that supply the area of basal ganglia and capsula interna. The cerebral tissue changes that occur due to age are multiple such as microemboli that result in **microinfarction** with the following reduction of cerebral function. This type of cerebral atrophy is a very common cause of senile dementia in our population.

The greatest loss of function occur directly following the occurence of infarction. During this period the situation is worsened by brain edema and disturbance of the cerebral vascular supply (ischemia, hypoxia, hypoglycaemia, etc.) A large infarction is associated with loss of consciousness. Whithin few days, when the infarct is organized, macrophages will appear in the area, there will be the formation of new capillaries, the edema ceases, and the area of functional dissability dicreases. The compensation of the lost functions is one of the characteristics of the brain tissue. However, this compensation might require few weeks and commonly maximal rehabilitation. A complete clinical renewal of the lost functions is possible in cases of small infact only.

6.15 Intracranial haemorhage

A spontaneous **intracranial haemorhage** (IH) is very rare to occur. Usually there is **a local vascular abnormality**, that is manifested incases of **hypertension**. A number of IH cases occur in **cerebral tumors**, systemic **diathesis** and **arterio-venous malformations**.

Basically, the intracranial haemorhages are devided into two groups:

1. Intra cerebral haemorhage
2. Subarachnoid haemorhage.

6.15.1 Intracerebral haemorhage

Intracerebral haemorhage occurs in middle aged patients suffering from **hypertension**. They often have **microaneurisms** on the small of the cerebral arteries. A direct cause of haemorhage is **rupture** of one of these aneurisms. The haemorhage commonly occurs in the region of medial cerebral artery – and mainly its bifurcation to supply the basal ganglia and the internal capsule, the haemorhage might also occur in pons and cerebellum. The course is usually sudden (acute), from complete health, the patient develops headache, diziness and hypertension commonly accompanies these conditions, the haemorhage will procede very fast. There will be an intracranial hypertension CNS functional disability, unconsciousness and death might occur. If the haemorhage is localized, the manifestations will be less dramatic. There might be variable degrees of dysfunction (paralysis according to the locality of the haemorhage). Intracerebral haemorhage always runs the typical course and usually spills into the ventricular space or the subarachnoid space.

In cases of untreated hypertension, the pressure in the brain capillaries might increase resulting in altered vascular wall permeability. This is how proteins, erythrocytes and other intravascular components reach the brain tissues and brain edema might occur. We are talking about **microhaemorhages** into the brain tissue. The common end result of this process is the gradual necrosis of brain tissue and the formation of **the hypertensive encephalopathic symptomatology**.

The risk of intracranial haemorhage is higher in patients suffering from hypertension by about 7-folds. The pathomechanism arises from the fact that in hypertensive patients the blood pressure is markedly raised in small arterioles with the resulting degeneration of the vascular wall. This might directly lead to wall rupture and hence the formation of aneurism and its following rupture. The prominant pulsation of these arterioles leads to the compression of the surrounding tissues (excavation), and a small perivascular space will be formed (lacunes). The vascular wall loses its back up that also leads to its weakening.

6.15.2 Subarachnoid haemorhage

Subarachnoid haemorhage is the most common manifestation of sacular aneurisms that are situated in the area of circle of Willis. The basic cause is a congenital malformation of the elastic constituent of the vascular wall. The aneurism is rare to be manifested during birth. The size of the aneurism can vary from 1–2 mm till 1–2 cm. However not all aneurisms cause haemorhage. The incidence increases with age. The aneurism can rupture directly into the brain tissue

and there will be intracerebral haemorhage. When bleeding into the subarachnoid space the intracranial pressure increases and the perfusion worsens. Some regulatory machanisms are activated and these will provide the adequate amount of oxygen supply to the brain. In the area of haemorhage vascular spasm might occur and this might lead into a secondary brain infarction. In this case the infarction is a complication of the original disease. Examination of the cerebrospinal fluid reveals blood and pink supernatant that remains after centrifugation due to erythrocyte haemolysis. After 24 hr. xanthochromia appears (yelow discoloration of the CSF due to degeneration products of the blood).

6.16 Aging changes and brain tissue atrophy

We know that brain tissue **atrophy** begins in the 3rd decade and the morphological changes of the brain tissue are associated with **aging**. The brain volume decreases by 2–3 % for every 10 or 20 years and by about 100 g wt from the 30th year of age. Its necessary to mention that these results were collected from many studies and still they dondt contain a wide scale of variability in relation to individual characteristics, life style, geographical and other conditions.

Macroscopically the brain of older people is smaller (the normal weight is about 1380 g in men and 1204 g in women), the arachnoid mater is thicker with a higher number of granulations, the subarachnoid space is thickened, the gyri are narrow and on the contrary the sulci are wide (normally itds the opposite). The most important microscopic aspect is the reduction of neocortical neurones, as well as the reduction of the number of Purkinje cells layers of the cerebellum and the motor cells of the spinal cord. In cases of **senile dementia** (as well as in cases of **senile Alzheimer dementia**) these signs are very marcable. Yet if the dementia occurs in any age, itds always accompanied with **degenerative or atrophic changes** of the brain.

Dementia is clinically manifested with disturbance of memory, new memory and disturbance of the intelectual functions. This gradual disorientation worsens progressively and relatively fast and hence the stage of complete dementia can develop within few years. The wide variability of manifestations of the clinical picture points to the fact, that these changes are not marely related to age. There is probably some multifactorial process. We suppose that a common incidence is related to a high incidence of cardiovascular diseases. Even in those diseases many heriditary factors as well as factors of the external environment could be more accurately specified.

6.17 Infections

CNS infections are in comparison with infections of other localities very rare diseases. The course of CNS infection can be asymptomatic with some minimal pathological changes (e.g. viral infections), yet the course of the infection might be very difficult and may lead to a permanent dysfunction and death.

Generally we devide the infectious diseases of the CNS according to their localization into two groups, those which can cross the barrier formed by pia mater, such as diseases of the meninges (**meningitis, empyema and abscess**), and those diseases affecting the brain tissue (**encephalitis and abscess**). The etiopathological agents are usually bacteria, viruses and mixed infections.

6.17.1 Bacterial infections

1. **Infections that usually spread via blood**. Very common infections to occur this way are infections in the area of subarachnoid space (meningitis) that can be **pyogenic** (e.g. meningococci, pneumococci and haemophilus), and **granulomatous** (e.g. tbc, treponema pallidum). If the bacteria sett directly in the brain tissue a brain abscess will form, that could be of two types (**pyogenic** – mixed infection, staphylococcal infection, or **granulomatous** – tuberculotic).

2. **Infections that cross the blood brain barrier due to the distruction of the protective tissues** (dis-