Course 2

Cardiovascular diseases
1. Etiopathogenic mechanisms of cardiovascular disease
Direct on the cardiovascular system

Decrease of the blood flow that arrives at the heart:

spasm $\rightarrow$ ischemia $\rightarrow$ lesion $\rightarrow$ necrosis
Increase of blood pressure – higher demand on the myocardium:

ischemia → lesion → necrosis
Heart rhythm changes:
- asystole;
- dangerous arrhythmias:
  - torsade de pointes:
  - ventricular fibrillation:
Impairment of normal clotting mechanisms (risk of trombosis)
Indirect, via other disease

Ex. diabetes:
stimulating necrosis and / or endothelial lesions
Indirect, via risk behaviors

Alcohol: direct toxic effect on the myocardium

Smoking: increasing the risk of coronary spasm and stimulating atherosclerosis
Clinical symptoms

The vicious circle mechanism is quite frequent (e.g. in cardiac failure).
An important mediator in worsening the prognosis =

non-compliance (ex. in depressive patients):

it refers both to medication intake and dietary measures or exercise.
2. The role of psychological factors
Early studies
(Framingham - 1948)

- objective:
  identifying the main risk factors for cardiovascular disease;

- 5209 participants (age range: 30-62), followed prospectively (across three generations);

- 1200 scientific articles and papers;
Risk factors:

Hypertension, cholesterol increase, smoking, obesity, diabetes, sedentarism, male gender;

... but also psychosocial factors (hostility, depression, lack of social support, low socio-economic status, social withdrawal).
Replication (WHO, 2007)

The major risk of cardiovascular disease is correlated to a number of biological variables:
- cholesterol $\geq 8$ mmol/l (320 mg/dl);
- LDL (low-density lipoprotein) $\geq 6$ mmol/l (240 mg/dl);
- TC / HDL-C (total cholesterol / high density lipoprotein) $> 8$;
- blood pressure $> 160-170 / 100-105$ mm Hg;
- diabetes type 1 or 2, associated to renal pathology;
- patients with renal failure or renal deterioration;
- PCR $\geq 1$ mg / dl;
- BMI $> 30$...
...but also
male gender,
old age,
family history,
smoking,
frequent alcohol intake,
sedentarism.
Biological and psychosocial factors operate often together.

The contribution of psychosocial factors explain the relapse of some interventions (even radical) (e.g. angioplasty).
Personality types associated with an increased cardiovascular risk

- A: associated to cardiovascular risk, through:
  - increase of blood pressure and pulse;
  - increase of adrenaline, noradrenaline and cortisol;
  - increase of the plasmatic level of LDL and triglycerides;
  - stimulation of inflammation (via cytokines and IL-6).

Aggravating factors: non-compliance and low perceived social support.
Personality types associated with an increased cardiovascular risk

- D (Denollet): combination of negative affect and social inhibition.

Predicts the onset of myocardial infarction and, more generally, of an increased cardiac reactivity.
Psychiatric comorbidity

Anxiety:

- reaction at the presence of the disease, but it can also stem from anticipating the disease or its consequences;

- it is a frequent component of the vicious (soma - psyche - soma) circle in cardiovascular diseases;
Anxiety

An important element is represented by (compulsive) reassuring behaviors, which are always problematic, because they facilitate reality distortion and the anxious anticipation of new symptoms.
Anxiety and panic facilitate the (abrupt) recourse to alternative medication or to overdosing (e.g., anti-arrhythmic drugs), but they also can contribute directly to the aggravation of the cardiovascular illness (via high catecholamines and the subsequent increase of cardiac workload).
Psychiatric comorbidity

Depression:

It can predict the onset of cardiovascular diseases, but also their relapse (via non-compliance, risky behaviors, unhealthy lifestyles (e.g. giving up sanogenetic behaviors: exercise, sport, sexual life).

"Vital exhaustion" = combination tiredness - depression: proved to be associated to myocardial infarction.
3. Psychosomatic aspects in various cardiovascular diseases
High blood pressure (HBP)

- unmotivated increase of BP > 140/90 mm Hg;

- it is a frequent condition (worldwide, 1 in 6 individuals has / will suffer from HBP);

- its incidence increases with age and is correlated with the incidence of cardiovascular diseases: for ppl. aged 40-70, each increase with 20 mm Hg of systolic BP and with 10 mm Hg of diastolic BP doubles the risk of CV diseases, irrespective of BP base levels.
Classification

Essential HBP

- 90% of cases;

Factors possibly involved: stress, alcohol and coffee intake, vitamin D deficit, obesity, resistance to insuline).

Secondary HBP

- Cushing syndrome, hyperthyroidism, acromegaly, feocromocitoma, vascular malformations: congenital stenosis of renal artery, coarctation of the aorta.
Pathogeny of HBP

The essential factors that trigger the onset of HBP are the cardiac flow (CF) and the peripheric vascular resistance (PVR).

CF is dependent mainly on the sympathetic / parasympathetic balance, but also on the condition of the heart. Its importance is higher at the onset of the disease.
PVR depends on hormonal factors, such as stress hormones, the higher ratio estrogen / progesterone), but also on local factors: condition of blood vessels, e.g. the atherosclerosis process). Its importance increases, as the diseases gets more advanced.
Types of vascular reactivity in stress (Light et al., 1994):

(a) CF higher, compared with PVR: "cardiac reactors";
(b) PVR higher, compared with CF: "vascular reactors";
(c) mixed pattern.

This distinction has importance for constructing guided imagery scenarios in biofeedback, relaxation and hypnosis.
Noncompliance in HBP

It is a very problematic behavior, because the efficacy of the treatment is based in a high proportion on getting medication (often daily) and respecting a strict dietary regimen.

The most frequent source of non-compliance: the lack of negative immediate consequences of not respecting the indications received from the doctor.
PT in HBP

Biofeedback can be useful in decreasing PVR (indication: HBP related to stress).

Relaxation / hypnosis:
- facilitate diverting pt. attention from his/her symptoms (e.g. by concentrating on other body function, for example breathing);
- can increase self-efficacy and trust in a good prognosis;
- decrease anxiety, thereby decreasing the probability of an abrupt increase of the BP.
PT in HBP

CBT:

- can contribute to cognitive remodeling:
  e.g. decreasing the occurrence of negative / irrational / extremist thoughts, correcting the distorted cognitive schemas, used by the patient to justify non-compliance (e.g. "it's no use to take the medication daily").
PT in HBP

CBT:

-behavioral changes: e.g. provoking purposely certain somatic symptoms which generate fear at the patient and demonstrating their benign character (e.g. BP is increased by the effort but it normally goes back to normal, once the effort ends).
Ischemic coronary diseases

Prototype: angina pectoris = pain in the cardiac area, derived from the imbalance between the oxygen necessities of the myocardium and its supply. Causes = spasm / obstruction of a coronary vessel (e.g. via atherosclerosis, thrombosis). In general, it is reversible, yet it can evolve towards infarct / sudden death.
Forms:
- stable (it is related to effort and it progresses in a rather predictable way);
- unstable (it is not related to effort and is associated more with the spasm, therefore it can have an acute evolution);
- microvascular (the X syndrome) (it is an angina that appears at efforts, yet with a normal angiogram).
Causes

- age (≥ 55 at men, ≥ 65 at women);
  - smoking;
  - diabetes mellitus;
  - dyslipidemia;
- family history of early cardiovascular disease (< 55 at men, < 65 at women);
  - HBP;
- renal disease (microalbuminuria or GFR < 60 mL/min);
  - obesity (BMI ≥ 30 kg/m2);
  - sedentarism;
  - polycythemia;
- medication (even vasodilating drugs);
  - arrhythmias;
  - valvular disease;
  - cardiomyopathy;
  - anemia;
  - hipoxemia.
Myocardial infarction: necrosis / lesion / ischemia; it involves, always (contrasting to AP) an irreversible morphological change.

Diagnosis criteria: extended pain (> 20 min.), which can spread into the left arm, gastric area, jaw, teeth; dyspnoea; nausea, vomiting; arrhythmias; cold sweats; loss of consciousness; anxiety / panic (can trigger a vicious circle).
Pathogenic contribution of psychological factors

- imbalance at the level of autonomic nervous system, with an increase in the activity of the sympathetic component. This is manifested into direct effects (HBP, increase of the heart frequency and cardiac flow), but also into indirect effects (thrombocytosis, predisposition to arrhythmias, clot formation and ruptures of atheroma plaques);
- various noxious behaviors: they can contribute to the supplementation of risks (e.g. smoking, marijuana and cocaine can all accelerate vasoconstriction);
certain abnormal psychological states, be they long or short lasting (e.g. depression, social isolation, aggressivity and hostility) can trigger non-compliance, including a delay in visiting the medical institutions.
Cardiac failure

-incapacity of the heart to ensure a sufficient systemic flow to cover the needs of the body;

Classification:

By the heart side which is more affected:

- left - the most important symptoms derive from lung stasis (dispnoea, tiredness, pulmonary oedema);

- right - the most important symptoms derive from the hepatic stasis (hepatomegaly, oedemas);

- global.
By onset:

- acute (e.g. acute pulmonary oedema, cardiac tamponade, massive pulmonary thromboembolism, extended myocardial infarctus);

- chronic (e.g. ventricular hyperthrophy, cardiomyopathy).
By the causing mechanism:

- through alteration of the muscular tissues [myocarditis, dilative cardiomiopathy, systemic diseases, endocrinopathies (e.g. diabetes), neurodegenerative diseases (e.g. Duchenne)];

- through alteration of contraction efficiency (HBP, obstructive cardiomyopathy, mitral / aortic insufficiency);

- through rhythm disorders (atrial fibrillation, supraventricular paroxysmal tachycardia, atrioventricular block);

- through increased flow (hyperkinetic syndrome): anemia, fever, hyperthyroidism, arteriovenous fistula.
By the degree of functional impairment (NYHA):

Class I:
The patient displays symptoms exclusively at big efforts, the daily physical activity is not affected.

Class II:
There is a moderate limitation of physical activity, because of symptoms (angina, palpitations, fatigue, dyspnoea). No symptoms at rest.

Class III:
Big limitation of daily activities, because of the symptoms. The discomfort disappears only at rest.

Class IV:
Symptoms are present also at rest.
Psychological aspects in cardiac failure

a) frequent psychiatric comorbidity

- a vicious circle-type relationship with depression: prevalence of depression in CF is 11-48%, but also depression can predispose cardiac patients to CF [a prospective study by Abramson et al. (2001) on 4538 patients evaluated the relative risk at 2.0];

- anxiety = more rare (as patients get accustomed with symptoms); it is more often correlated to dyspnoea.
b) importance of self-monitoring and prevention of disease aggravation:

- some patients (e.g. type A) perceive CF as rather a casual episode (a happening), than a chronic problem that requires self-monitoring;

- self-monitoring aims:
  - early recognition of symptoms (e.g. oedemas, weight gain, dyspnoea);
  - enforcement of rules regarding diet (e.g. salt and liquids consumption), regular exercise, ceasing of smoking and alcohol consumption;
  - compliance to medication.

Personalized educational programs are considered a key element for a correct self-monitoring.
Arrhythmias

Palpitations or diverse uncomfortable sensations related to heart beats occur in 16% of patients.

Yet, in practice only 43% of those complaining of palpitations have them, or have a cardiac disease.

In spite this, these patients are very big consumers of medical resources, especially by visiting the doctor quite often and without any immediate reason.
In women, especially at those associating various anxiety disorders (e.g. agoraphobia, social phobia), these symptoms are frequent.

The explanation lies in the decrease of the perception threshold for normal heart beats + the anxious expectation of any irregular beat ("self-fulfilling prophecy") + the increased need of support of these patients.
The psychological treatment of arrhythmias (or "arrhythmias-like complaints") is based on:

- CBT: working with irrational thoughts, esp. by reality testing – e.g. verifying the normal oscillations of the pulse, if an effort is done;

- relaxation/ hypnosis: both contribute to the increase of self-esteem and self-efficacy;

- encouraging the functional type of social support (i.e. that kind of support that does not encourage the sick role).
Cardiac surgery

Anxiety:

- can remain a problem for weeks and even months after the intervention;

- can increase the chances of the relapse for a negative coronary event (infarctization, thrombosis). Most frequent mechanisms: spasm, high secretion of cathecolamines.
Anxiety profile in emergency situations

- Anxiety generated by the symptom
- Anxious patient
- Anxiety generated by the recall of the dangers the patient passed through ± the fear that these or some similar ones may reoccur
- Normal patient
- Surgical act (anxiety is controlled by medication)

Time

Anxiety
Depression:

- has a negative effects, especially via non-compliance;

- is especially a problem when preceding the intervention: its impact is higher;

- negative / inadequate information given to the patient can mediate the onset of postoperative depressive states.
Perception of a low quality of life (QoL):

- unrealistic: 25-49% ; does not correspond to any objective data (it is rather due to fear, this leading to self-restrictions);

- real: QoL can decrease if the surgery generated a major change in the daily life of the patient (e.g. can accelerate cognitive decline in elder patients, can decrease the perceived social support or the ability to pursue a career or fill a social role).
Relaxation and CBT can help in decreasing the level of preoperative anxiety, the incidence of depression, exhaustion or aggressiveness and the need of analgesics in the postoperative period.

Also a positive effect is brought by :
- eliminating unhealthy behaviors;
- increase of social support resources;
- doing exercise;
- early management of all psychological symptoms.