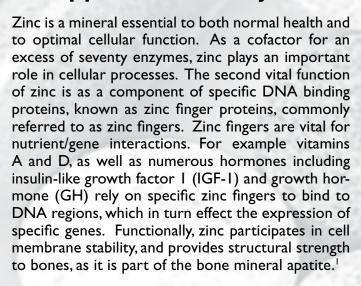
### Biotics Research Corporation Product Showcase

## Zn-Zyme™/Zn Zyme Forte™

**Dietary Supplement** 

For Healthcare Professionals Only

### **Support for Healthy Immune Function**



Zinc also affords many other immunological and host defenses. Thymulin, a thymus specific hormone, requires zinc for expression of activity. 2,3 New protein production for tissue repair is a zinc dependent process, thus zinc status is particularly important in times of high tissue reformation, as seen in trauma and sepsis. In animals a zinc deficient diet maintained for two weeks resulted in a severe impairment in the ability to generate a cytotoxic response to a tumor challenge, which was reversed with zinc administration.4 Immunological consequences as a result of deficiency are evident by alterations in numerous cellular types including a decrease in interferon-gamma (IFN- $\gamma$ ), interleukin-2 (IL-2), and tumor necrosis factor-alpha (TNF- $\alpha$ ), as well as decreased NK cell lytic activity, resulting in a decreased percentage of T cells.<sup>5</sup> Zinc deficiency has been associated with both thymic atrophy and lymphoid tissue atrophy.<sup>6,7</sup>

Zinc is also an important component in blood sugar stabilization, as insulin production is a zinc dependent process. Structurally, insulin contains two to four zinc atoms as part of its crystalline structure, thus a constant zinc supply is essential for normal function. Furthermore, low zinc status has also been observed in women with osteoporosis and osteopenia.<sup>8</sup>

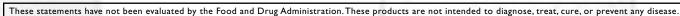
BIOTICS

The production of the transporter protein metallothionein (MT) is dependent upon zinc status. As a result of deficiency or with low dietary zinc, gene expression is impaired, resulting in low levels of MT. Although the function of MT is unclear, it is thought to be involved with protection against metal toxicity, regulation of physiological metals, specifically zinc and copper, and in protection against oxidative stress. 9,10 In one study MT was demonstrated to be an extremely efficient hydroxyl radical scavenger. 11 MT has also been correlated with the suppression of mitochondrial oxidative stress, consequentially attenuating early-phase cardiac cell death, and shown to result in a significant preventative effect on the development of diabetic cardiomyopathy. This effect was correlated to MT's suppression of mitochondrial oxidative stress. 12 A separate study deduced similar conclusions, whereby zinc supplementation resulted in the deterrence of diabetic cardiomyopathy, which was attributed to zinc-induced cardiac MT induction. 13 Additionally, zinc is virtually absent in highly refined foods, thus is likely deficient in individuals consuming this type diet. Taken together these studies and others demonstrate the beneficial roles of oral zinc. On a cautionary note, supplemental copper is recommended with long-term zinc supplementation.

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### **Biotics Research Corporation Product Showcase**

# Aqueous Zinc™

### **Dietary Supplement**

### **Support for Healthy Immune Function**

Zinc deficiency is generally widespread in the American population. Because of its involvement in an abundant number of physiologically different enzymatic processes, deficiency encompasses a wide array of symptomatologies, and may be broad reaching.

Dietary sources of zinc are generally low, with the largest quantity found in oysters. Other food sources of zinc include red meat, poultry, beans, nuts, whole grains, fortified cereals, and dairy products, however phytates inherently found in many vegetables and in whole grain products are know to decrease zinc absorption. The estimated daily consumption of zinc is 4-14 mg/day, however, of this only 10-40% is absorbed. Supplemental forms of zinc

are easily administered, and aqueous varieties offer the

Enzymol 205:11-24, 1991.

advantage of an easily adjustable dose. Additionally, an aqueous form is easily utilized to perform a Zinc Tally or Zinc Taste Test to assess for deficiency. Signs of zinc deficiency include poor wound healing, slow growth, and poor appetite.

Gustin, a zinc dependent polypeptide in the mouth may be utilized to assess for zinc deficiency. This protein aids in discriminating specific tastes for metals such as zinc. Therefore, those zinc-deficient have little to no taste for zinc.



- 1. Berdanier CD. Advance Nutrition Micronutrients. CRC Press. 1998.
- Dardenne M, Pleau JM, Nabarra B, et al. Contribution of zinc and other metals to the biological activity of the serum thymic factor. Proc Natl Acad Sci USA. 1982; 79:5370-3.
- Pleau JM, Fuentes V, Morgat JL, Bach JF. Specific receptors for the serum thymic factor (FTS) in lymphoblastoid cultured cell lines. Proc Natl Acad Sci USA. 1980; 77:2861-5.
- Frost P, Rabbani P, Smith J, Prasad A. Cell-mediated cytotoxicity and tumor growth in zinc-deficient mice. Proc Soc Exp Biol Med 1981;167:333-7.
- 5. Prasad AS. Zinc and Immunity. Mol Cell Biochem. 1998 Nov;188(1-2):63-9.
- Prasad AS, Oberleas D. Changes in Activities of Zinc-Dependent Enzymes in Zinc-Deficient Tissues of Rats. J Appl Physiol 1971;31:842-6.
- 7. Prasad AS. Zinc: Mechanisms of Host Defense. J Nutr 2007;137:1345-9.
- Mutlu M, Argun M, Kilic E, Saraymen R, Yazar S. Magnesium, zinc and copper status in osteoporotic, osteopenic and normal post-menopausal women. J Int Med Res. 2007;35:692-5.
- Cai L, Wang Y, Zhou G, Chen T, Song Y, Li X, Kang YJ. Attenuation by metallothionein of early cardiac cell death via suppression of mitochondrial oxidative stress results in a prevention of diabetic cardiomyopathy. J Am Coll Cardiol. 2006 Oct 17;48(8):1688-97.

hydroxyl radicals. Biochim Biophys Acta. 827:36-44, 1985.

 Klaassen CD, Liu J, Choudhuri S. Metallothionein: An intracellular protein to protect against cadmium toxicity. Annu Rev Pharmacol Toxicol. 39:267–294, 1999.

10. Templeton DM, Cherian MG. Toxicological significance of metallothionein. Methods

 Thornalley PJ, Vasak M. Possible role for metallothionein in protection against radiationinduced oxidative stress: Kinetics and mechanism of its reaction with superoxide and

 Wang Y, Song Y, Elsherif L, Song Z, Zhou G, Prabhu SD, Saari JT, Cai L. Cardiac metallothionein induction plays the major role in the prevention of diabetic cardiomyopathy by zinc supplementation. Circulation. 2006 Jan 31;113(4):544-54.

#### **Product Information:**

**Zn-Zyme™** & **Zn-Zyme Forte™** is available in bottles of 100 tablets. **Aqueous Zinc™** is available in bottles of 4 fluid ounces.



"The Best of Science and Nature" www.bioticsresearch.com

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