BEAR RIVER ZEOLITE BRZ™

MEDICAL APPLICATIONS Research Review

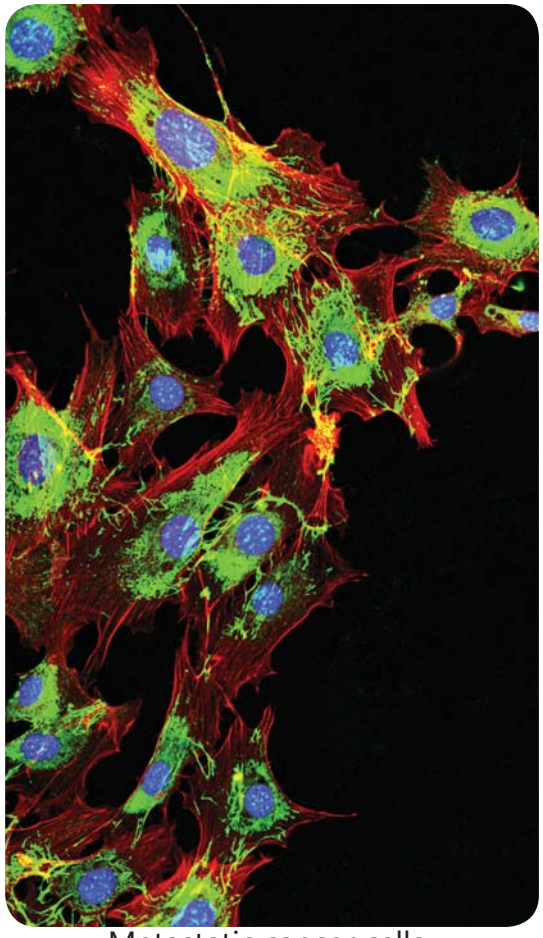
Some clinoptilolite studies report unsubstantiated claims that are inaccurate regarding the efficiencies and mechanisms involved in medical applications. This document was prepared from third party clinoptilolite studies using scientific methods to be used as a resource for further research. Benefits from studies cannot be claimed by Bear River Zeolite, Co. due to U. S. and Canadian government restrictions.

High purity natural clinoptilolite is a non-toxic mineral that is readily available, environmentally friendly and economical. The molecular sieve properties allow it to exchange and hold cations on its negatively charged lattice structure and absorb fluids in its channelways. The mineral allows flexibility with options to micronize particles and/or modify the surface to alter the charge for specific applications. It is durable and highly stable in high temperatures and acidic conditions.*

Medical applications using clinoptilolite have already been developed and used to treat radiation poisoning in Chernobyl, osteoporosis, diarrhea, fungal infections, bacterial infections and for use as a filter media in kidney dialysis. The unique properties of clinoptilolite and their effective mechanisms have inspired a wider focus toward a broader range of treatments. The following information was gathered from studies to illustrate the potential of clinoptilolite in medical applications and to provide information on the sterilization and modification of clinoptilolite.*

CLINOPTILOLITE IN CANCER THERAPY

- Enhanced the immune response to cancerous cells and the production of tumor suppressor proteins (p21WAF1/CIP1 and p27KIP1). Pavelic, K., et al. 2001
- Activated phagocytic white blood cells that destroy cancerous cells, with no negative effects on healthy cells. Pavelic, K., et al. 2001
- Reduced cell proliferation in human cancer cell (cervical, pancreatic, colon, laryngeal) in vitro studies. Zarkovic, N., et al. 2003
- Antioxidative and antitumor effects when fed orally (in water) to rats and mice that had active mammary cancer cells and enhanced the antitumor effects by interfering with lipid peroxidation when combined with Doxorubicin chemotherapy. Zarkovic, N., et al. 2003
- Adsorbed β -Glucuronidase (GUS) a bacteria that produces carcinogens in the intestine and may be a biomarker for cancer risk. Kavak, D.D. and Ulku, S. 2015
- Effectively inhibited colon cancer cell (Caco-2) proliferation which increased with time to 70.5% at 72 hours. Kavak, D.D. and Ulku, S. 2013
- A carmustine cream with added clinoptilolite was more effective for skin cancer than carmustine alone. Ghiciuc, C.M., et al.2017
- Inhibited tumor aggressiveness and viability by decreasing the expression of bcl-2 and cox-2 proteins. Ghiciuc, C.M., et al.2017
- Inhibited cervical cancer cell growth regardless of sterilization method but the highest inhibition of cell proliferation and decrease in cell viability resulted with UV radiation sterilization. Ghazi, N.A., et al. 2013



Metastatic cancer cells

BEAR RIVER ZEOLITE, PO Box 643, 47 Cox Gulch Road, Thompson Falls, MT 59873
406-827-3523 • FAX: 406-827-3543 • www.bearriverzeolite.com • tfl3543@blackfoot.net

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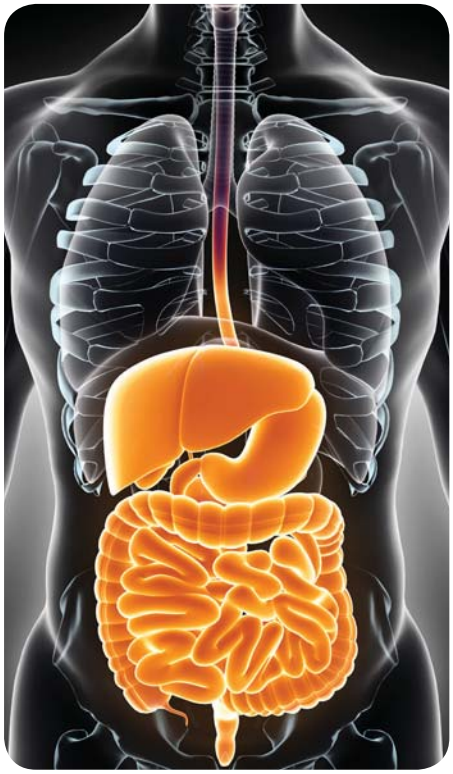
EFFECTS OF CLINOPTILOLITE ON BLOOD CHOLESTEROL

- Effectively improved lipid fractions with the highest decrease in total cholesterol (TC) and low-density lipoprotein cholesterol (LDLc). Cutovic, M., et al. 2017

Illustration of plaque buildup (in yellow) restricting blood flow



Digestive system

CLINOPTILOLITE AS A GASTROPROTECTIVE AGENT

- Accelerated the recovery from DSS (dextran sulphate sodium)-induced intestinal inflammation without transference to epithelial layer, gut-associated lymph follicles, or the liver. Nizet, S., et al. 2018
- Significantly reduced the occurrence, severity of pain and mucosal erosion in patients with endoscopically negative gastroesophageal reflux disease (ENGORD) and in patients with induced gastritis from the nonsteroidal anti-inflammatory drug (NSAID). Potgieter, W., et al. 2014
- Effective treatment for food toxin induced diarrhea and neuropathic diarrhea resulting from vascular impairment in patients with diabetes mellitus. Rodriquez-Fuentes, G., et al, 1997

CLINOPTILOLITE EFFECTS ON OSTEOPOROSIS

- Improved bone density and could possibly delay the onset or prevent occurrence of osteoporosis.
  Hraschan, J. PATENT. 2014

Stage 4 osteoporosis

Ibuprofen caplets

CLINOPTILOLITE AS A CONTROLLED RELEASE DRUG CARRIER

- Effective as a carrier of the anti-inflammatory drugs diclofenac sodium (DS) and Ibuprofen for sustained release. De Gennaro, B., et al. 2015, Krajisnik, D., et al. 2014

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CLINOPTILOLITE WOUND DRESSING ADVANTAGES

- Topical application of clinoptilolite showed a significant reduction in animal mortality and accelerated wound healing after one week when compared to the Quikclot group, which showed serious necrotic tissue. Li,Y., et al. 2012
- Higher level of coagulation when compared to kaolin based hemostatic products. Bayır, A., et al. 2016
- Potential alternative to hemostatic products that contain chitosan, such as Quikclot, which is derived from shellfish. Khoshmohabat, H., 2016

Controlling wound blood loss

ANTIVIRAL EFFECTS OF CLINOPTILOLITE

- Inhibited the viral proliferation of HSV 1, coxsackievirus B5 and echovirus 7 and was somewhat effective on adenovirus 5. Grce, M. and Pavelic, K. 2005

CLINOPTILOLITE AS A DETOXICANT

- Strongly decreases digestive absorption of lead (Pb), limiting transfer into the blood. Beltcheva, M., et al. 2015
- Effective for paraquat extraction from water (98%) and blood (82%) and has potential for gastrointestinal paraquat decontamination. Aghaii-Afshar, M-A. and Shetab-Boushehri, S.V. 2014.

EFFECTS OF CLINOPTILOLITE ON OXIDATIVE STRESS

- Higher level of antioxidants in plasma and reduced H_2O_2 levels and lipid peroxidation activity in subjects that smoked cigarettes. Atitlan-Gil, A.., et al. 2017

CLINOPTILOLITE HISTAMINE REMOVAL

- Effectively adsorbed and held histamine. Dathe, W., et al. 2014

Monitoring glucose blood levels

GLUCOSE LOWERING EFFECTS OF CLINOPTILOLITE

- Significantly decreased blood glucose levels and may be an alternative oral treatment for diabetes patients experiencing side effects from glucose lowering medications. Hossein Nia, B., et al, 2018

CLINOPTILOLITE IN OXYGEN GENERATION

- Successful use of clinoptilolite as a purifying filter media in a vacuum powered Fully Renewable Energy Oxygen (FREO2) siphon system to produce oxygen by removing nitrogen from air. Sobott, B.A., et al. 2015

Oxygen therapy for pneumonia in remote locations without electricity

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Clinoptilolite has been studied for decades and has been used as selective adsorbents, molecular sieves, and as catalysts. It has shown positive results as topical treatments for burns, lacerations, athletes foot, bed sores and dental applications. The antibacterial, antifungal, and antiviral properties of clinoptilolite are beneficial to healing. Clinoptilolite has also shown promising results as a filter for highly toxic substances such as heavy metals, polonium, potassium cyanide and strontium 90.*

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*Additional information on file at Bear RIver Zeolite Co.