Cardiovascular risk factors.

CARDIOVASCULAR DISEASE PREVENTION

INTRODUCTION

- Cardiovascular risk management decisions are totally based on the profile of cardiovascular risk factors (CVRF).
- They lead to determining total cardiovascular risk as being the risk of fatal cardiovascular events in a predefined period.
- It is important to know not only the CVRF number got by a person but also the magnitude of each factor, both of which are proportional to cardiovascular risk (CVR).

CVRF Classification

- Major risk factors

  (whose association with the risk of cardiovascular disease was highly significant)

  WHO defined the major risk factors using 3 criteria:

1. high prevalence among population;
2. independent impact on the risk of coronary heart disease or stroke;
3. their treatment or supervision decrease risk.

- Contributing risk factors (that increase CV risk at a less significant level).

CRF Classification

- modifiable risk factors (factors that can be controlled by diet or treatment, for example: smoking, obesity, dyslipidemia, diabetes, hypertension)
- non-modifiable risk factors (for example: age, sex, height, heredity).

CRF Classification

- classical risk factors (proved by many social studies to be correlated with CV risk).

- new risk factors (there are more recent studies for them and they may be involved in different parts of physiopathogenic cycle, for example: lipoprotein, homocysteine, proinflammatory and thrombotic factors).

CARDIOVASCULAR RISK FACTORS

AGE

- Over 83% of the population affected by coronary heart disease is over 65 years old.
- For both sexes, the risk of CAD increases with age.
- It is considered that the age limit for the risk of CVD is over 45 years for men and over 55 years for women. With age, the female advantage of low CVR before menopause is lost.
- At older age, women with myocardial have a lower survival than men.
- One explanation is the fact that most CVRF have a higher age rate (e.g.: hypertension, dyslipidemia, obesity, diabetes).

SEX

- incidence is significantly lower at women than at men before the age of 50, for middle-age people the risk is 2-5 times higher at men than at women.
- A INTERHEART research showed that women usually have their first AMI 9 years later than men.
- The men AMI at a younger age may be explained by higher levels of plasma lipids and smoking before 60. Especially that in most countries smoking is more common in males.
- In the past estrogen was considered as protective factor for atherosclerosis at women, but random studies regarding the hormone replacement therapy led to reconsideration of relationship between estrogen and the risk of AMI. It is proved that estrogen has a positive effect on lipid profile and improves vascular function at women, but social studies have brought controversial results on vascular protection offered by hormone replacement therapy .

Heredity

- Family backgroung is considered as CVRF in case of premature CVD, (e.g. IMA) at first degree relatives: males <55 years old, females <65 years old.
- Racial factor plays a great role along with heredity. For example, African Americans with more severe hypertension than Caucasians have higher CVR.
- These differences must be taken into account in determining overall risk as well.

OBESITY

- Obesity is a major CVRF with increasing prevalence in developed countries mainly due to:
  - environmental and social factors,
  - peculiarities of diet,
  - sedentary way of life.
- Obesity is more common among people with low socioeconomic level, thus linking to this psychosocial risk factors.

INDEXES OF OBESITY

Index	Definition	Limită obezitate
Body mass index (BMI) (kg / sq m)	Ratio of weight (in kg) and square height (m) (G/ h square)	IMC=25-29,9 kg/sq m - overweight IMC>30 kg/sq m - obesity IMC>40 kg/sq m – lethal obesity
Abdominal circumference (cm)	Circumference measured at the umbilicus and halfway between costal margin and iliac crest	NCEP: > 102 cm at men and > 88 cm at women IDF: >94 cm at men and > 80 cm at women
Waist circumference to hip circumference ratio (waist to hip ratio, WHR)	Ratio of the 2 circumferences reflects the type of obesity	> 0.95 (M) and> 0.81 (W) - CVR associated moderately high

IDF - International Diabetes Federation; NCEP- National Cholesterol Education Program

OBESITY

- Several recent studies have shown obesity (measured by BMI) as an independent predictor of CVR, especially for high values of BMI;
- BMI limiting parameter explained by the fact that it does not reflect the distribution of body fat nor does it differentiate between muscle and fat.
- As a result, other parameters such as waist circumference and hip circumference ratio in waist circumference were proposed (waist to hip ratio, WHRM).
- Waist to hip circumference ratio is a derived parameter that reflects the abdominal fat in report to the general body size.
- In the INTERHEART study, this ratio was correlated significantly and progressively with the risk of AMI.

"Obesity paradox"

- described recently in several social studies
- defined as a better short- and long-term prognosis at overweight or obese patients.
- There were launched some possible explanations (better metabolic reserve, protective effects of some cytokines secreted by adipose tissue, lower renin activity, etc.), but so far there is no unique satisfactory physiopathological explanation.
- At present it is considered that efforts related to maintaining normal body mass

Normal weight obesity

- defined by normal body mass index (BMI <25 kg / sqm) and excess body fat.
- Threshold value above which it is considered that body adiposity is increased at these patients has not been established, but the largest study published up to date defines excess fat as follows:
- fat over 23.1% of body weight at men
- fat over 33.3% of body weight at women
- Normal weight obesity is associated with:

✓ cardiometabolic abnormalities such as metabolic syndrome and its components,

✓ proinflammatory status,

✓ increased oxidative stress,

✓ increased cardiovascular mortality in women.

SEDENTARISM

- Sedentarism is a growing problem in the developed world:
- Over 60% of population does not meet the minimum requirement of 30 minutes of daily physical activity
- quarter of population does not perform any physical activity during the week.
- Inactivity is associated with an increase 1.5-2 of CVR in comparison with active people.
- The INTERHEART study showed that exercise was a protective factor with an OR of 0.86 for AMI occurrence (95% confidence interval 0.76 to 0.97M).
- The mechanisms by which physical activity plays a CV protective role are multiple:
- maintaining an appropriate body weight
- increase in HDL-cholesterol
- lowering triglycerides
- increase of insulin sensitivity
- reducing blood pressure
- improve the uptake of oxygen by the myocardium
- Increase of coronary artery diameter.

SMOKING

- Smoking is a major risk factor for atherosclerotic disease (coronary, carotid, peripheral), including passive smoking, showing to increase RCV.
- Risk stratification should be based on total consumption of cigarettes (expressed for example as parcel number per year)
- Calculation method number of packets per year:
- Number of packet/year = (packets smoked per day) x (years as a smoker)
- Number of packets/year = (number of cigarettes smoked per day) × (years as a smoker) / 20
- (1 packet- 20 cigarettes)
- Example: a patient smoking 15 cigarettes / day for 40 years has consumpted (15 times 40) / 20 = 30-year packets.
- CV risk is even greater as smoking onset occurs before the

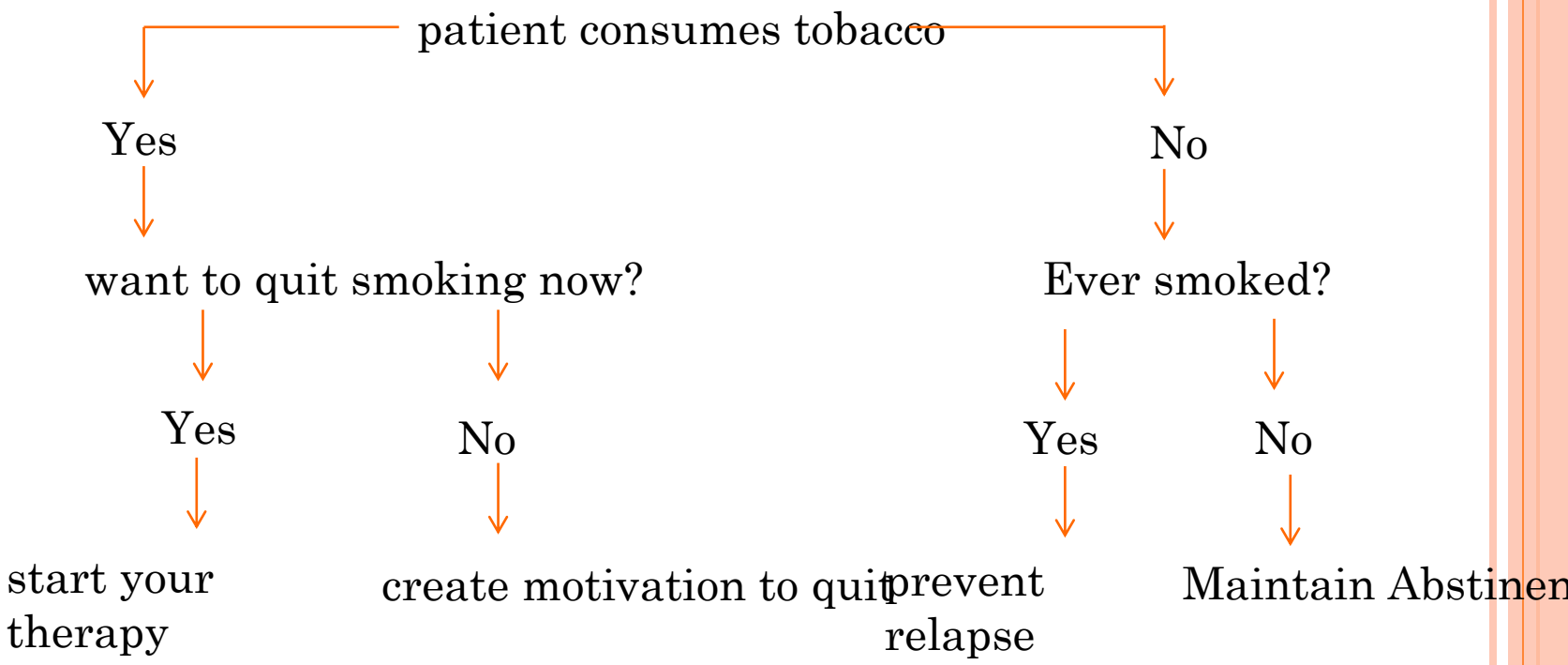
SMOKING

- The mechanisms by which smoking increases the CVR are:
  - Increase of total cholesterol and decrease of HDL cholesterol
  - platelet and leukocyte activation
  - Increase of circular fybronogen
  - endothelial dysfunction as well as promoting crack vulnerable plaques
  - Increase of heart rate and blood pressure
  - Arterial vesselconstruction (including coronary spasm)
  - effects of worsening myocardial ischemia due to carbon monoxide.
- Stopping smoking is an effective method to reduce the CVR. CV risk of former smokers decreases rapidly, reaching in about 3 years after stopping to the level of similar non-smokers.

SMOKING

- Quitting smoking is the most effective of all preventive measures, the effect being pronounced at patients with coronary artery disease.
- There is no age limit for the benefits of quitting smoking.
- Clear and strong urge for smoking cessation is often decisive, especially when it happens during an event procedure or during an coronorian intervention, the patient being very motivated when deciding to quit smoking.

Algorithm for smoking cessation assistance



SMOKING

- Drug therapy includes nicotine replacement therapy, available in different forms (gum, patch, nasal spray or inhalators, pills), being considered that they would increase 50-70% withdrawal rate.
- Some European countries have adopted legislative measures banning smoking in public places, estimating that more than 200 million European citizens would benefit from this legislation.
- After banning smoking in public places, several countries have reported reduction of acute coronary events (in Italy, 11.2% in people between 35-64 years and 7.9% for those between 65 and 74 years) .

ALCOHOL

- Link between alcohol and CVR is more complex.
- CVR is high for intensive consumers
- CVR is lower for moderate drinkers compared to abstainers.
- Thus it is known that excessive alcohol consumption (> 90g per day for at least 5 years) is a risk factor for the development of dilated cardiomyopathy (DCM), the cause of over a quarter of cases of CMD.
- Also, excessive alcohol consumption increases the risk of hypertension and, in parallel, the risk of hemorrhagic stroke or subarachnoid hemorrhage.
- Drinking large amounts of alcohol can lead to particularly supraventricular arrhythmias (e.g. atrial fibrillation in the so-called ,,Haliday-heart syndrome,,).

ALCOHOL

- On the other hand, all recent epidemiological studies agree that moderate alcohol consumption appears to have a protective CV effect with evidence collected especially for red wine.
- In this kind of alcohol,the effects of polyphenols contained in wine are more beneficial than the effects of ethanol contained in it.
- However, it is proved that considering the absence (and ethical difficulties) of average studies, patients can not be advised to use moderate amount of alcohol in order to reduce CVR.

High blood pressure

- High blood pressure defined as values of blood pressure over 140/90 mmHg, is one of the most important preventive causes of cardiovascular death, contributing to about half of the global CV mortality.
- Cardiovascular mortality doubles for every 10 mmHg increase in diastolic blood pressure and with 20 mmHg systolic blood pressure.
- Not only the absolute values of blood pressure are cardiovascular risk factors, but the pulse pressure (the difference between systolic blood pressure and diastolic blood pressure), whose increase reflects the presence of a predominant systolic high blood pressure, represents an independent factory of risk for the cardiovascular mortality (in particular coronary and for cardiovascular accidents) especially after 55 years.

High blood pressure

- In consequence, the decrease in blood pressure values through measures of lifestyle modification and pharmacological treatment has a very important impact on reducing cardiovascular mortality in primary prevention.
- Of lifestyle measures remain essential :
- hyposalted diet
- dropping weight
- moderating alcohol consumption for consumers of ethanol
- At these it should be added pharmacological measures for obtaining the normal values of blood pressure.
- And in secondary prevention, it is proven that an optimal control of the blood pressure values significantly decreases the risk of relapse of ischemic cardiovascular accident, cardiovascular mortality after coronary accident.

Dyslipidemia

- Dyslipidemia is one of the factors with high prevalence and susceptibility to be modified.
- It includes a series of disorders of lipid metabolism with the potential of inducing and maintenance of aterosclerotic phenomenon:
- Classic anomalies (increase of total cholesterol, LDL cholesterol and decrease of HDL cholesterol)
- Items recently described of the lipid imbalance (apolipoproteins changes, the increasing number of small dense LDL particles, of lipoproteins (a), triglyceride-rich lipoproteins and their fragments)

Total Cholesterol

- Epidemiological studies (Framingham studies, Multiple Risk Factor Intervention Trial - MRFIT, Atherosclerosis Risk In Communities - ARIC etc.) have proved to be a direct relationship between the serum levels of total cholesterol and cardiovascular mortality and morbidity.
- Cardiovascular risk increases by 2-3% for each percentage point of total cholesterol concentration.
- Clinical trials that have used hypolipomiant therapies have shown that reduction of colesterol values joins morbidity and mortality reduction in cardiovascular diseases in patients with or without established cardiovascular disease.

LDL-Cholesterol

- Numerous clinical studies have shown that lowering serum values of LDL cholesterol is associated with decreased cardiovascular risk.
- It has been proven that in order to reduce to 30 mg/dl in plasmatic LDL cholesterol register a 30% reduction of cardiovascular risk.
- As a result, the reduction in serum concentration of LDL cholesterol is the next target of therapy in people with dyslipidemia, causing marked reduction in the risk of coronary death, nonfatal myocardial infarction, revascularization procedures and strokes.
- The national guide Cholesterol Education Program (NCEP) established in patients with cardiovascular disease targets of LDL cholesterol concentration < 100 mg/dl or even < 70 mg/dl.

HDL Cholesterol

- Unlike LDL, increased HDL cholesterol level is a cardiovascular protective factor.
- This inverse relationship between HDL levels and cardiovascular risk is explained by the role of HDL cholesterol reverse transport that is mobilized from the periphery to be catabolized in the liver, and involvement in other antiaterogenic mechanisms.
  - antioxidant function
  - improvement of the inflammatory cascade
  - protection against procoagulant activity
- The value of serum HDL cholesterol less than 40 mg/dl is a predictive factor for cardiovascular disease.
- Low HDL levels along with trygleceridemia are the elements of the metabolic syndrome.

Diabetes Mellitus

- Insulin resistance, hyperinsulin and hyperglycemia are associated pathophysiological with atherosclerotic cardiovascular disease.
- The diabetes have a higher risk of myocardial infarction or cardiovascular accident of 2-3 times, independent of other cardiovascular risk factors .
- NCEP included in 2002 as a equivalent of BCI with a high risk.
- Control of risk factors as well as glycemic values must be aggressive in patients with diabetes mellitus (LDl cholesterol values < 100 mg/dl and the optimal values of blood pressure of <130/80 mmHg).
- Optimal control of diabetes leads to lowering the rate of cardiovascular complications.

Psychosocial factors

- Includes:
- Professional or personal stress
- financial stress
- stressful life events
- depression
- the perception of skill to control the situations of life
- lack of social support
- results of the study have shown that psychosocial factors can contribute in a significant proportion to lower risk of myocardial infarction.
- their overall effect was smaller than the smoking, but comparable with hypertension or abdominal obesity.
- the effect of stress on the risk of myocardial infarction was similar in men and women, age boundary and in all regions.

RECENT CARDIOVASCULAR RISK FACTORS DESCRIBED

Homocysteine

- The first Association of increased serum homocysteine concentration (Hcys) and atherosclerosis was based on necroptic studies in patients with the homozygot deficiency of enzymes necessary in homocysteine metabolism (CBS, metilentetrahidrofolat reductase, MTHFR).
- In patients with these defects, severe atherosclerosis develops from childhood and many of them shows a first myocardial infarction before the age of 20 years.
- Homocysteine has toxic effects on the endothelium, is protrombotic, increases the synthesis of collagen and decreases nitric oxide availability.
- Depending on the lab, hyperhomocystein is defined by a level of Hcys over 12-16 mmol/l. a level of 15-100 mmol/l is considered to be moderately increased, and more than 100 mmol/l is severely increased.

Homocysteine

- The main cause of hyperhomocysteinemia remains the genetic one.
- Main mutations found in the population are mutations of the MTHFR gene, type C677T and A1298C type.
- These patients have an increased atherosclerotic risk to the coronary artery, peripheral and cerebral.
- Blood concentration can be reduced to normal through treatment with folic acid, but are still needed studies to determine if this treatment prevents the progression and eventually the regression of atherosclerotic

Lipoprotein (a)

- The lipoprotein (a) is a particle containing an ester of cholesterol and apolipoprotein B100, differing of LDl cholesterol by the presence of glycoprotein apo (a), a plasminogen analog.
- Studies in vitro and in vivo have shown that favors atherogenesis and thrombogenesis, representing a cardiovascular risk factor independently moderated.
- A metaanalyse including 31 prospective studies reported a relative risk of 1.5 times in patients with values of Lp (a) in the upper third in comparation with lower distribution Lp (a) (according to the averages in those categories of 50 versus 5 mg/dl)
- The coexistence of an increased level of LDL, decreased of HDL or the high blood pressure increases secondary the cardiovascular risk in the patients with a high level of Lp (a).

Prothrombotic Factors

- **Thrombosis plays a central role in the pathogenesis of acute coronary syndromes, through processes that involve both platelets and clotting factors.**
- **An important haemostatic factor associated with the risk of major coronary ischemic is Fibrinogen. Thus, the high level of fibrinogen is associated with cardiovascular risk independent of lipid profile.**
- **Other haemostatic factors correlated with increased cardiovascular risk are :**
- **activated factor VII**
- **Plasminogen activator inhibitor-1**
- **Plasminogen Activator Tissue**
- **Von Willebrand (that is a marker of endothelial dysfunction)**
- **Relatively common genetic defects in population leading to a procoagulant potential are known as thrombophilias (factor V Leiden mutation, prothrombin -factor II mutation, deficits of protein C, S or antithrombin III)**
- **Indications for setting completely thrombophilic profile :**
- **in case of the disease at young age (below 45)**
- **of his family agregation**

Cardiovascular risk scores

- Estimation of the effect of combined cardiovascular risk factors on cardiovascular morbidity require the use of risk scores, in which the major risk factors to be included on the basis of their weighted prognostics.

Framingham Score

- Framingham score is calculated on the basis of equations that take into account gender, age, total cholesterol, HDL cholesterol, smoking and systolic blood pressure, assigning a number of points depending on the presence and magnitude of each factor.
- A form easier to use in actual practice is derived from this score as a coronary risk map (Coronary Risk Chart).
- In order to evaluate the risk of cardiovascular morbidity and mortality, the score set arbitrary limits :
- <10% for low risk
- 10-20% for intermediate risk
- >20% for high risk, that requires pharmacological intervention.

The score Score

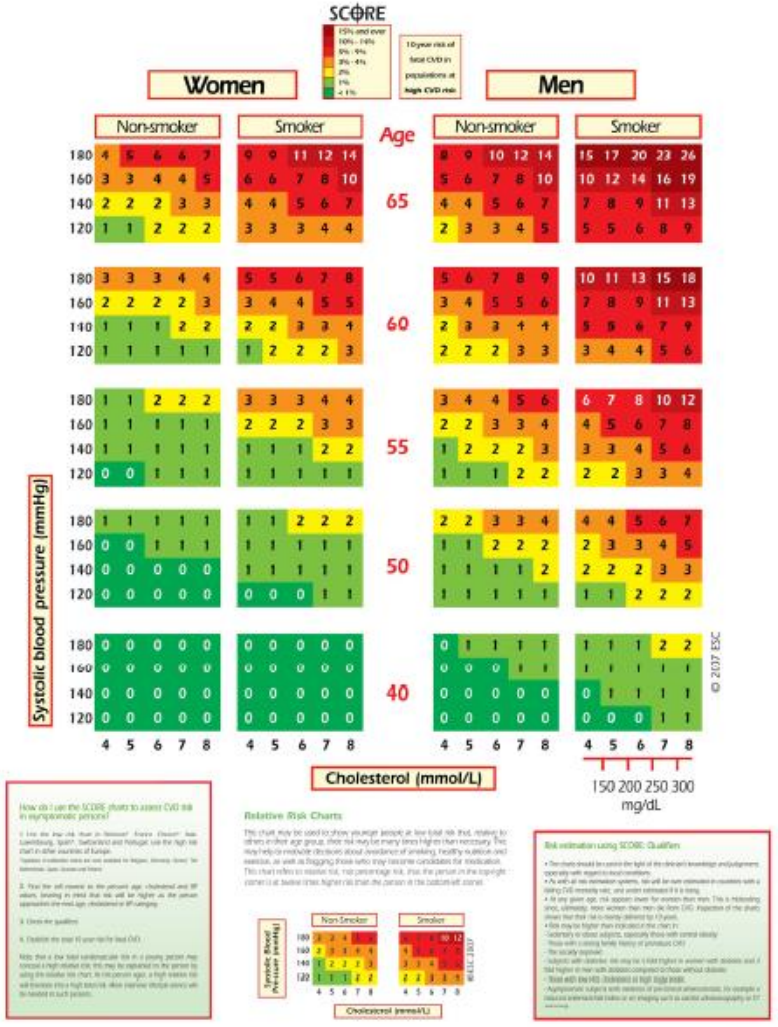
- Unlike Framingham score:
- report on cardiovascular mortality and not on total cardiovascular events.
- are taken into account and the deaths by atherosclerosis in non-coronary territories (AVC)
- the score is adjusted average ages, changing risk with age is more steep
- there are separate scores for European countries with high risk and low risk, where there was complete data about mortality.

The score Score

- The score is available in two versions, one for the regions with low risk (Belgium, France, Greece, Italy, Spain, Luxemberg, Switzerland and Portugal) and another for those at high risk, where fit and our country, along with other European countries which were not mentioned in the list above.

SCORE - European Low Risk Chart

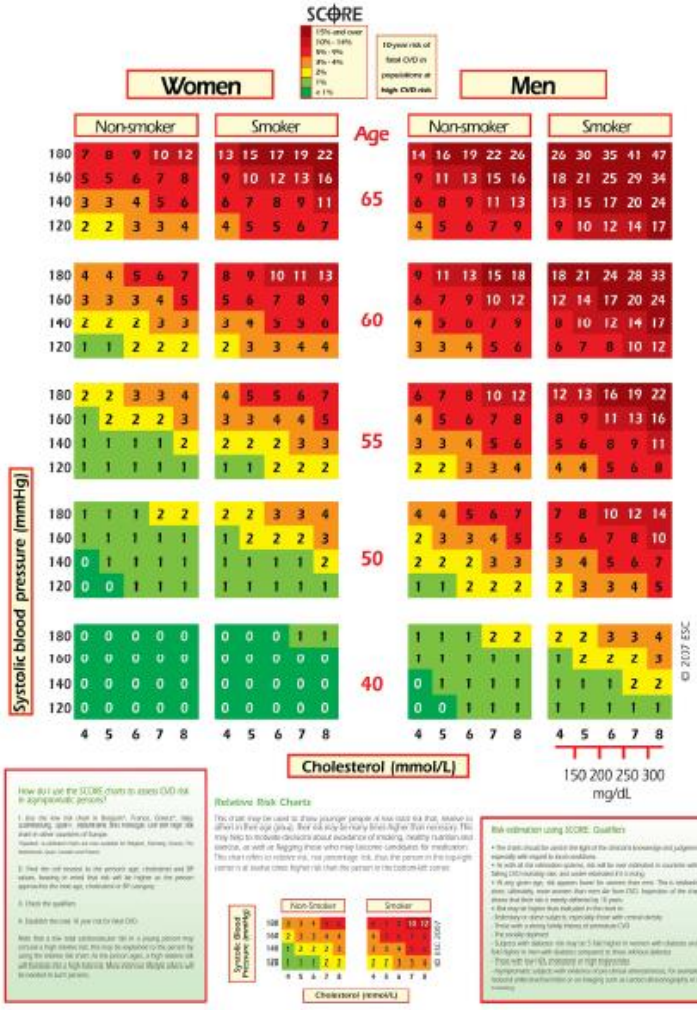
10 year risk of fatal CVD in low risk regions of Europe by gender, age, systolic blood pressure, total cholesterol and smoking status



www.escardio.org/Prevention

SCORE - European High Risk Chart

10 year risk of fatal CVD in high risk regions of Europe by gender, age, systolic blood pressure, total cholesterol and smoking statu



www.escardio.org/Prevention

The score Score

- It should be noted that the SCORE will be aimed at individuals without cardiovascular disease, aged up to 65 years. The subjects with the disease manifest ATS are considered already high risk and should be treated as such.
- The SCORE has a few functions:
- highlights the risk of CVD fatal event in the next 10 years in the table, without additional calculations
- estimated relative risk, comparing a cell (square of the grid) with any other, in the same category of age,
- assess the impact of the improvement of the risk factor (the move from one category to another risk by stopping smoking, lowering total cholesterol, etc.)
- highlight the effect of the action of a risk factor in time (increased risk with aging)

PREVENTION OF CARDIOVASCULAR DISEASE

The importance of the problem

- Cardiovascular disease is the cause of the 48% of deaths (43% in men and 55% women) in Europe and 42% in the countries of the European Union, produce more than 4.3 million deaths in European countries and over 2 million in the 27 countries of the EU.
- A notable proportion of these deaths occurs in relatively young individuals under 65, and more than 800,000 according to Europe and over 230,000 in EU countries.
- Coronary heart disease (CHD) is the most common cause of death in Europe, being responsible for 1 in 5 deaths in Europe.
- Most epidemiological models used suggest that improvement and control of risk factors, have had a more marked than in the control treatment of CVD (here being included major changes in the treatment of acute coronary syndromes, hypertension and heart failure, secondary prevention measures).

Prevention strategies

- The work of prevention of CVD has as targets the reduction of mortality and morbidity and increasing hope of life while maintaining or improving quality of life.
- There's clear scientific records whitch show that the change in style of life and the control of risk factors in reducing their action, can influence the development and progression of the disease, both before and after producing a clinical event manifest.

Prevention strategies

- The World Health Organization (WHO) considers that a comprehensive action for prevention must include three components:
- Populational strategy - referring to the change in lifestyle and the environment and addressing social and economic factors, cultural, determinants of CVD, is accomplished through the formulation of strategies and interventions in the community.
- Strategy for high-risk population - pressure identified individuals to high risk and the reduction of risk factors.
- Secondary prevention - prevention of recurrence and progression of the disease in patients with CVD clinically manifest.
- These three strategies are complementary.

POPULATION STRATEGY

Population Strategy is crucial in reducing the overall incidence of cardiovascular disease ,proposing to reduce the influence of risk factors at the population level through changes in lifestyle and social environment, without the need for individual medical examination.

Measures of influence on lifestyle refer to:

- ***Reducing the number of smokers,***
- ***Encouragement of physical activity,***

POPULATION STRATEGY

- *In 2005 the EU adopted a declaration defining characteristics associated with cardiovascular state of health:*
  - *No smoking,*
  - *Regular physical activity (at least 30 minutes daily)*
  - *healthy eating habits,*
  - *avoidance of overweight,*
  - *blood pressure below 140/90mmHg in patients without diabetes or target organ damage or with multiple risk factors,*
  - *Total cholesterol below the threshold of 5 mmol / L (about 200mg/dl).*
  - *These characteristics can be summarized as a number:*

0-3-5-140-5-3-0

- ***0*** *- no smoking*
- ***3*** *- 3km or 30 minutes of physical activity daily*
- ***5*** *- fruit and vegetable servings daily*
- ***140*** *- systolic blood pressure less than 140mmHg,*
- ***5*** *- total cholesterol below 5 mmol / l,*
- ***3*** *- LDL cholesterol less than 3 mmol / l,*
- ***0*** *- no overweight or diabetes).*

Total risk estimation

- *Total risk is the probability of a person developing a fatal cardiovascular event in a defined period of time.*
- *Assessment is done by taking into account all risk factors, not just one.*
- *The example shown in the table below shows how a female of 60 years, with a high cholesterol level of 310mg/dl has a 9-fold lower risk for cardiovascular mortality than a male of the same age, but who smokes and is hypertensive.*

Gender	Age	Cholesterol mmol/l	AP (mm Hg)	Smoker	Risc (%)
F	60	8	120	No	2
F	60	7	140	Yes	5
M	60	6	160	No	8
M	60	5	180	yes	19

STRATEGY FOR HIGH-RISK POPULATION

• *preventive measures for persons at high risk, but otherwise in good health, must become part of clinical practice. Total cardiovascular risk estimation is the first step in prevention measures.*
• *People at high risk are those with:*
- Multiple risk factors, giving a risk score of ≥ 5%
- Significantly increased level of a single risk factor, e.g. BP ≥ 180/110 mmHg or persistent BP ≥ 160/110mmHg, these values should be treated, regardless of the presence of other risk factors,
- Total cholesterol ≥ 8 mmol / L (320mg/dL)
- LDL-cholesterol ≥ 6 mmol / L (240mg/dL)
- Diabetes mellitus (relative risk is 5 for women and 3 for men).

Secondary prevention

- *Targets patients who have had a cardiovascular event and is considered to be the best cost-effective strategy.*
- *Secondary prevention initially addressed patients with coronary artery disease, particularly those with myocardial infarction or those who were revascularized, both categories being included in rehabilitation program.*
- *Cardiovascular Rehabilitation, with a mainstay at physical activity has been shown to reduce both cardiac mortality, as well as mortality overall.*
- *Patients are relatively few (compared to the population level), easily identifiable and more motivated than those who are asymptomatic.*

- *Secondary prevention suggests counseling regarding lifestyle and pharmacological therapy as the integral part of patient care after a cardiovascular or neurological event.*

Objectives of secondary prevention:

- *Smoking cessation*
- *Healthy nutrition*
- *Physical activity: at least 30 minutes of moderate physical activity daily*
- *Total cholesterol<4,5 mmol/L (175mg/dL) with option of <4mmol/L (155mg/dL), where feasible*
- *Total LDL-cholesterol <2,5mmol/L (100mg/dL) with option of < 2 mmol/L (80mg/dL), where feasible*
- *BP<130/80mmHg.*

Physical activity

- *Lack of physical activity is a major lifestyle problem since childhood. Nowadays, few children practice sports, and most of them become sedentary reaching adulthood. Also, few patients with cardiovascular disease participate in programs with physical exercise, especially when in presence of heart failure.*
- *It is estimated that at least 60% of the world population does not meet the recommended minimum of 30 minutes of moderate physical activity daily*
- *proportion of people who do not perform any kind of physical movement in a week is 25%.*
- *The risk of developing a cardiovascular disease is at least 1.5 times higher in the inactive people with major impact on the young people, where currently has been registered a marked decrease in physical activity levels at the age group from 12 to 21 years, with a tendency for stabilization at average age (30-64 years) and even improvement at more advanced age.*

- *The combination of excessive caloric intake and insufficient exercise is a contributing factor to the development of metabolic syndrome, with registered epidemic growth in recent years.*

- *The latest report published by the AHA in December 2009 on coronary heart disease and stroke, shows that almost one third (31.9%) of children aged between 2 and 9 years old are overweight or obese.*

- *The study on primary prevention from 2008, which included 513,472 individuals, shows that people who exercise during their free time lower the risk of development of coronary disease or cardiovascular mortality with 27% (for intense physical activity) and with 12% (for moderate activity) in comparison with those with low physical activity, or none at all.*

- *In secondary prevention, reduction of total mortality due to only practicing of physical exercise was assessed at 27% and 31% for cardiac mortality*

Physical activity

- *Weight maintenance or even weight loss for the overweight,*
- *Has effect on lipid profile by means of increasing, mostly, HDL-cholesterol and lowering the level of triglycerides*
- *Increases insulin sensitivity*
- *Reduces blood pressure*
- *Increases compliance to the measures of influence on other risk factors, thus lowering the incidence of cardiovascular disease and cardiac mortality*
- *Any kind of increase, low to moderate, of the level of effort has positive effects (e.g. usage of stairs instead of elevator).*
- *Everyone can choose the modality of physical activity which seems to be more attractive (walking, cycling, gardening).*

Recommendations on physical activity

Physical activity may not add
too many years of life,
but more importantly,
adds more life to years remaining

Children and adolescents

- *Each child should be encouraged to perform at least 60, preferably 90 minutes of physical activity daily, which significantly increases heart rate , under aerobic conditions (vigorous intensity at least 3 days a week) ,as well as muscle and bone strengthening exercises.*
- *The proposed activities must be adjusted to age, be pleasant and appealing.*

Healthy Adults

- *The European guide on prevention shows that 30 minutes of moderately vigorous exercise on most days of the week will reduce risk and increase tonus (physical).*

- *In practice, this recommendation can be accomplished by performing at least 30 minutes of moderate physical activity 5 days a week or at least 20 minutes of vigorous activity three days a week or a combination of these 2 regimens.*
- *To the aerobic activity (brisk walk, jogging, dancing, swimming, games such as basketball), muscle toning exercises should be added at least 2 days per week (jumping, pushups, squats, lifting weights, elastic bands, 8 -12 reps per set).*
- *Additional benefits are obtained by moderate activity of 300 minutes (5 hours) per week or 150 minutes of vigorous activity or combination of these two modalities.*

Adult with cardiovascular disease

- *Recommendations on physical training are based on information obtained from effort tests , whether it is a standard ECG, or preferably the measurement of gas changes and direct assesment of oxygen consumption.*
- *One of the most important components of secondary prevention is cardiac rehabilitation(rehab).*
- *The term "Cardiac Rehabilitation" refers to the coordinated, comprehensive intervention which has as a goal optimization of physical, psychological and social status of a cardiac patient with slowing down, stabilization and even regression of atherosclerotic process, thus reducing morbidity and mortality.*

NUTRITION

- *The relationship between dietary habits and cardiovascular risk is well established, as demonstrated in several clinical and epidemiological studies.*

General recomandations for subjects with high cardiovascular risc

nutrients	% of energetic comsumption
Total fats	30
Saturated fats	10
Trans acids	<2
Polyunsaturated	>10
N-3	1g/day
Cholesterol	<300g/day
Fruits and vegetables	>5 portions/day
Salt	<6g/day

Lipids

have a major role in the formation of atheromatous plaque.

- *The relationship between fat intake and the development of cardiovascular disease is related to the content of saturated fatty acids, which increase LDL cholesterol concentration. The main sources are animal products, processed food industry and certain fats used in cooking.*
- *Monounsaturated fatty acid intake is associated with decreased risk of cardiovascular disease.*
- *Fatty acids with trans configuration are produced by industrial hydrogenation of vegetable fats and oils. There is a positive association between trans acids and cardiovascular morbidity and mortality, which led to banning of their presence in food in many European countries.*
- *polyunsaturated acids n-6 and n-3, the main representative of which is linoleic acid, are derived mainly from vegetable oils and were found to lower LDL cholesterol and cardiovascular risk compared with intake of saturated or trans fatty acids.*

Fruit and vegetables

- *are sources of vitamins and fibers, regular intake of which reduces systolic and diastolic blood pressure.*
- *The risk of coronary events is reduced by 7% and stroke by 5% for one serving of fruit and vegetables per day.*
- *In EU countries is recommended consumption of at least 400g/day (leading to prevention of 135,000 cardiovascular disease deaths annually), consumption of 600g daily reduces the risk of cardiovascular disease by 18% and stroke by 11%.*
- *Note that approximately 90% of children in European countries consume fruit and vegetables on daily basis below the recommended amount.*

Salt intake

- *Approximately 75% of the amount of salt we eat is already in the food.*
- *The amount of salt can vary widely within the same product (bread, for example, can contain from 0.7 to 3 g/100 g of product).*
- *Reduction of salt intake from food products to 3g (equivalent to 1200mg of sodium) reduces the annual number of new cases of heart disease by 60,000 to 120,000, of stroke by 32000-66000 and myocardial infarction with 54000-99000, number of deaths from any cause being reduced from 44,000 to 92,000.*
- *The effect is similar to that obtained by reduction of tobacco consumption by 50%, reduction by 5% of body mass index in obese or usage of statins in people with low or intermediate risk. Reducing dietary salt up to 3g/day correlates with lowering of health costs with 10-24 billion annually.*
- *Currently guidelines for hypertension management based on data from WHO, recommend daily consumption of only 5g of salt (one teaspoon).*