Hellenic Society
for the Study of Hypertension

41 PRACTICAL QUESTIONS AND ANSWERS ABOUT HYPERTENSION AND HYPERCHOLESTEROLEMIA

2008

HELLENIC SOCIETY FOR THE STUDY OF HYPERTENSION

41 PRACTICAL QUESTIONS AND ANSWERS ABOUT HYPERTENSION AND HYPERCHOLESTEROLEMIA
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PREFACE

- In developed countries, cardiovascular incidents (mainly myocardial infarctions and strokes), are responsible for almost half of the deaths in adults. Especially in ages above 40 years, myocardial infarction and stroke are the most frequent causes of severe disability. Many of these incidents can actually be prevented.

- Hypertension is one of the most important and most frequent factors that increase the risk of both a stroke and a myocardial infarction. Although considerable progress has been made during the last few years in the management of hypertension, it remains a serious problem because most hypertensive persons have poor control of their blood pressure. In Greece, less than 25 % of hypertensive people have satisfactory control. Equally alarming is the management of high cholesterol levels.

- Unfortunately, in general popular misconceptions of both hypertension and high cholesterol levels are prevalent. These, are at least in part responsible for the inadequate control of these two risk factors which leads to a reduced protection from cardiovascular incidents.

- The Hellenic Society for the Study of Hypertension (HSSH) has been working systematically since 1988 to educate Greek doctors in an up-to-date knowledge of hypertension and its management. The Society's main task is the organization of annual seminars (one Saturday per month, six months per year) for internists, cardiologists, nephrologists, general practitioners etc. Seventeen annual seminars as well as many other educational meetings have been held so far. The program of all Seminars can be found in the Society's electronic address www.hypertension.gr.

- In 2005, the HSSH developed practical hypertension guidelines for the Greek doctors. The guidelines were published in the journal "Archives of Hellenic Medicine", volume 22 (2005), issue 1, pages 10-22) and also 20.000 copies were distributed throughout the country. They can be found in electronic format in the Society's electronic address www.hypertension.gr.

- The "41 Practical Questions and Answers for Hypertension and Cholesterol" concern people who are willing to acquire elementary knowledge of the importance of hypertension and hypercholesterolemia, their effective management the subsequent protection from cardiovascular incidents. The information is presented in the form of questions and answers in order to give the reader the opportunity to get clear-cut, up-to-date and responsible answers to 41 common questions about hypertension and/or hypercholesterolemia.

GENERAL INFORMATION

WHAT IS BLOOD PRESSURE AND HYPERTENSION?

- Blood pressure is the force that blood exerts on the inner wall of the great arteries of the body which transport blood from the heart to all the human organs. Hypertension is the condition in which blood pressure is persistently higher than the normal upper limit.

HOW COMMON IS HYPERTENSION?

- Research in several developed countries in Europe (Greece among them), the USA, Canada, Australia etc has shown that one in four adult persons (25 %) develops hypertension. It is estimated that in our country the number of hypertensive persons amounts to 2.000.000.

- The likelihood of hypertension rises with ageing. Half of the elderly (over the age of 65) population have hypertension.

WHAT IS SYSTOLIC AND DIASTOLIC BLOOD PRESSURE?

- Blood pressure is recorded with two numbers, e.g. 150/95. The higher number is the ¨systolic¨ pressure, which is also known as the ¨maximum¨ pressure, and the lower number is the ¨diastolic¨ or ¨minimum¨. Systolic is the pressure that is exerted on the arteries when the heart contracts in order to send the blood towards the organs. Diastolic is the pressure exerted when the heart relaxes in order to be filled again with blood.

- Blood pressure is measured in millimeters on a column of mercury (mmHg). Therefore electronic devices record the pressure as, for example, 140/90 (in contrast to 14/9 as it is usually known to most people).

- The level of blood pressure depends on the force by which the heart sends blood and on the effect that the resistance of the small periph-

eral arteries has on this transmission. In young hypertensive persons high blood pressure is usually due to the increased force by which the heart transmits the blood. In the elderly, the increased resistance of arteries is usually the cause of high blood pressure. Furthermore, it is common for the elderly to have high systolic pressure with normal or low diastolic pressure. This kind of hypertension, called ¨systolic hypertension¨, is equally as or even more dangerous than the ¨diastolic¨ or the ¨combined diastolic and systolic hypertension¨ and is due to the stiffness of the walls of the large arteries.

WHAT IS THE CAUSE OF HYPERTENSION?

- The majority of hypertensive people (95%) have ¨primary¨ hypertension. This means that its cause is unknown. It is mainly related to heredity (gene-related) as well as to some other factors like obesity, long-term high sodium intake, lack of physical activity etc. Usually it occurs at the age of 30 or later, but it may occur at all ages, even in childhood.

- When an individual has two hypertensive parents, the life-long risk of developing hypertension is more than 70 %. In persons with one hypertensive parent the likelihood is about 30 % and in people without hypertensive parents it is approximately 15 %.

- In the minority of cases (5 %) hypertension is a manifestation of an underlying disease (secondary hypertension). If that disease is diagnosed and treated, hypertension can also be cured. The most common causes of secondary hypertension are chronic kidney disease, sleep apnea syndrome and renal artery stenosis. Other rare causes are primary hyperaldosteronism, pheochromocytoma, Cushing syndrome, coarctation of the aorta, etc.

- Special laboratory tests for the identification of the cause of hypertension are needed in only a few cases. The patient's physician will decide which of these cases accord with established criteria.

WHAT ARE THE RISKS DUE TO HYPERTENSION?

- Hypertension significantly increases the risk of a stroke and a heart attack. In fact, hypertension is the most important modifiable risk factor for a stroke and one of the most important risk factors for a myocardial infarction.

- Hypertension also increases the risk of heart failure, sudden death, kidney damage, obstruction of the arteries of the legs etc.

- For every 20 mmHg elevation of the systolic pressure or 10 mmHg of the diastolic pressure the risk of death from a stroke or a heart attack doubles. For example, a systolic pressure of 150 mmHg doubles the risk of cardiovascular incidents compared to a systolic pressure of 130 mmHg. Similarly, a diastolic pressure of 90 mmHg doubles the risk compared to a diastolic pressure of 80 mmHg.

WHICH BLOOD PRESSURE IS MORE DANGEROUS: SYSTOLIC OR DIASTOLIC?

- Both systolic and diastolic hypertension significantly increase the risk of cardiovascular disease. The belief that diastolic pressure (known as ¨heart's pressure¨) is more significant than systolic is false. Especially in people above 50, systolic hypertension is much more dangerous than diastolic.

WHAT ARE THE SYMPTOMS OF HIGH BLOOD PRESSURE?

- As a rule, high blood pressure cannot be sensed and in fact causes no discomfort at all. If there is any discomfort this is due to hypertension complications, which usually appear many years after its appearance. That's why in the USA hypertension is known as ¨the silent killer¨.

- Headaches, dizziness, tinnitus, face flashing etc. are not caused by hypertension, even in the case of very high blood pressure (for example systolic more than 200 mmHg). In fact, the opposite usually happens: the concern that these symptoms may be due to high blood pressure, which means increased risk of a stroke, may increase blood pressure.

- Hypertension does not cause nosebleeds either. The noticeable rise in blood pressure that is apparent during such cases is due to the concern (or even panic) caused by the bleeding. This rise in blood pressure subsides without medication when the patient relaxes.

🔴 BLOOD PRESSURE MEASUREMENT – DEVICES

WHAT IS THE CORRECT METHOD FOR BLOOD PRESSURE MEASUREMENT?

General information

- The diagnosis of hypertension is based exclusively on blood pressure measurement. There is not any other method or test for the detection of hypertensive persons.

- Blood pressure measurement is a simple procedure. Nevertheless, education, practice and meticulousness are required for its proper measurement.

- Both in healthy and in hypertensive people, blood pressure continually fluctuates. Therefore for the exact blood pressure level determination, many measurements are usually required. These measurements must be performed only when the patient is relaxed. If he is in a nervous state or in a state of fear, panic or during exercise (i.e. running, weight lifting etc) blood pressure may increase too much: in fact systolic pressure may exceed even 200 mmHg. This is not the ¨true¨ blood pressure. This blood pressure does not need any management and subsides a little later.

- The measurement of blood pressure may be performed either with an automatic electronic device or with a sphygmomanometer (mercury or aneroid sphygmomanometer) that requires the use of a stethoscope (see ¨Which devices are the most appropriate for blood pressure measurement¨, figures 3 and 4, page 18).

- All devices read blood pressure in millimeters on a column of mercury (for example 140/90 mmHg).

Instructions for correct blood pressure measurement (figure 1)

- At least half an hour before the measurement, you must avoid drinking coffee and smoking (of course you should always avoid smoking).

- The measurement must be performed in a sitting position. If you take antihypertensive pills your doctor may also ask you to perform some measurements also in a standing position in order to determine if your blood pressure lowers in this position (orthostatic hypotension).

- Before the measurement you must remain in a sitting position for about 5 minutes.

- During the measurement your back must be supported by the back of a chair and your arm must be supported on a firm surface (for example a table).

- The cuff (i.e. the cloth that is wrapped around the arm) must fit well around the naked arm.

- The sleeve must be loosened if it is too tight.

- The cuff must be at the level of the heart (figure 1).

- The end of the stethoscope must be placed on the inner surface of the elbow without being completely covered by the cuff (figure 1).

- Be sure that your blood pressure device indicates 0 before you start the measurement.

- Inflate the cuff to 200-220 mmHg. Deflate slowly (about 10 mmHg every 5 seconds).

- Systolic blood pressure is the point when the first rhythmic sound is heard.

- The diastolic blood pressure is read from the mercury column when this sound disappears.

- Blood pressure must be recorded in millimeters, for instance systolic pressure 160 and diastolic 90 mmHg and not ¨16 and 9¨.

- Your device has marks for every 2 millimeters of pressure i.e. 90, 92, 94, 96 etc. The pressure value must not be rounded as for example

Figure 1. Technique of blood pressure measurement using a stethoscope.
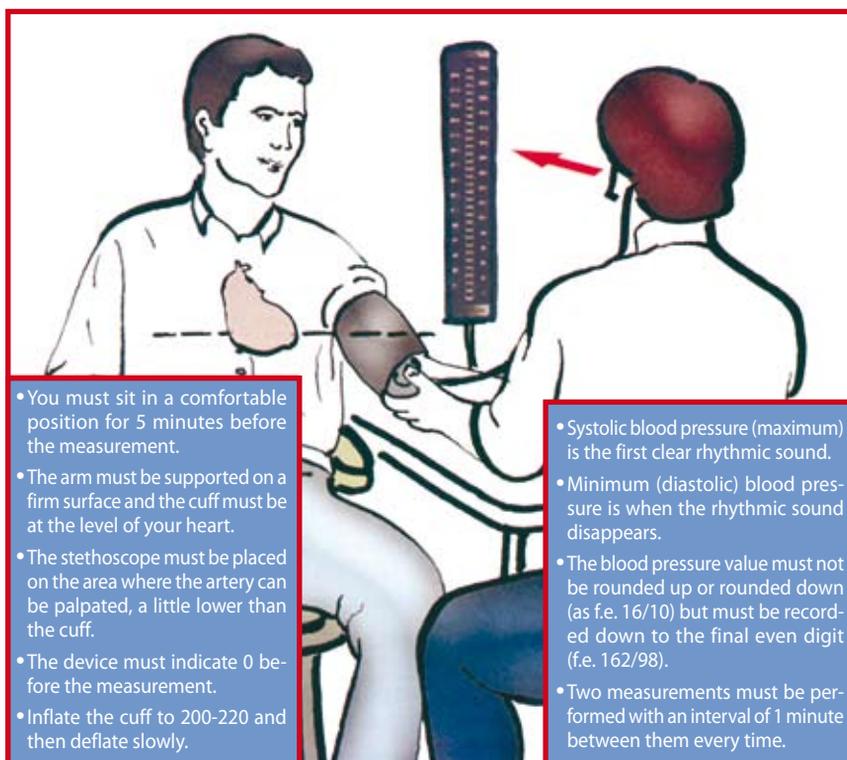
- You must sit in a comfortable position for 5 minutes before the measurement.
- The arm must be supported on a firm surface and the cuff must be at the level of your heart.
- The stethoscope must be placed on the area where the artery can be palpated, a little lower than the cuff.
- The device must indicate 0 before the measurement.
- Inflate the cuff to 200-220 and then deflate slowly.

- Systolic blood pressure (maximum) is the first clear rhythmic sound.
- Minimum (diastolic) blood pressure is when the rhythmic sound disappears.
- The blood pressure value must not be rounded up or rounded down (as f.e. 16/10) but must be recorded down to the final even digit (f.e. 162/98).
- Two measurements must be performed with an interval of 1 minute between them every time.

160/95 but must be recorded in detail with the final even (not odd) digit, i.e. 162/94 mmHg.

- In most cases, two measurements are enough with an interval of 1 or 2 minutes in between. The second measurement usually shows lower blood pressure than the first one. If there is a large difference between the two measurements (more than 10 mmHg), a third one must be performed. All measurements must be recorded on paper.

WHAT IS THE CORRECT METHOD FOR BLOOD PRESSURE MONITORING AT HOME?

General information

- Blood pressure measurement at home is necessary for the evaluation of pressure and the diagnosis of hypertension but also for the long-term observation of pressure.

- For the right evaluation of pressure at home the patient must be trained in the technique of measurement and the device must be checked periodically (once per year).

- Reliable measurements may be performed with a mercury or a mechanical sphygmomanometer (it is like a clock with a revolving indicating needle) and a stethoscope (see the figure) after the patient's meticulous training in the technique of measurement (see ¨What is the right way of blood pressure measurement?¨, page 12) or more easily with an automatic electronic device (see ¨Which devices are appropriate for blood pressure measurement at home?, page 18).

- The measurements may be performed by the hypertensive person himself or by another person at home.

- Patients usually change their drug treatment (more pills or avoidance of a regular dose) based on an isolated measurement. This is a wrong strategy and must be avoided.

How many measurements are needed

- For the evaluation of pressure at home many measurements must be performed on different days in resting conditions and the average must be assessed.

- Isolated measurements are of low value because they may not represent the true pressure at home.

- The measurement of pressure in a state of agitation, stress, discomfort, panic, headache, dizziness etc must be avoided because it will be misleading.

- For the long-term home monitoring of blood pressure, 1-2 measurements per week are usually enough.

- For the evaluation of blood pressure by patients at home it is recommended to monitor blood pressure for at least 3 and preferably 7 routine working days before each visit to the doctor.

- Duplicate morning (before drug intake if treated for hypertension) and evening measurements should be taken after 5 minutes sitting rest and with 1 minute between measurements.

- The total of measurements should be averaged to give a single number for systolic and diastolic blood pressure after discarding measurements of the first day.

- All measurements must be recorded, as in figure 2. You must not choose which measurement you record. You must not choose which measurements you will show to your doctor. But you may record if you had any problem during the measurement.

- In general, blood pressure is lower at home than at the doctor's office. Blood pressure is recorded as normal at home when the average of measurements is lower than 130 mmHg for the systolic and lower than 80 mmHg for the diastolic.

Figure 2. A form for reporting blood pressure at home (from the Hypertension Center, Third Department of Medicine, University of Athens, Sotiria Hospital, Athens, Greece)

HYPERTENSION CENTER – STRIDE HELLAS-7
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BLOOD PRESSURE MONITORING AT HOME

NAME:

DATE OF BIRTH: ___ / ___ / ___   DEVICE:

1ST DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

2ND DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

3RD DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

4TH DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

5TH DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

6TH DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

7TH DAY   ___/___/200___   MORNING 1st) / 2nd)   EVENING 1st) / 2nd)   TIME   SYSTOLIC-DIASTOLIC   (PULSE)

BEFORE MEASURING READ CAREFULLY THESE INSTRUCTIONS

- Measurements for 7 routine work days.
- Morning 6–9 a.m. (before pill taking) and evening 6-9 p.m.
- After 5 minutes sitting rest.
- 2 measurements each time with an interval of 1 minute.
- Exclude the first day and calculate the average of all measurements.

WHICH DEVICES ARE RELIABLE FOR
THE MEASUREMENT OF BLOOD PRESSURE AT HOME?

- On the market there are mercury, mechanical or aneroid (like a clock with a revolving indicator needle) and electronic devices (figure 3).

- Even though the mercury devices are considered as the gold standard for blood pressure monitoring at home, the use of a simple mechanical or an electronic device is acceptable, on the condition that their reliability has been checked.

- Automated electronic sphygmomanometers are preferred, because very little instruction is required for their use and the measurements are performed objectively.

- There are many electronic devices but very few of them are reliable (table 1).

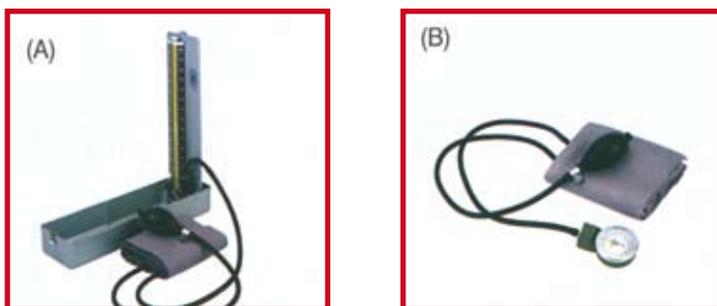**Figure 3.** Mercury (A) and aneroid sphygmomanometer (B).

Figure 4. Reliable electronic devices (for the arm).

- The devices that measure blood pressure at the arm are preferable. The devices that measure pressure at the wrist or finger are less reliable and are not recommended.

- If a sphygmomanometer with a stethoscope is going to be used, a careful instruction on the technique of blood pressure measurement must be given to the patient in advance. (see ¨What is the correct method for blood pressure measurement?¨, page 12).

- Information for the reliable sphygmomanometer can be found on the web at the address www.dableducational.org or www.hypertension.gr.

- The functional state of the sphygmomanometer must be checked once every year and not only in the case of trouble.

- Irrespective of the kind of sphygmomanometer, the dimension of the cuff must fit your arm perfectly. For many people who have a large arm (arm circumference of 30 cm or more) the standard cuffs are too small. As a result, the sphygmomanometer will show a false higher pressure than the actual one. Ask your doctor or your pharmacist which cuff you need.

Table 1. Reliable electronic devices for home blood pressure measurement on the arm. Those not included in the table have not been validated yet or are unreliable (information from www.dableducational.org and www.hypertension.gr until May 2008)*

A&D UA-631 (UA-779 Life Source)	Omron 705IT
A&D UA-705	Omron HEM-705CP *
A&D UA-767	Omron HEM-706/711 *
A&D UA-774 (UA-767 Plus)	Omron HEM-713C *
A&D UA-787	Omron HEM-722C * (M4)
Artsana CSI 610	Omron HEM-735C *
Colson MAM BP3AA1-2	Omron HEM-737 Intellisense *
Health and Life HL888HA	Omron IA2 (HEM-7011-C1)
IEM Stabil-O-graph	Omron M1 Classic (HEM-442-E)
Microlife BP 3AC1-1	Omron M1 Compact (HEM-4022-E)
Microlife BP 3AC1-1 PC	Omron M1 Plus (HEM-4011C-E)
Microlife BP 3AC1-2	Omron M5-I
Microlife BP 3AG1	Omron MIT *
Microlife BP 3BTO-1	Omron M6 (HEM-7001-E)
Microlife BP 3BTO-A	Omron M6 Comfort (HEM-7000-E)
Microlife BP 3BTO-A (2)	Omron M7 (HEM-780E)
Microlife BP 3BTO-AP	Omron M10-IT
Microlife BPA100	Rossmax ME 701 series
Microlife BPA100Plus	Seinex SE-9400
Microlife RM100	Sensacare SAA-102
Microlife WatchBP Home	Spengler KP7500D

Devices that have been discontinued.

WHAT IS 24-HOUR BLOOD PRESSURE MONITORING?

- The 24-hour blood pressure monitoring, which sometimes is erroneously called ¨blood pressure holter¨, is a portable electronic device which automatically measures blood pressure every 15-30 minutes for an entire 24-hour period. The device consists of a cuff which is wrapped around the arm and a device which is a little larger than a pack of cigarettes. The device is connected to the cuff and is placed on the belt or hung on the shoulder.

- The application of this technique enables the performance of multiple measurements of blood pressure away from the stress inducing environment of a doctor's office. Hence, a full profile of blood pressure is acquired under the normal conditions of a working day, during work, at home and during sleep.

- 24-hour ambulatory blood pressure monitoring is not necessary for all hypertensive persons. However, it may be useful in selected cases, mainly for the diagnosis of the "white coat hypertension" (see ¨What is white coat hypertension¨, page 23).

Figure 5. A 24-hour ambulatory blood pressure monitor.

DIAGNOSIS OF HYPERTENSION

WHAT ARE THE NORMAL VALUES OF BLOOD PRESSURE

- According to the guidelines of the European Society of Hypertension (2003), which have been adopted by the British Society of Hypertension (2004) and the Hellenic Society For The Study Of Hypertension (2005), the classification of pressure for adults can be seen in table 2. This classification is based on blood pressure measurements performed on at least 2 different visits to the doctor's office. On every visit, at least two measurements must be performed after the patient has relaxed for a few minutes in a sitting position.

- It is worth mentioning that according to the recent American Guidelines for Hypertension (JNC-7, 2003) a systolic level of 120-139 mmHg and a diastolic level of 80-89 mmHg are called ¨prehypertension¨. The adoption of this term aims at the wider sensitization of both the public and the physicians at the early stages of hypertension. This will presumably help in the wider application of lifestyle changes for the prevention of hypertension and also in the tight monitoring of blood pressure to allow the patient's prompt treatment, in the initial stages of hypertension.

Table 2. Normal values of blood pressure and classification of hypertension in adults.

Optimal pressure	Systolic pressure lower than 120 mmHg and diastolic lower than 80 mmHg
Normal pressure	Systolic pressure 120-129 mmHg and diastolic 80-84 mmHg
High normal pressure	Systolic pressure 130-139 mmHg or diastolic 85-89 mmHg, of both
Hypertension	Systolic pressure higher than 140 mmHg or diastolic higher than 90 mmHg, of both
Isolated systolic hypertension	Systolic pressure higher than 140 mmHg and diastolic lower than 90 mmHg

HOW CAN HYPERTENSION BE DIAGNOSED?

- The diagnosis of hypertension will be made by your doctor with measurements of your blood pressure in his office. Usually repeated measurements are needed during at least 2-3 different visits to the doctor's office. One isolated visit is almost never enough for the diagnosis of hypertension. The diagnosis of hypertension is made when either the systolic blood pressure in the doctor's office is persistently higher than 140 mmHg or when the diastolic is higher than 90 mmHg or whenever the two conditions coexist.

- Blood pressure levels are not as stable as cholesterol or body weight but tend to vary in every measurement. Especially during the first visit to the doctor's office, the pressure may be much higher than its actual levels. Moreover, in any visit, blood pressure is usually higher in the first measurement than in the following ones. It frequently occurs that blood pressure is found higher in the first or second visits, but is reduced even to normal levels in the following visits without any treatment. Therefore, not only the diagnosis of hypertension but also the commencement of antihypertensive drug treatment must not be made based on occasional pressure measurements.

- Even in people with a very high blood pressure levels (more than 180/110 mmHg), if there is no call for emergency treatment dictated by cardiovascular complications, the doctor must wait for some days in order to ascertain the levels of blood pressure and also to perform the required laboratory evaluation of the patient. The closer to the diagnostic limit of 140/90 mmHg the blood pressure is, the longer it will take to confirm the diagnosis of hypertension. It is well known that when the proper pattern of blood pressure evaluation is used, some people that have been otherwise considered as hypertensives and have therefore started antihypertensive treatment finally prove to be normotensives and, as a result, the treatment is discontinued.

WHAT IS WHITE COAT HYPERTENSION?

- Sometimes a consistently high blood pressure is recorded in the doctor's office (>140/90) whereas normal values are recorded at home (<130/80). This situation, which is known as ¨white coat hypertension¨ or more correctly ¨isolated office hypertension¨ is not as dangerous as true hypertension.

- In these cases, 24-hour ambulatory blood pressure monitoring is required for the confirmation of the diagnosis. (see ¨What is 24-hour blood pressure monitoring?¨, page 20).

WHAT IS THE THRESHOLD
FOR HYPERTENSION IN THE ELDERLY?

- The limits for the diagnosis of hypertension are the same irrespective of age. Hence, a 75-year old person with a blood pressure level higher than 140/90 in repeated measurements is considered as hypertensive. The doctor will decide if and when it is appropriate to prescribe antihypertensive drugs.

DOES HYPERTENSION IN CHILDREN EXIST?

- Hypertension in children and adolescents is more frequent than previously believed and it occurs in 1-2 % of children, especially during adolescence. Unfortunately, due to the prevalence of obesity, the frequency of hypertension has increased during the last years. In children younger than 12 hypertension is usually caused by an underlying disease (see ¨What is the cause of hypertension? ¨, page 9). In children older than 12 what is called "primary" hypertension is more frequent. If a child is obese then he or she is highly likely to develop hypertension as well.

- The levels of blood pressure required for the diagnosis of hypertension in children and adolescents vary according to age, gender and height. As in adults, to diagnose hypertension repeated measurements are required on each visit. For the correct measurement of blood pressure in children small cuffs must be used corresponding to the circumference of the arm.

TREATMENT OF HYPERTENSION - BLOOD PRESSURE CONTROL

CAD HYPERTENSION BE CURED?

- The fact is that hypertension can not be cured. In other words, a patient with hypertension will never be cured in the way that a patient with pneumonia will totally recover. However, it is possible to lower blood pressure within normal limits, mainly through regular and consistent use of antihypertensive (blood pressure lowering) drug, as well as through non-pharmaceutical means, such as body weight and salt intake reduction e t c.

WHY SHOULD BLOOD PRESSURE BE WELL CONTROLLED?

- Efficient blood pressure control completely eliminates the risk of a stroke due to hypertension, and significantly reduces the risk of a myocardial infarction (heart attack because a part of the tissue died when blood supply to it has been cut off). Moreover, it reduces the risk of developing (or the further deterioration of) heart or kidney dysfunction.

- The administration of blood pressure lowering drugs is not sufficient per se in order to accomplish maximal reduction of cardiovascular risk; optimal blood pressure control is required. Furthermore, the risk of developing a stroke or myocardial infarction depends mostly on the management of optimal blood pressure control, rather than the level of blood pressure before the commencement of treatment.

IN WHAT LEVEL SHOULD BLOOD PRESSURE BE LOWERED WHITH TREATMENT?

- In all hypertensive subjects, blood pressure goal should be lower than 140/90 mmHg (140 for the systolic blood pressure and 90 for the diastolic blood pressure).

- The same is true for the elderly (over 65 years of age).

- In subjects with diabetes mellitus or in those with impaired renal function the blood pressure goal should be lower (130/80 mmHg).

IS HYPERTENSION WELL CONTROLLED IN GREECE?

- Percentages regarding the diagnosis, treatment and control of hypertension in Greece are similar to those of other developed countries. Unfortunately, many people are unaware of the fact that they already have hypertension (almost 4 in 10). However, even among those that are aware of their underlying hypertension, less than 50% control it adequately.

Figure 6. Propotion of awareness, treatment and control of hypertension in Greece

- Both in Greece and other countries, the percentage of hypertensive people that adequately control their blood pressure never exceeds 20 – 25% (maximum one out of four). It is therefore clear that major advances can be made in both the diagnosis and the more efficient control of hypertension in Greece.
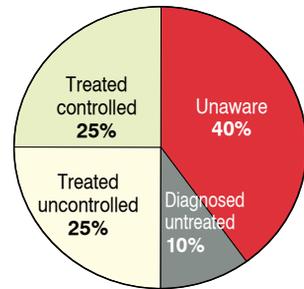
BLOOD PRESSURE REDUCTION WITHOUT MEDICATIONS – LIFESTYLE CHANGES

HOW CAN BLOOD PRESSURE BE REDUCED WITHOUT DRUG TREATMENT?

- Various therapeutic means, beyond drugs, may lead to some extent to blood pressure reduction. These means are useful in all hypertensive subjects, regardless of the use of blood pressure lowering drugs. If effectively applied, they may actually lead to a reduction in antihypertensive drug (fewer pills) or even, in some cases, to the complete withdrawal of any medication.

- Unfortunately, controlling the patient's blood pressure is fraught with problems mainly due to the fact that the patient finds it difficult to follow the prescribed regime over a prolonged period of time.

- Body weight reduction in obese hypertensive subjects is the most effective way to lower blood pressure without drugs. Even a relatively small reduction in body weight (e.g. 5 kg) may help the control of blood pressure effectively and also improve other risk factors (e.g. blood cholesterol and sugar levels) which are associated with the likelihood of a heart attack or a stroke.

- A diet rich in fruits, vegetables and low-fat dairy products (known as DASH diet), in other words, a diet rich in potassium and calcium, may help to lower blood pressure lowering.

- The restriction of diet salt intake lowers blood pressure mainly in elderly hypertensive persons. Moreover, it may increase the effectiveness of antihypertensive drug treatment, especially the angiotensin converting enzyme inhibitors and the angiotensin receptor blockers (see "Antihypertensive drugs")

- Alcohol restriction (up to two drinks per day for men and one for women) lowers blood pressure in subjects with prior alcohol abuse.

- Exercise (brisk walking or bicycling for at least half an hour most days of the week) may help to lower blood pressure as well as to improve

other risk factors (e.g. blood cholesterol and glucose values) which are associated with cardiovascular incidents.

- Smoking affects blood pressure very little, if at all. However, smoking cessation is the first goal of hypertensive subjects because it is at least as important as blood pressure itself in causing a myocardial infarction and a stroke.

ORANGES, COFFEE AND GARLIC: DO THEY REALLY AFFECT BLOOD PRESSURE LEVELS?

- Oranges do not increase blood pressure. On the contrary they are rich in potassium which is useful in hypertensive subjects, especially those under treatment with diuretics.

- Coffee consumption may induce a slight and temporary increase of blood pressure for 1-3 hours. However, daily coffee consumers develop a "resistance" to this effect and as a consequence their blood pressure is not affected. In this respect, and if there is no other medical reason beyond high blood pressure (e.g. tachycardia), hypertensive subjects may consume a reasonable daily amount of coffee.

- Garlic contains a substance (allicin) with vasodilating properties, which may therefore lower blood pressure. However, the potentially beneficial or hazardous effects from the long term use of this substance are not known.

ARE SEDATIVES – TRANQUILIZERS EFFECTIVE IN LOWERING BLOOD PRESSURE?

- No. The use of tranquilizers has absolutely no place in the treatment of hypertension.

- Tranquilizers are useful for persons with anxiety and panic attacks, irrespective of the presence of hypertension.

- The term "stress induced hypertension" is quite wrong and misleading because under conditions of emotional stress, regret or panic, every person, hypertensive or not, may have high blood pressure. In that

sense every human being may exhibit "stress induced hypertension". On the contrary, only those persons who consistently exhibit high blood pressure, under restful conditions, are hypertensives.

DRUG TREATMENT FOR HYPERTENSION

WHICH ARE THE BLOOD PRESSURE LOWERING (ANTIHYPERTENSIVE) DRUGS?

- The following 5 groups are considered as first choice drugs for the treatment of hypertension:

1. Diuretics

2. Beta-blockers

3. Calcium channel blockers

4. Angiotensin converting enzyme inhibitors

5. Angiotensin receptor blockers

- Other blood pressure lowering drugs which are alternatively used when the first choice drugs are either not effective or not well tolerated, are the following:

1. Alpha 1 – blockers

2. Alpha 2 – agonists and I1- blockers

3. Directly acting vasodilators

HOW DOES EACH CLASS OF ANTIHYPERTENSIVE DRUGS ACT AND WHAT ARE THEIR MAIN ADVANTAGES AND DISADVANTAGES

- Antihypertensive drugs are probably the most widely researched drugs currently in use. Numerous studies involving several thousands of hypertensive persons who have been under observation for years have shown that - at least - the 5 groups of first choice drugs (see above) are highly effective not only in lowering blood pressure but also in the protection of the organs which are damaged by high blood pressure. Furthermore, they have few side effects which are rarely severe.

Drugs with frequent or severe side effects have already been with-drawn from the market.

Diuretics (thiazides)

- Diuretic drugs initially act by augmenting the urine production and by diminishing salt and water retention and reducing thereby circu-lating blood volume. When used daily over a long period of time, they no longer induce increased urine production, but they lower the re-sistance of the arteries.

- They can be used as a single drug for treating hypertension (mono-therapy), but they are mainly very useful in cases when the combi-nation of two drugs is required. In such cases, a fixed combination of the two drugs may already be available in the market.

- Their most common side effect is the decrease of potassium level in the blood. In few cases, they can also induce the increase in blood uric acid and glucose, as well as the decrease in sodium, mainly when they are used in higher doses.

Beta-blockers (b-blockers)

- Beta-blockers reduce the effect of a vasoconstricting substance, named noradrenalin, by blocking its site of action (the beta receptors). They also slow down the heart rate (i.e. they induce bradycardia) and re-duce the cardiac output.

- They are useful in treating hypertension and are especially recom-mended when a patient's history includes one or more of the follow-ing: myocardial infarction, angina (i.e. chest pain due to insufficient blood flow to the heart), heart failure and arrhythmia.

- Their most common side effects are the feeling of fatigue, bradycardia (below 50 beats per minute) and bronchospasm (causing dyspnea) in patients with asthma or chronic obstructive pulmonary disease.

Calcium channel blockers (calcium antagonists)

- Calcium channel blockers prevent the entry of calcium ions into the

muscle cells of the arterial vessel walls and this results in vasodilatation. There are two different types of calcium channel blockers: the dihydropyridines and the non-dihydropyridines (bradycardic calcium channel blockers)

• They are useful in treating hypertension, especially in persons with angina (i.e. chest pain due to ischemia of the heart). Non-dihydropyridines (bradycardic calcium channel blockers) are especially useful in treating hypertension in persons with arrhythmia.

• Their most common side effects are edema (swelling) of the lower limbs (especially of the ankles). Edema is caused by local vasodilatation (arterial dilatation) and does not carry any danger. The use of diuretics is not useful in treating this type of edema which easily responds to drug withdrawal or to dose reduction. Dihydropyridines may also rarely cause a facial rash, headaches or tachycardia whereas non-dihydropyridines may cause constipation, headaches or bradycardia.

Angiotensin converting enzyme inhibitors (ACE inhibitors)

• Angiotensin converting enzyme inhibitors inhibit the formation of a vasoactive substance called angiotensin. Angiotensin induces the contraction of arteries as well as the secretion of another substance called aldosterone, which increases sodium (salt) and water retention by the kidneys.

• They are useful in treating hypertension especially in persons with heart failure, previous myocardial infarction or renal disease due to diabetes mellitus.

• Their most common side effect is a consistent dry cough. In rare cases of bilateral renal artery stenosis they may cause a deterioration of renal function.

Angiotensin receptor blockers (ARBs)

• Angiotensin receptor blockers inhibit the action of the substance angiotensin (see above "Angiotensin converting enzyme inhibitors") on its specific site of action (which is called AT1 receptors). This results in vasodilatation and reduction of the sodium (salt) and water retention by the kidneys.

- They are useful in treating hypertension especially in patients with heart failure or hypertrophy of the left ventricle, with a history of myocardial infarction, or of renal disease due to diabetes mellitus.

- Side effects are rare. Like angiotensin converting enzyme inhibitors in the rare cases of bilateral renal artery stenosis they may cause a deterioration of renal function.

Alpha 1-blockers (a-blockers)

- The alpha 1 - blockers inhibit the action of the substance called noradrenaline by blocking its specific receptors (a1 receptors) which are located on the vascular walls.

- They are used in treating hypertension as well as in symptomatic prostate hypertrophy.

- They may cause a feeling of fatigue as well as an exaggerated decrease of blood pressure when used for the first time (first dose effect).

Alpha 2 – agonists and I1- blockers

- They act on specific sites in the brain (receptors a2 and I1, respectively) and thus reduce the activity of the vasoconstrictive system that uses the two substances adrenaline and noradrenaline as mediators.

- These drugs are used only for the treatment of hypertension. One of these drugs, called methyldopa, is the safest and most commonly used drug for treating hypertension that develops during pregnancy. Their main adverse reactions are drowsiness and dry mouth (xerostomia). Methyldopa may also cause anemia or liver dysfunction.

Directly acting vasodilators

- They act directly on the arterial wall causing vasodilatation.

- They are used rarely, mainly in cases of difficult-to-control hypertension in combination with other drugs. Their main side effects are palpitations, hirsutism and the reduction of renal function.

HOW ARE ANTIHYPERTENSIVE DRUGS USED IN PRACTICE?

- The planning of the antihypertensive treatment strategy is made by the physician specifically for each patient (individualization of treatment). The choice of the best available drug depends on the presence of various other parameters, such as comorbidities (ie coronary heart disease, renal disease, diabetes mellitus, uric acid arthritis, asthma, chronic bronchitis), previously used drugs and also other factors like age, gender, lifestyle etc. In other words the antihypertensive treatment is tailored according to each individual's needs.

- As a rule, the antihypertensive therapy is lifelong. If the treatment is for any reason discontinued arterial hypertension soon reappears (within a few days or weeks) or, in some cases, after months.

- Upon drug treatment commencement, the physician will also specify the target (blood pressure level) of therapy (please see: "How much should blood pressure be lowered?")

- The antihypertensive treatment usually begins with one single drug (monotherapy). In cases of very high blood pressure levels or when other comorbidities exist (diabetes mellitus, previous cardiovascular event etc.) the physician may decide to use from the beginning a combination of two different drugs (sometimes combined in one pill).

- In order to get the maximum antihypertensive effect of a drug its continual use for at least 3 to 4 weeks is required. Therefore, one week's treatment is not sufficient to judge the efficacy of a drug. For that reason, the rush to increase drug dose or to switch to a different drug is not advised.

- The decision whether to continue or to reconsider the treatment strategy by increasing the dose of the drug, adding a second drug or changing the prescribed drug is based on the achieved level of blood pressure as well as on the development of side effects. These may present themselves as clinical symptoms or alterations in metabolic parameters.

- The optimal control of blood pressure by one, and only one, drug is achieved in less than half of the patients. In most cases in order to achieve the blood pressure target a combination of two or even more drugs is required.

- The drugs with a prolonged duration of action are preferred when planning the treatment strategy because they allow a single dose per day regimen, increasing the patient's comfort and compliance with the therapy. In some difficult cases drugs may be prescribed twice a day and occasionally three times per day.

- Antihypertensive drugs should be taken every day, and as a general rule, early in the morning immediately after waking up.

IS IT RIGHT TO USE ANTIHYPERTENSIVE DRUGS EVERY OTHER DAY OR 2 - 3 TIMES PER WEEK?

- NO. The effect of the majority of antihypertensive drugs last slightly less than 24 hours. Therefore even drugs whose effect is of the longest duration will not be effective, even if prescribed every other day.

WHEN BLOOD PRESSURE IS ELEVATED SHOULD I TAKE AN EXTRA ANTIHYPERTENSIVE PILL?

- The treatment strategies for hypertension are very different from the concept of treating a headache with aspirin. The use of extra pills when a measurement reveals high levels is completely wrong and must be avoided at all costs. A temporary increase in blood pressure is by no means related to the presence of an increased risk of an acute cardio-vascular incident (eg. a stroke).

- Do not panic in case of high rise in blood pressure. Such an increase is usually transient and the result of a stress related situation. Repeat the measurement a little later and if blood pressure remains higher than it should be consult your physician.

WHAT MUST BE DONE WHEN BLOOD PRESSURE IS TOO LOW?

- The goal of treatment is to reduce systolic pressure below 140 and diastolic pressure below 90; in some cases (eg. in patients with diabetes mellitus or renal disease) even lower levels of blood pressure are required

(systolic blood pressure below 130 and diastolic blood pressure below 80 (see also: "How much should blood pressure be reduced by treatment?"). This means that systolic pressure will be around 120 or 100. Such values of systolic pressure should not be regarded as excessively low even in the elderly. It should be kept in mind that the ideal blood pressure is: systolic pressure below 120 and diastolic pressure below 80 (see also: "What is the ideal pressure?"). Therefore those levels of blood pressure should not generate anxiety or lead to treatment withdrawal.

- On the other hand, if you observe that low blood pressure is accompanied by symptoms, like a feeling of dizziness or fainting, especially when standing up (a situation called orthostatic hypotension), you should inform your physician.

ARE THERE ANY CASES IN WHICH ANTIHYPERTENSIVE DRUG TREATMENT CAN BE DISCONTINUED?

- Very few if any. If the treatment is interrupted hypertension usually re-appears after a few days or weeks (or in some cases after months).

- Only in cases when the initial diagnosis of hypertension is wrong or in cases when important life style modifications have been achieved subsequently (eg. a significant decrease body weight) leading to a significant blood pressure reduction, may blood pressure remain normal after the discontinuation of drug treatment.

- The abrupt discontinuation of specific drugs, like beta-blockers, may cause significant adverse reactions (such as tachycardia, sudden and severe increase of blood pressure or may even trigger a heart attack in patients with underlying coronary heart disease). Therefore when dose reduction of these specific drugs is required, it should be gradual and under the guidance of a physician.

WHAT IS ANTIHYPERTENSIVE CRISIS AND HOW SHOULD IT BE MANAGED?

- When blood pressure is incidentally found very elevated due to a certain symptom (eg headache or dizziness), it is a common practice to

take an extra antihypertensive pill, quite often in sublingual form. This is not correct. It is just a remnant of the old belief that a stroke is the result of arterial ruptures in the brain (cerebral hemorrhage) due to the abrupt increase of blood pressure.

- The cardiovascular risk which is attributed to hypertension is a long-term risk and not an immediate one. This means that hypertension stiffens the arteries (arteriosclerosis) and narrows their lumen, due to cholesterol and calcium deposition (atheromatosis) only in cases when it remains high for long periods of time (years). The final result is the occlusion (thrombosis) of the artery eg. in the heart (resulting in an acute myocardial infarction) or in the brain (resulting in an acute stroke). In conclusion, hypertension is not a common cause of cerebral hemorrhage, but on the contrary it is associated with thrombotic strokes due to the long-term effects of elevated blood pressure and not to the acute spikes of pressure.

- The use of sublingual pills in order to rapidly decrease blood pressure is not beneficial. On the contrary it may even be dangerous. Especially in the elderly as well as in persons with atherosclerosis, the abrupt drop in blood pressure may lead to blood flow reduction through the stenotic arteries and trigger an acute cardiovascular incident (a myocardial infarction or a stroke). In general, sublingual pills should not be used for treating hypertension, but only for treating angina (chest pain due to insufficient blood flow to the heart).

- The prompt treatment of hypertension is required only in rare and severe cases in which the patients should be hospitalized. In those situations the high levels of blood pressure are usually accompanied by chest pain or dyspnea (difficulty in breathing) or other severe symptoms. In such cases patients should immediately seek medical attention.

- The term "hypertensive crisis" is wrong and misleading. Hypertensive patients who are aware of this term, usually misinterpret its meaning because they believe that this is a life threatening situation and that they need to be treated urgently. Therefore they are unnecessarily submitted to overwhelming anxiety and they often suffer from panic attacks due to the rise in blood pressure.

HOW OFTEN SHOULD A HYPERTENSIVE PERSON VISIT THE DOCTOR?

- At the beginning, follow up visits to the doctor should be every few weeks, in order to verify the diagnosis of hypertension, to estimate the cardiovascular risk and choose the appropriate treatment strategy.

- Subjects with well controlled blood pressure should visit their doctor every 6 months.

- Subjects who face other problems (such as high cholesterol, diabetes mellitus, smoking, renal disease, heart disease, stroke or when hypertension is difficult to treat in their particular case) should visit their doctor every 2 or 3 months.

- Unfortunately, some hypertensive patients give up their treatment or follow up after a certain period of time. This usually happens because they think that are "cured" and that they do not need drugs any more, or because they experienced adverse reactions to the treatment, or just because they forgot to take their medication or visit their doctor.

- Effective cooperation between the patient and the physician is the most important prerequisite for the effective control of hypertension and the accomplishment of its long-term therapeutic targets. Individuals with poorly controlled hypertension are exposed to many risks. If patients are followed-up on a regular basis and well controlled, these risks can be avoided.

WHAT ELSE SHOULD HYPERTENSIVE PERSONS KNOW?

- The goal of the antihypertensive treatment is not only the reduction of blood pressure but also the prevention of cardiovascular incidents. For that reason, beyond blood pressure control, all hypertensive patients should attend to all the other cardiovascular risk factors which may lead to an increased cardiovascular risk. In other words, they should simultaneously definitely treat cholesterol and glucose (diabetes mellitus) and give up smoking.

HYPERCHOLESTEROLEMIA

WHY IS HIGH CHOLESTEROL IMPORTANT?

- High cholesterol, just like high blood pressure, accelerates the athero-sclerotic and atheromatic process resulting in increased risk of cardio-vascular incidents (mainly of myocardial infarction).

- Cholesterol levels are not regulated only by the dietary intake. In fact, cholesterol is mainly produced by our own body (the liver) and a smaller percentage comes from food which is rich in animal lipids (eg. eggs, meat, dairy products etc.).

- Therefore the increase in cholesterol blood levels is attributed to both an impaired metabolism and also an increase in the intake of animal lipids. Very occasionally, it may be attributed to other diseases such as decreased thyroid function (hypothyroidism) or renal damage (ne-phritic syndrome).

- The increase of cholesterol and triglycerides is not manifested by any symptoms.

WHAT IS "GOOD" AND WHAT IS "BAD" CHOLESTEROL AND WHAT ARE TRIGLYCERIDES?

- LDL-cholesterol is the so called "bad cholesterol", which penetrates the vessel (arterial) wall and thus initiates the atherosclerotic process. The higher the LDL-cholesterol in the blood the more the LDL parti-cles penetrate the vessel wall.

- In contrast, HDL-cholesterol, the so called "good cholesterol", protects the vascular wall by removing the "bad" LDL cholesterol from the wall and thus retarding the atherosclerotic process.

- Triglycerides are another form of blood-circulating lipids. They come from food but they can also be synthesized by our own body.

- Increases in triglycerides levels are attributed both to an impaired metabolism and to an increased intake of animal lipids. Uncontrolled

diabetes mellitus, increased body weight, alcohol abuse and several drugs may also lead to increased triglycerides levels.

- The long-term effect of high levels of triglycerides is the development of coronary artery disease (although triglycerides play a less important role than cholesterol in this aspect) as well as of pancreatitis (an acute and severe disease that manifests itself in acute abdominal pain and demands prompt hospitalization). Pancreatitis is mainly observed in patients with very high triglycerides levels (>1000 mg/dl).

WHEN AND HOW SHOULD A LIPID BLOOD TEST BE PERFORMED?

- Blood lipid levels should be tested after an overnight fast (12-14 hours). Otherwise triglycerides levels will rise.

- The first measurement should be performed at the age of 30 for men and 40 for women.

- Exceptions to the above rule are subjects with diabetes mellitus, a positive family history of cardiovascular events (with a father or brother who had an incident before the age of 50, or a mother or sister before the age of 60), positive family history for familial hypercholesterolemia, or subjects at risk from other cardiovascular risk factors such as smoking, hypertension etc. These subjects should have their blood lipid levels measured at a younger age.

- The blood test should include a measurement of total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides.

- In subjects with normal lipid values, repeated tests are recommended every 5 years. Subjects with borderline values should be rechecked at shorter intervals. However, subjects with perfectly normal values and without any other cardiovascular risk factor should be retested, but not necessarily at five year intervals. In cases of high values, an earlier follow-up with the physician is strongly recommended.

HOW LOW SHOULD CHOLESTEROL LEVELS BE?

- The lower the values of total and "bad" LDL - cholesterol as well as the higher the values of "good" HDL – cholesterol the less the risk of a cardiovascular incident in the future. The optimal levels of lipids in the blood are shown in the following table.

Ideal (optimal) values of blood lipids

Total cholesterol	below 200 mg/dl
LDL – cholesterol	below 100 mg/dl
HDL – cholesterol	higher than 40 mg/dl for men higher than 50 mg/dl for women

- In case the values of cholesterol are not within these limits a long-term application is needed to modify them by adopting lifestyle changes such as exercise, diet or even drug treatment,.

- The high levels of cholesterol should be verified by repeated measurements (at least 2 different tests on separate days). In patients who are at high risk of cardiovascular incidents (a prior myocardial infarction or a stroke, diabetes mellitus, a combination of many risk factors or a very high cholesterol level), immediate drug treatment is usually recommended, always along with lifestyle changes. In most other cases, the physician has to suggest lifestyle modifications and wait for 3-6 months before deciding to prescribe drugs.

HOW CAN CHOLESTEROL BE LOWERED WITHOUT DRUGS?

- Body weight reduction in overweight people will reduce total cholesterol as well as triglycerides.

- Lifestyle as well as dietary changes are also required and a balanced, healthy diet is recommended. Regular body exercise will be significantly helpful by reducing the "bad" LDL-cholesterol and increasing the "good" HDL-cholesterol.

- You should limit the consumption of food rich in saturated fat, such

as fatty meats (lamb, pork), ham, bacon, fatty cheese, butter, margarine, cream, full fat dairy products, fresh cream, avocado, dried fruits, and Bovril.

- You should also limit the consumption of food rich in cholesterol such as egg yolk, butter, cream, entrails, lamb, shrimps, mussels, lobster, full fat dairy products and mayonnaise.

- Your menu should include fat free or low fat dairy products (milk, yogurt), low fat cheese, pulses, granary bread and breadstuffs, as well as fruit and vegetables.

- You should eat meat only after getting rid of its visible fat and you should also avoid fried food. Use sauces and dressings with the least possible fat.

- Use only olive oil for cooking and even this in limited quantities.

- Limit the use of alcohol.

- The sum of daily calories should derive: 15% from proteins, 30% from fat, and the rest from carbohydrates (about 50%).

- Your exercise should last 30 to 60 minutes most days of the week (and not less than 3). Try, if possible, jogging, cycling, swimming etc.

- There is food enriched in plant sterols (milk, yogurt, margarine) that may reduce "bad" (LDL) cholesterol by 10%.

WHEN AND HOW SHOULD HIGH CHOLESTEROL BE TREATED?

- Just like in the case of hypertension, treatment of high cholesterol is lifelong, with only a few exceptions.

- The criterion for the commencement of drug treatment is based on LDL-cholesterol levels and not on total cholesterol or HDL-cholesterol.

- The decision to prescribe drugs is based not solely on the level of LDL-cholesterol but also on the level of the total estimated risk (of cardiovascular incidents) of each patient. For example, a patient with an LDL-cholesterol level of 120 mg/dl and a history of a prior myocardial infarction or a stroke will need drug treatment. On the contrary,

a young man with an LDL-cholesterol level of 160 mg/dl but without any other risk factors (no prior myocardial infarction, no hypertension, no diabetes, a non-smoker etc.) may just need to modify his lifestyle to include exercise and a healthy diet. The physician will decide on the duration of this period as well as how and when the drug treatment will start.

- The same guidelines of treatment apply to the elderly, as long as they are in good shape and no other severe health problems coexist.

WHICH DRUGS LOWER CHOLESTEROL?

Statins

- These are the most important drugs used for the reduction of cholesterol, because they are effective and have been subject to analysis over a long period of time. Their side effects are rare. Sometimes they may induce an increase in the enzymes in the blood which are related to liver function (transaminases). A small increase in the levels of these enzymes up to three times the upper normal limit is not a justifiable reason for the discontinuation of the treatment, but an earlier follow up is a reasonable strategy for these patients. Very rarely, statins may cause temporary muscular damage, especially when used in combination with other drugs. Therefore, they should be used only under the guidance of the physician, who has to be aware of all the drugs that are taken by the patient. Statins may decrease LDL-cholesterol by 20 to 60% from the baseline levels before treatment.

Ezetimibe

- This drug reduces the intestinal absorption of food cholesterol and in this way it lowers the level of "bad" (LDL) cholesterol. It is a mild drug regarding its ability to reduce the level of "bad" LDL-cholesterol, when used alone (monotherapy). However, its combination with a statin may significantly help in the reduction of LDL-cholesterol levels. There are only a few and non significant side effects from this drug.

Fibrates

- They are used mainly for the reduction of triglyceride levels. They are safe drugs. They should not be used in subjects with renal disease (renal failure). Fibrates reduce "bad" LDL-cholesterol only minimally, but they can increase "good" HDL-cholesterol levels.

Omega – 3 fatty acids

- They decrease triglyceride levels significantly

ARE THERE ANY OTHER THERAPIES FOR HIGH CHOLESTEROL?

Soya

- It contains isoflavonoids, which have the ability to act in the same way as estrogens. A diet rich in soya may significantly reduce the levels of total cholesterol, LDL-cholesterol and triglycerides as well as reduce the levels of HDL-cholesterol. However, food protein substitution for soya is not recommended.

Plant stanols and sterols

- It seems that they reduce cholesterol absorption by the gut. They are found in fruits, vegetables, dried fruits and pulses. They may also be found in various commercial products (margarines, milk and yogurt) and dietary supplements. When the recommended doses are used they may reduce total and LDL-cholesterol levels. However, there is no proof yet that they can reduce the risk of cardiovascular incidents.

🛡️ KEY POINTS

✓ Hypertension is one of the leading factors that increase the risk of a myocardial infarction and a stroke worldwide.

✓ After the age of 55, systolic (maximum) blood pressure is more dangerous than diastolic (minimum).

✓ Hypertension does not have any symptoms.

✓ The diagnosis of hypertension is established when, in the physician's office, systolic blood pressure is consistently over 140 or diastolic blood pressure over 90 or both in 2 – 3 different visits. The same diagnostic criteria are also valid for older patients.

✓ Optimal blood pressure control eliminates the danger of a cardiovascular incident due to hypertension.

✓ The target of treatment is: systolic blood pressure below 140 and diastolic blood pressure below 90. In patients with diabetes or renal disease the target is even lower (below 130 and 80). In Greece, less than 25% of hypertensive persons are being treated effectively.

✓ Blood pressure should be measured at home 1-2 times per week, only in a state of relaxation.

✓ In order to measure blood pressure reliably at home, the best available method is the use of those automatic devices which are applied at the arm. Automatic devices which are designed for measuring blood pressure at the wrist are not currently recommended.

✓ Body weight reduction as well as salt and alcohol restriction may help to lower blood pressure.

✓ Antihypertensive drugs should be taken every day, usually early in the morning just after awakening. Temporary drug treatment modifications due to temporary fluctuations of blood pressure should not be made.

✓ The use of sublingual drugs that lower blood pressure too abruptly is under any circumstances wrong and potentially harmful.

✓ High LDL-cholesterol (the "bad" one) significantly increases the risk of a myocardial infarction. On the contrary, high HDL-cholesterol (the "good" one) reduces the risk of a myocardial infarction.

✓ High LDL-cholesterol is the result of an impaired metabolism as well as of an inappropriate diet.

✓ Body weight reduction, a healthy diet and daily exercise improve cholesterol levels.

✓ The criteria for drug treatment commencement are mainly based on LDL-cholesterol level as well as the total cardiovascular risk of each patient, which depends on the presence of concomittant conditions (eg. hypertension, diabetes, heart disease).

✓ The treatment of high cholesterol and blood pressure is, in the majority of cases, lifelong.

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