

Immunostimulatory effect of natural clinoptilolite as a possible mechanism of its antimetastatic ability

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Abstract. *Purpose:* Many biochemical processes are closely related to ion exchange, adsorption, and catalysis. Zeolites reversibly bind small molecules such as oxygen or nitric oxide; they possess size and shape selectivity, the possibility of metalloenzyme mimicry, and immunomodulatory activity. These properties make them interesting for pharmaceutical industry and medicine. *Methods:* The experiments were performed on mice. Different biochemical and molecular methods were used. *Results:* Micronized zeolite (MZ) administered by gastric intubation to mice injected with melanoma cells significantly reduced the number of melanoma metastases. In mice fed MZ for 28 days, concentration of lipid-bound sialic acid (LSA) in serum increased, but lipid peroxidation in liver decreased. The lymphocytes from lymph nodes of these mice provoked a significantly higher allogeneic graft-versus-host (GVH) reaction than cells of control mice. After i.p. application of MZ, the number of peritoneal macrophages, as well as their production of superoxide anion, increased. However, NO generation was totally abolished. At the same time, translocation of p65 (NF- κ B subunit) to the nucleus of splenic cells was observed. *Conclusion:* Here we report antimetastatic and immunostimulatory effect of MZ and we propose a possible mechanism of its action.

Keywords. Micronized zeolite - Clinoptilolite - Oxidative stress - Immunostimulation - T-lymphocyte - NF- κ B

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Molecular mechanisms of anticancer activity of natural dietetic products

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Abstract. The efficiency of dietetic supplements in cancer prevention and treatment is a popular and controversial subject of research. New in vitro and in vivo research results indicate that some dietetic supplements do indeed show anticancer activity. The strongest anticancer action has been demonstrated by natural compounds with multifunctional activity. For instance, antioxidants, which also bind to and modulate the activity of protein kinases involved in signal transduction cascades show both cytostatic and cytotoxic activity towards cancer cells. Other activities such as angiogenesis inhibition, nitric oxide synthase inhibition, and pro-oxidants production have also been observed. Catechins and polyphenols from plant extracts such as green tea show the strongest anticancer activity. The initial clinical trials with some flavonoid molecules are already underway.

Keywords. Dietetic supplements - Mechanism of anticancer activity

Abbreviations. *CDK*: Cyclin-dependent kinase *ECGC*: Epigallocatechin 3-gallate *JNK*: c-Jun N-terminal kinase *PDGF*: Platelet-derived growth factor *VSMC*: Vascular smooth muscle cell

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Natural zeolite clinoptilolite: new adjuvant in anticancer therapy

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Abstract. Natural silicate materials, including zeolite clinoptilolite, have been shown to exhibit diverse biological activities and have been used successfully as a vaccine adjuvant and for the treatment of diarrhea. We report a novel use of finely ground clinoptilolite as a potential adjuvant in anticancer therapy. Clinoptilolite treatment of mice and dogs suffering from a variety of tumor types led to improvement in the overall health status, prolongation of life-span, and decrease in tumors size. Local application of clinoptilolite to skin cancers of dogs effectively reduced tumor formation and growth. In addition, toxicology studies on mice and rats demonstrated that the treatment does not have negative effects. In vitro tissue culture studies showed that finely ground clinoptilolite inhibits protein kinase B (c-Akt), induces expression of p21^{WAF1/CIP1} and p27^{KIP1} tumor suppressor proteins, and blocks cell growth in several cancer cell lines. These data indicate that clinoptilolite treatment might affect cancer growth by attenuating survival signals and inducing tumor suppressor genes in treated cells.

Keywords. Clinoptilolite · Adjuvant · Anticancer · Treatment

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