

# Plant extracts in joint diseases

The natural preparation has been developed at Irvine University in California in order to help people suffering from joint diseases. This preparation is a unique combination of six plant extracts working synergistically and having a beneficial effect on joints. Based on the pharmacognosy data it is taken that synergic action of active ingredients may lead to the inhibition of a specific enzyme cyclooxygenase-2, which results in a reduction of inflammation and pain and inhibition of an over-reacting immune system. This inhibits joint damage and supports cartilage regeneration.

**Angelica root extract** (*Angelica sinensis*, called in traditional Chinese medicine *Dong quai*): is a source of volatile oils i.a.  $\alpha$ -phellandrene,  $\alpha$ -pinene, and  $p$ -cymene and coumarins: i.a. *archangelicin*, *ostheol*, *osthenol*, *ferulic* and *angelic acids* that inhibit cyclooxygenase-2 and 5-lipoxygenase showing anti-inflammatory and analgesic effect. Angelica extract shows multilateral activity and has been used in digestive problems, to alleviate menopause symptoms and vascular disorders.



**Astragalus root extract** (*Astragalus membranaceus*, in traditional Chinese medicine called *Huang qi*): it is source of i.a. triterpene glycosides - so called *astragalosides*. Astragalosides connected to amino acids and trace elements show a significant immunomodulating activity, which might be beneficial in rheumatoid arthritis and other autoimmune diseases like e.g. systemic lupus erythematosus due to inhibition excessive immune reactions.



**Broccoli sprout extract** (*Brassica oleracea italica*): is a rich source of organic sulphur that is important in the regeneration process. It also provides sinigrin, that has multidirectional activity i.a. on lipids metabolism, thyroid hormones, cellular apoptosis, anti-oxidative and anti-inflammatory activity.



**Chamomile flower extract** (*Chamomilla recutita*): provides volatile oils including oxides of  $\alpha$ - and  $\beta$ -bisabolol and *chamazulene*. Chamazulene has strong anti-inflammatory activity. Moreover, the extract provides bioflavonoids (*apigenin*, *luteolin* and *quercetin*). All active compounds show synergistic clinically important anti-oxidative and spasmolytic (muscle relaxing) activity, which protects joints from oxidative damage caused by free radicals cascade formed in the course of the inflammation process



**Lemon fruit extract** (*Citrus lemon*): is a rich source of *C vitamin* in *bioflavonoid complex*. It also provides volatile oils containing *limonen*, *citral* and *citronelal* having antiseptic, soothing, analgetic and strong antioxidative and anti-inflammatory properties.



**Pineapple fruit extract** (*Ananas comosus*): is most of all a source of the proteolytic enzyme *bromelain*. Bromelain is useful in many clinical situations e.g. being overweight. However, it is the most useful in reduction of inflammation that is related to injury and infection. Several studies have shown that bromelain, like non-steroid anti-inflammatory drugs, reduces pain and inflammatory symptoms in osteoarthritis and rheumatoid arthritis.



## Dictionary:

- Synergy** - joint action of two or more agents (drugs) that, taken together, produce a greater effect than the sum of their individual effects.
- Pharmacognosy** is the science of medicines derived from natural, mostly plant, sources. The word "pharmacognosy" is derived from the Greek words *pharmakon* (drug) and *gnosis* (knowledge). The contemporary study of pharmacognosy can be divided into the fields of: (1) medical ethnobotany: the study of the traditional use of plants for medicinal purposes, (2) ethnopharmacology - the study of the pharmacological qualities of traditional medicinal substances; (3) phytotherapy - the medicinal use of plant extracts, (3) phytochemistry - the study of chemicals derived from plants (including the identification of new drug candidates derived from plant sources), (4) zoopharmacognosy - the process by which animals self-medicate, by selecting and using plants, soils, and insects to treat and prevent disease, (5) marine pharmacognosy - the study of chemicals derived from marine organisms.
- Cyclooxygenase** is an enzyme responsible for formation of important biological mediators called prostanoids, including prostaglandins, prostacyclin and thromboxane. There are first of all two cyclooxygenases; the first (COX-1) so called constitutive; it takes part in formation of regulatory prostaglandins for blood vessels and GI tract, and the second (COX-2) so called induced e.g. by injury or inflammatory stimuli and it is responsible for the inflammatory reaction swollenness, pain, and fever.
- Bisabolol** more strictly  $\alpha$ - and  $\beta$ -bisabolol, is the primary constituent of the essential oil from German chamomile. Bisabolol has a weak sweet floral aroma and is used in various fragrances. It has also been used for hundreds of years in cosmetics because of its perceived skin healing properties. Bisabolol is known to have anti-irritant, anti-inflammatory and anti-microbial properties.
- Bromelain** is a proteolytic enzyme extracted from the pineapple fruit. Bromelain, increases blood fibrinolytic activity as well as inhibiting fibrinogen synthesis and subsequently inhibiting blood clots formation; bromelain also directly degrades fibrin and fibrinogen. Kininogen and bradykinin serum and tissue levels are lowered by bromelain and it also affects prostaglandin synthesis, which gives its anti-inflammatory effects. Bromelain has been found to reduce the excretion of proinflammatory cytokines as well as chemokines in a study into its possible mechanism of action in ulcerative colitis, inflammatory bowel disease, and Crohn's disease.
- Astragalosides** - triterpenoid saponines derived from Astragalus. They show adaptogenic activity, which increases the ability of an organism to adapt to environmental factors, and to avoid damage from such factors. The bidirectional activity typical for adaptogen regulates immune system stimulating depressed and inhibiting over reacting immune system. It has been proved in several experimental papers that consumption of triterpenoid saponines from Astragalus is very beneficial in several clinical situations i.a. for joint health.
- Sinigrin** is a glycosinolate that belongs to the family of glycosides found in some plants of the cabbage family such as Brussels or broccoli sprouts, turnip, and mustard seeds. Sinigrin gives food a characteristic scent and taste. Sinigrin has potent anti-oxidative, anti-inflammatory and tissue protective activity. The studies made in Norwich Research Park in UK suggest that sinigrin may eliminate pre-cancer cells (apoptosis). This suggests that regular consumption of sinigrin high content food may have a positive effect in bowel tract cancer prevention.
- Apoptosis** (from Greek) is the natural process of programmed cell death (PCD) that may occur in multi-cellular organism. In contrast to necrosis, which is a form of traumatic cell death, which results from acute cellular injury, apoptosis confers advantages during an organism's life cycle. Thanks to this mechanism the used up and/or injured cells are destroyed and removed. Between 50 and 70 billion cells die each day due to apoptosis in the average human adult. It is of great importance