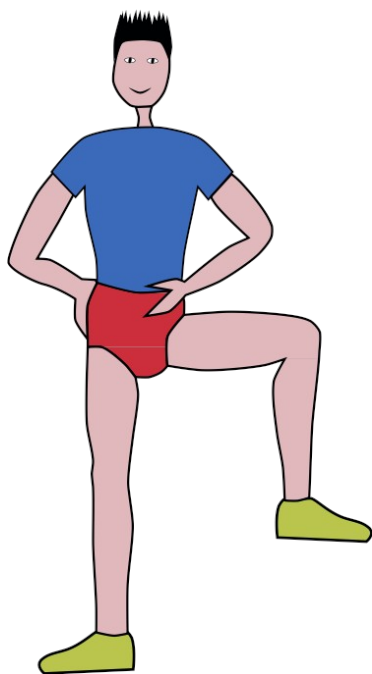
Repeat 10 times



Exercise No. 21

Lean with your back against a wall, hands on your hips, flex one knee, bring it outwards by rotating the hip; return to the starting position and perform the same exercise with the other leg. Free breathing..

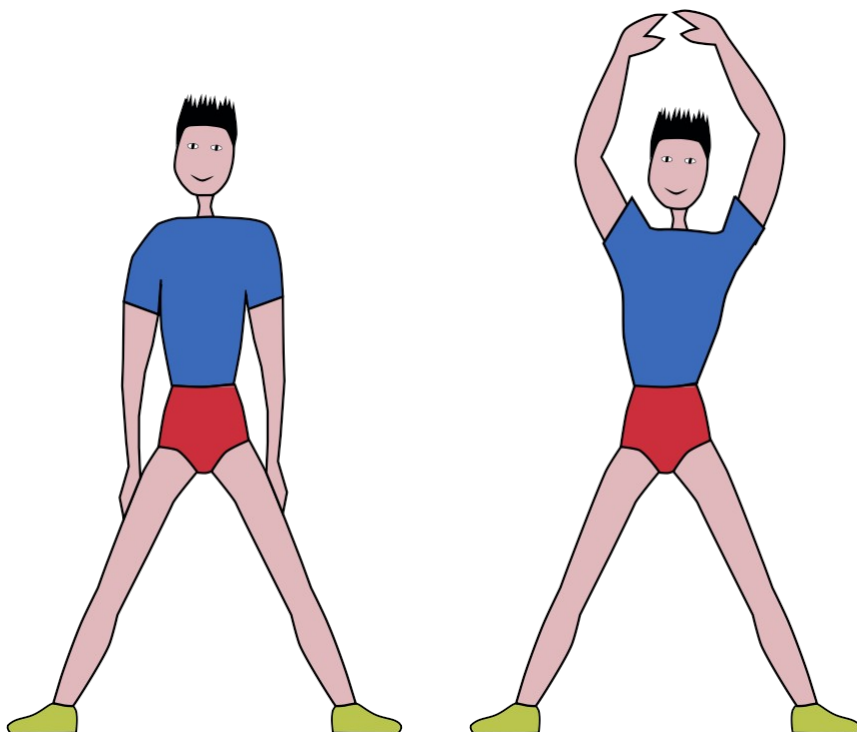
Repeat 10 times



Exercise No. 22

Legs apart and arms along the sides, inhaling bring the arms out and up until you clap your hands, return to the starting position exhaling.

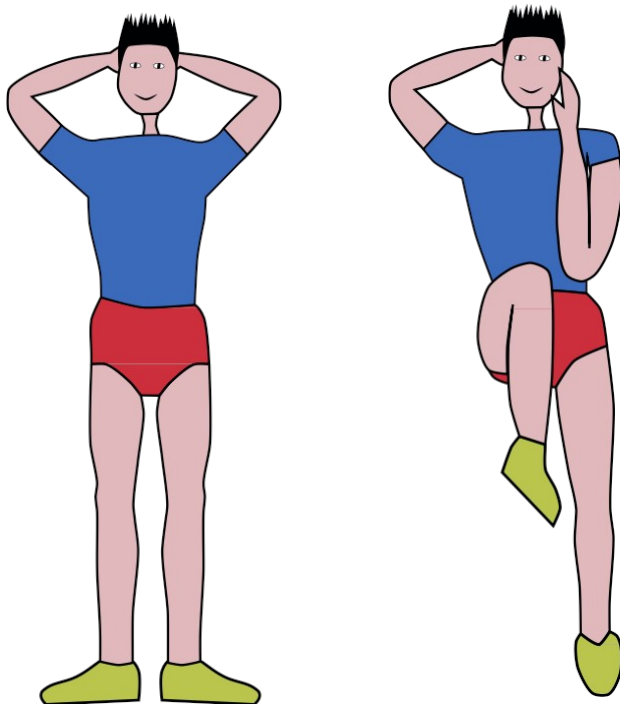
Repeat 10 times



Exercise No. 23

Lean your back against a wall, hands behind your neck, exhale and flex your right knee trying to touch it with your left elbow. Return to the starting position by inhaling; do the same on the other side.

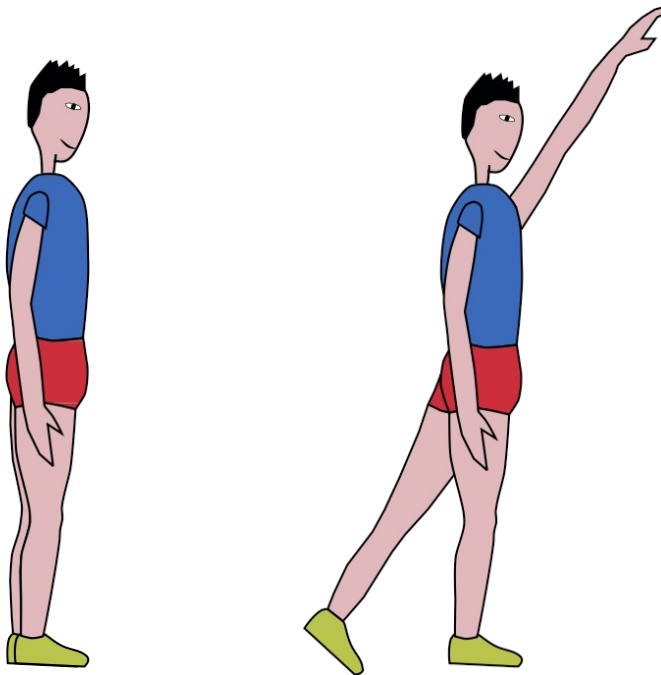
Repeat 10 times



Exercise No. 24

Arms along the sides, inhaling, bring the right arm up with the elbow extended and the left leg backwards with the knee extended. Return to the starting position while exhaling and do the same on the other side.

Repeat 10 times



P.S. Remember that correct breathing is inhaling through the nose and blowing the air out (i.e. exhaling) through the mouth.

IT IS NOT NECESSARY TO CARRY OUT THE WHOLE SEQUENCE OF EXERCISES, it is advisable to start the day after discharge from hospital by performing only those in the supine position.

IT IS RECOMMENDED TO GRADUALLY INCREASE THE EXERCISES PERFORMED DAILY until, if possible, to carry out the entire sequence before the start of the outpatient rehabilitation at the Cardiopathic Rehabilitation Unit of the Maggiore Hospital.

At the end of the exercises, measure your heart rate and possibly blood pressure and write them down.



WHAT CAN BE DONE AND WHAT CAN NOT BE DONE DURING CONVALESCENCE?

During the first weeks at home it is normal to be a little scared; **ACCEPT SUPPORT FROM FAMILY AND FRIENDS**, take care of yourself: you are the best person.

Many questions are often asked about the activities that are recommended or rather those that are not recommended in the first month after a myocardial infarction.

Here are some general tips. **IF YOU HAVE ANY DOUBTS OR OTHER QUESTIONS, DO NOT HESITATE TO ASK THE STAFF AT THE CARDIOLOGY DEPARTMENT.**

Can I drive the car?

It is recommended to resume driving the car four weeks after the heart attack. If possible, resume driving calmly, without engaging in very long or very demanding journeys.

- Those who drive by profession such as truck drivers, taxi drivers, bus drivers and so on, will have to wait for the authorization of the cardiologist.

Should sexual activity be avoided?

Generally, sexual activity with the usual partner can be resumed about 2-4 weeks after discharge from hospital.

- Any sexual relations with occasional partners, charged with emotion, are advisable to be resumed later.

Is it possible to go on holiday to the sea and to the mountains?

Always follow the rules that are valid for anyone: if the journey is particularly long, plan intermediate pauses during which to carry out minimal motor activity (just walk), possibly rest; the means of

transport should be comfortable: comfortable armchairs, air conditioning;

- always bring with you an adequate quantity of medicines you take on a daily basis;
- if you go to the mountains keep in mind that up to 1500 meters there are no contraindications, but for higher altitudes the oxygen rarefaction of the air breathed could lead to a lower oxygenation of the heart or respiratory symptoms such as air hunger which would be even more marked during physical activity. Therefore, walks at high altitudes are not recommended for those who have not been adequately prepared (physical training);
- if you go to the sea, try to choose areas with a dry climate, avoiding those with high levels of humidity;
- always bring with you a detailed clinical report of your health problems, including the electrocardiogram.

In case of illness, this document can be useful for informing the health personnel about your pathologies and the therapies you are taking.

When can work be resumed?

Resuming work has several positive implications ranging from economic to social, moral and psychological elements. However, it is not recommended to resume work before a month after the

infarction, even if particular situations must be submitted to the doctor's advice.

- A particular consideration applies to activities related to the transport of vehicles and people, as well as to activities that induce a particular situation of stress or even activities that require significant physical effort.

Is it possible to practice sports?

It is recommended to wait for the end of the rehabilitation period to undertake a sport activity, always remembering that a sedentary lifestyle is an important risk factor in cardiovascular disease.

HOWEVER, IT IS IMPORTANT TO REMEMBER SOME RULES:

Competitive activity is contraindicated.

- The effort must be compared to the degree of training achieved.
- There should always be a warm-up period before strenuous physical activity and it should be followed by a cool-down or recovery period.
- It is inadvisable to practice sports when the weather conditions are unfavorable (excessive cold, heat, wind, humidity).
- In general, sports activities such as underwater fishing, judo, weight lifting, windsurfing, rugby, mountaineering are not recommended.

What type of food is recommended?

If there are problems with body weight (overweight or obesity) or metabolic problems such as dyslipidemia or diabetes mellitus, a specialist in metabolic diseases should be consulted.

The general recommendations that you need to follow are:

- Avoid foods rich in animal fats or saturated fats (e.g. butter) preferring vegetable fats or unsaturated fats (e.g. extra virgin olive oil)
- Reduce the intake of table salt.
- Avoid foods that contain too much sugar.
- Consume plenty of fiber.
- Consume meat up to 3-4 times a week, preferring instead the consumption of oily fish.
- Consume at least 4-5 servings of fruit and vegetables per day. Use semi-skimmed milk (1-2 glasses a day). Do not exceed 200 grams of cheese per week, preferring those with a low fat content (e.g. mozzarella, ricotta, low-fat fresh cheese).
- Use up to a maximum of 2 eggs a week.
- You can drink up to 2-3 coffees a day, in addition you can drink barley coffee.
- Avoid alcohol and spirits.

IT IS ALLOWED TO MAKE EXCEPTIONS ON SPECIAL OCCASIONS, BUT THE CORRECT DIETARY STYLE MUST BE THE RULE.

WHAT IS REHABILITATION OF THE SECOND PHASE?

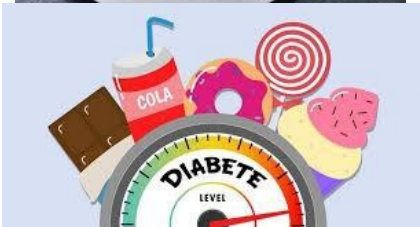
The rehabilitation of the second phase is the rehabilitation after discharge from hospital.

Hospital discharge letter includes the date of the first appointment for a cardiological examination and electrocardiogram at the Cardiovascular - Sports Medicine and Cardiopathic Rehabilitation Unit of the Maggiore Hospital. Subsequently, cardiac function will be evaluated through an exercise induction test. Based on the result of the latter, it will be proposed to start the effort training which will be carried out first on a stationary bike and then with bodyweight gymnastic sessions in the gym.

After concluding the cycle of rehabilitation sessions, a final cardiological visit will be performed with an electrocardiogram, a further induction test to evaluate the increase in exercise tolerance, an echocardiogram and blood chemistry tests to measure cholesterol and triglycerides in the blood.

The General Practitioner will be informed of the development of the rehabilitation programme.

It is important to consider that the cardiological rehabilitation of the patient has a multidisciplinary nature since the person is considered as a whole, so as to provide the tools to abolish the risk factors. In fact, for example, the anti-smoking program already started in the Cardiological Intensive Care Unit and in the Cardiology department will be continued for smokers. Each person will be oriented towards the best way of life possible.



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CARDIOLOGY DEPARTMENT

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