

## Session No.1

### Health problems of elderly people from the perspective of a geriatrist, neurologist and a pharmacologist

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#### **1. Health needs of the elderly - the potential role of plant preparations**

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#### **2. Current neuroprotection possibilities in acute brain damage**

*Professor Konrad Rejdak, PhD habilitated in medical sciences*

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#### **3. Interactions of plant-based drugs used in older patients**

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## **1. Health needs of the elderly - the potential role of plant preparations**

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Elderly people suffer from several chronic diseases on average. In addition to classic diseases such as cardiovascular, respiratory or rheumatic diseases, seniors struggle with problems characteristic of old age, such as protein-energy malnutrition, sarcopaenia (dynapaenia), cachexia or frailty syndrome. Elderly patients often take several or even a dozen or so different preparations. This raises the risk of side effects from medications.

In geriatric therapy, drug-free treatment options should always be considered, drugs should be adapted to a specific diagnosis, doses and number of drugs should be reduced whenever possible, treatment checked regularly, methods should be used to reduce polypharmacy: Beers criteria, a list of drugs whose use should be considered in the absence of contraindications - START (Screening Tool to Alert doctors to Right Treatment), a list of potentially inappropriate drugs in the treatment of patients > 65 years of age. - STOP (Screening Tool for Older Persons's Prescription).

Plant preparations have been widely used in many cultures for centuries. Herbal medicines are preparations with proven therapeutic effect. The growing number of scientific studies makes it possible to better assess the effects of individual plant substances. For example, a meta-analysis of over a dozen published studies found that Echinacea reduced the chances of developing a cold and the duration of the common cold. However, there is still a lack of studies in the Evidence Based Medicine standard assessing the effectiveness of plant substances. Unfortunately, the quality of most herbal drug clinical trials reported to date is of great concern due to a number of factors that have made the data questionable. In a review of 206 randomized controlled trials (RCTs) in herbal medicine that was published in Medline in 1966-2003, important methodological elements of RCTs, in particular, blinding of studies, concealment of allocations, generation of allocation sequences, and analysis of treatment intent have not been fully described. Only 15% of these studies used blinding, the majority of the sample sizes were less than 300 patients, the controls were inadequate and the studies were short term.

In common understanding, herbal medicines are "natural" and safe. The elderly often cannot distinguish between plant medicines and dietary supplements. The concomitant use of prescription drugs and herbal medicinal products among the elderly is common. Many elderly people are convinced of the effective effects of these preparations. However, we should remember about special safety considerations. Taking other medications, even without a prescription, in combination with the active substances of herbal materials can cause serious side effects, especially if they are anticoagulants, painkillers or medications for high blood pressure. In people waiting for surgery, taking herbal supplements can affect the course and success of surgery. The ingredients of some herbal preparations may reduce the effectiveness of anesthetics or lead to an increase in blood pressure and hemorrhage. The metabolism of drugs in the elderly is different than in younger people, therefore it is always advisable to consult a doctor before using herbal preparations.

## **2. Current neuroprotection possibilities in acute brain damage**

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Cerebral vascular diseases are one of the most common causes of death and disability, and the number of cases in many countries of the world is constantly increasing. In recent years, great progress has been made in understanding the basic molecular mechanisms responsible for the cellular damage processes in acute brain injury. This provided the basis for the development of therapeutic methods. Despite numerous failures of neuroprotective therapy in diseases of the central nervous system to date, the strategy of stimulating neuroregeneration/neuroplasticity will occupy an important place in modern neurology. After analyzing the extensive literature on this issue, it seems that in rapidly progressing pathological conditions (stroke, trauma) a combination therapy with the use of substances acting on different levels of the damage cascade will be a rational approach. In the case of diseases with a slow but progressive course, early diagnosis and starting treatment in the asymptomatic period when most of the neurons have not yet been destroyed is extremely important. Otherwise, the only rational approach will be symptomatic therapy or techniques currently being developed to reconstruct tissues by stimulating their development. This presentation will discuss the most important methods of neuroprotective therapy in acute brain injury.

### 3. Interactions of plant-based drugs used in older patients

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Age is known to be one of the factors influencing the variability of a pharmacotherapeutic response. Therefore use of polytherapy, including the use of herbal drugs, is a serious challenge for safe pharmacotherapy. It is known that in the elderly, the processes of drug absorption from the gastrointestinal tract are slightly reduced, but age has a significant impact on the distribution of medicinal substances, because in patients over 65 years of age there is a decrease in the volume of distribution, an increase in the permeability of the blood-brain barrier or a decrease in plasma albumin concentration, which may increase the concentration of the free, unbound drug in the plasma. During aging, liver weight and hepatic blood flow rate decrease, leading to a slower metabolism (especially by CYP2C19) and hepatic clearance of drugs. Renal elimination of drugs in elderly patients is slowed down, and a decrease in muscle mass and an increase in body fat lead to a prolonged half-life, especially of lipophilic drugs. In addition, there is an increased likelihood of side effects from a pharmacodynamic point of view with age. The occurrence of the risk of pharmacokinetic and pharmacodynamic interactions during polytherapy in elderly patients may have a significant clinical dimension, especially when using a herbal drug that is inherently multi-component. It is known that from a practical point of view, when using chemical species as drugs, the likelihood of interactions increases with the increase in their number, reaching for two drugs - 13%, for five drugs - 38%, and for over seven - 80%. It should be emphasized that most of the knowledge about possible interactions comes from in vitro or in vivo tests using experimental animals. Conducting clinical trials that meet the currently used rigorous methodological assumptions is limited due to their cost, ethical considerations and reference to a specific population (role of pharmacogenetics). Hence, the results of interactions are known mainly from clinical or toxicological case reports, most of which are incidental. Nevertheless, there are known cases of serious interactions of such synthetic drugs as e.g. warfarin, benzodiazepines, statins, paracetamol, NSAIDs with drugs containing St. John's wort (*Hypericum perforatum*), ginkgo biloba (*Ginkgo biloba*), ginseng (*Panax ginseng*), valerian root (*Valeriana officinalis*), common garlic (*Alium sativum*), red-root sage (*Salvia miltiorrhiza*), Echinacea purpurea (*Echinacea purpurea*), fenugreek (*Trigonella foenum-graecum*), milk thistle (*Silybum marianum*). The effects of increasing the potency of warfarin were observed, leading to an increase in its effect and prolongation of bleeding time after the use of fenugreek, garlic, red-root sage, even leading to intracerebral haemorrhage (ginkgo). However, there is also a group of medicinal plants whose use reduces the effect of warfarin, e.g. St. John's wort, ginseng. The best known plant in terms of interactions is St. John's wort. Most of the sources cite interactions at the pharmacokinetic level, leading to a decrease in the concentration and thus the reduction of the effect of such drugs as alprazolam, amitriptyline, bupropion, gliclazide, imatinib, methadone, omeprazole, statins (rosuvastatin, atorvastatin), and zolpidem. Sometimes the comedication of St. John's wort with drugs leads to very strong and dangerous pharmacodynamic interactions, such as joint administration with buspirone or drugs from the SSRI group (paroxetine, sertraline) or venlafaxine (serotonin syndrome). Hence, due to the changed physiology of the elderly and the resulting implications, the emerging risk of the above-mentioned interactions should be carefully considered and reflected in the careful use of polytherapy in patients over 65 years of age.