

# Zn-Zyme™ & Zn-Zyme Forte™

## Support for Healthy Immune Function

Zinc is a mineral essential to both normal health and to optimal cellular function. As a cofactor for an excess of seventy enzymes, zinc plays an important role in cellular processes. The second vital function of zinc is as a component of specific DNA binding proteins, known as zinc finger proteins, commonly referred to as zinc fingers. Zinc fingers are vital for nutrient/gene interactions. For example vitamins A and D, as well as numerous hormones including insulin-like growth factor 1 (IGF-1) and growth hormone (GH) rely on specific zinc fingers to bind to DNA regions, which in turn effect the expression of specific genes. Functionally, zinc participates in cell membrane stability, and provides structural strength to bones, as it is part of the bone mineral apatite.<sup>(1)</sup>

Zinc also affords many other immunological and host defenses. Thymulin, a thymus specific hormone, requires zinc for expression of activity.<sup>(2,3)</sup> 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.<sup>(4)</sup> Immunological consequences as a result of deficiency are evident by alterations in numerous cellular types including a decrease in interferon-gamma (IFN-g), interleukin-2 (IL-2), and tumor necrosis factor-alpha (TNF-a), 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>

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.<sup>(9,10)</sup> In one study MT was demonstrated to be an extremely efficient hydroxyl radical scavenger.<sup>(11)</sup> 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.<sup>(12)</sup> 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.<sup>(13)</sup> 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.

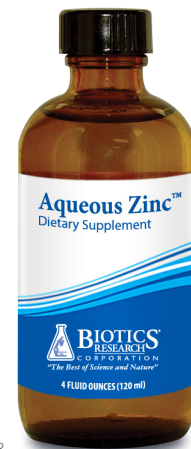


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# Aqueous Zinc™



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 symptomatology, 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 known to decrease zinc absorption. The estimated daily consumption of zinc is 4-14 mg/day, however, of this only 10-40% is absorbed.<sup>(1)</sup> Supplemental forms of zinc are easily administered, and aqueous varieties offer the 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.

## References

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Aqueous Zinc® is available in 4 ounce bottles (#1731).

## Supplement Facts

Serving Size: 2 teaspoons (10 mL)

Servings Per Container: 12

	Amount Per Serving	% Daily Value
Zinc (as zinc sulfate heptahydrate)	2.3 mg	15%

**Other ingredients:** Purified water.

**This product is gluten and dairy free.**

**RECOMMENDATION:** Two (2) teaspoons (10 mL) one (1) to two (2) times each day as a dietary supplement or as otherwise directed by a healthcare professional.

**KEEP OUT OF REACH OF CHILDREN**

Store in a cool, dry area.

Sealed with an imprinted safety seal for your protection.

Product # 1731 Rev. 05/13



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