# MULTIFACETED USE OF GLUCOSAMINE AND ITS COMBINATION WITH FLAVONOIDS AND NSAIDs

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There are many different diseases that threaten the human life and health. Cancer is a serious social and health problem, devastating disease with significant mortality and morbidity in both developed and developing countries. Acquired and intrinsic resistance to major classes of anticancer agents: antimetabolites, anthracyclines, taxanes and alkylating agents which are mostly pro-apoptotic present a serious challenge to management of cancer. They are also affected by the problem of drug resistance. So there is need for new anticancer agents with new mechanisms of action that are apoptosis independent.

Osteoarthritis is a chronic degenerative disease of joint characterized by progressive destruction of articular cartilage, loss of free movement and disability. The 14% of adults have osteoarthritis. The losses connected with diseases of this group increased in recent years and up to 3% of gross national income of developed countries such as USA, Canada, UK, France and Australia. Thus, the development of new highly efficient methods of treatment and prevention of osteoarthritis is a very important problem of experimental and clinical pharmacology.

These two serious illnesses can be treated with the same compounds. Among such compounds can be identified glucosamine, which in addition to being a promising drug for the correction of the toxicity of anticancer therapy. Glucosamine has nephroprotective, hepatoprotective, cardioprotective, gastroprotective, chondroprotective effects. Therefore, his combination with other drugs that are used to treat cancer and osteoarthritis can be extremely effective.

The analysis of research confirms that derivatives of glucosamine exhibit antitumor activity of hormone-dependent tumors. D-glucosamine was previously reported to show potent *in vitro* antitumor activity on a range of cancer cell lines derived from breast, pancreas and prostate cancer.

Derivatives of glucosamine at intermediate dose (250 mg/kg) had the highest inhibition ratio on tumor growth and that the inhibition ratio declined at higher dose (500 mg/kg). The antitumor activity may be due to its cytocidal and immunomodulating properties. D-glucosamine hydrochloride at dose of 250 mg/kg could also promote obviously the T-lymphocyte proliferation induced by ConA, as well as the thymus index and spleen index.

Quercetin has also been demonstrated to display the anticarcinogenic, antiviral, antibacterial and anti-inflammatory effects. The anticarcinogenic properties of quercetin result from its significant impact on an increase in the apoptosis of mutated cells, inhibition of DNA synthesis, inhibition of cancerous cell growth, decrease and modification of cellular signal transduction pathways.

Derivatives of glucosamine improves the metabolism of cartilage. These compounds are a substrate for the synthesis of glycosaminoglycans, stimulates the synthesis of proteoglycans. Despite the high chondroprotective activity of derivatives of glucosamine it should be noted the lack of efficacy of this group on anti-inflammatory and analgesic effect, which somewhat limits the possibilities of their use in patients with osteoarthritis.

Today the most promising direction is the development of third generation chondroprotective drugs based on combinations derivatives of glucosamine with drugs of other groups (non-steroidal anti-inflammatory drugs (NSAIDs), vitamin, micronutrients, etc.). This can significantly extend the pharmacodynamics derivatives of glucosamine. The resulting combination drug influences on the several pathogenic links of destructive-dystrophic lesions of cartilage. Osteoarthritis is chronic destructive disease of the articular cartilage, which is always accompanied by pain. In order to eliminate pain is most often used NSAID as parenterally or topically in a variety of gels and ointments. Combining derivatives of glucosamine with NSAIDs will reduce pain and improve patient's quality of life.

After review of the literature suggests that the combination of glucosamine and quercetin may be more effective than the individual components thereof, and used not only as a promising toxicity correctors anticancer therapy that has been proven in our studies, but have themselves antitumor activity. This allows you to draw near to the creation of drugs – not only universal correction toxicity of anticancer therapy, and those which have themselves an antitumor effect.

For the treatment of osteoarthritis patients need long-term use of drugs with anti-inflammatory, analgesic and chondroprotective effect. The combination derivatives of glucosamine and NSAIDs can reduce pain and improve cartilage metabolism. It is very important for the treatment of osteoarthritis.

In conclusions we would like to note that the use of combinations of glucosamine with quercetin and NSAIDs can significantly increase the efficacy of treatment of cancer and osteoarthritis. Further investigation of such combinations is necessary and scientifically substantiated.