ALBION®
HUMAN NUTRITION

RESEARCH NOTES

A COMPILATION OF VITAL RESEARCH UPDATES ON HUMAN NUTRITION

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Chromium. . . Has the Public Been Mislead?

The chromium market has been growing at a tremendous rate. Because chromium picolinate suppliers shout, "Lose the fat – keep the muscle." Supposedly, chromium picolinate works with insulin to promote decreased body fat while promoting muscle growth. This claim has launched a multitude of products designed to take advantage of our society's desire to have that perfect, lean, sculpted appearance. Much has been written to theoretically support the effectiveness of chromium picolinate as a body shaping tool. Has the public been mislead?

There is no question that chromium is an important trace mineral. A review of the symptoms associated with chromium deficiency shows that it is involved in several critical metabolic roles (Table 1)[1,3]. Research employing Albion's patented Chromium Chelavite® points to chromium playing important roles in fighting stress and maintaining the immune system.[1,2] Other research reviews chromium's vital role in glucose tolerance factor. The true value of chromium should never be limited to weight loss and body-building. It is much more than a narcissistic mineral!

1. Mowat, D.N., et al., 1992, Chromium and Immunity of Stressed Feeder Calves. Proc Univ Guelph Nutr Conf for Feed Mfgr, p. 109.

2. Chang, X. and Mowat, D.N., 1992, Supplemental Chromium for Stressed and Growing Feeder Calves. J Animal Sci 70:559.

3. Anderson, R.A., 1988, Chromium in Trace Minerals in Foods, K. Smith (ed) Marcel Dekker, Inc. NY p. 231.

Table 1.
Signs and symptoms of Cr deficiency in humans and livestock.

FUNCTION	ANIMAL SOURCE TESTED
Impaired glucose tolerance	Human, rat, mouse, squirrel, monkey, Guinea pig, cattle
Hyperinsulinemia	Human, rat, pig, cattle
Glycosuria	Human, rat
Hypoglycemia	Human, cattle
Impaired growth and/or feed efficiency	Human, rat, mouse, turkey, pig, cattle, fish, guinea pig
Elevated serum cholesterol and/or triglycerides	Human, rat, mouse, cattle, pig
Increased incidence of aortic plaques	Rabbit, rat, mouse
Neuropathy and encephalopathy	Human
Corneal lesions	Rat, squirrel monkey
Ocular eye pressure	Human
Decreased fertility and sperm count	Rat, pig
Decreased longevity	Rat, mouse
Decreased insulin binding and insulin receptor number	Human
Decreased lean body mass	Human, pig, rat, broiler chick
Elevated percent body fat	Human, pig, broiler chick
Decreased humoral immune response	Cattle, pig
Decreased cell-mediated immune response	Cattle
Impaired vaccine response	Cattle
Elevated inflammatory response	Cattle
Morbidity	Cattle
Impaired milk production	Cattle
Impaired feed intake	Pig
Subclinical ketosis	Cattle
Increased variability (glucose-insulin and Glucagon kinetics, growth, feed intake)	Cattle, human, pig

Source: Adapted from Anderson (1988)[3] and Mowat (1992)[1].

Recent Advances in the Clinical and Biochemical Effects of Chromium Deficiency

Signs and symptoms of chromium deficiency in the general population appear widespread due not only to suboptimal intake of dietary chromium, but also the elevated consumption of simple sugars that are known to increase chromium losses. A large percentage of the subjects with marginally impaired glucose tolerance or elevated circulating insulin respond to supplemental chromium. The mechanism of action of chromium in the potentiation of insulin activity as well as the exact structure of biologically active chromium is unclear, but progress has been made here. In summary, recent advances in chromium nutrition research strengthen the association of insufficient dietary chromium as one of the risk factors to maturity

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onset diabetes and cardiovascular diseases, and further document the role of chromium in the maintenance of optimal health.

Prog Clin Biol Res. 380:221-34, 1993.

Effects of Chromium Picolinate Supplementation on Body Composition, Strength, and Urinary Chromium Loss in Football Players

The effects of 9 weeks of daily chromium supplementation (200 mcg of chromium as picolinate) were investigated in a double-blind design on football players during spring training. Testing was done pre-, mid-, and post-supplementation on the following criteria: urinary chromium excretion, girth and skin fold measures, percent body fat, lean body mass, and isometric and dynamic strength. With the exception of 2 variables out of 65 measured, there were no significant differences found among the groups. The two exceptions were unrelated and inconsequential. For 27 of the 38 subjects, the average urinary chromium loss at pre-trial was 0.36 mcg/24 hrs, it was undetectable in 10 subjects, and excessive (2.4 mcg/ 24 hrs) in one. Subjects receiving chromium supplements demonstrated urinary chromium losses 5 times greater than those in the placebo group at mid and post trial. Chromium picolinate was ineffective in bringing about changes in body composition or strength during this program of intensive weight-training.

Int J Sport Nutr 4 (2): 142-53, 1994 June.

Effects of Chromium Picolinate on Beginning Weight Training Students

In this double-blind study, 59 college age students (37 male, 22 female) were involved in a 12 week program. In the study, half of the students were given 200 mcg of chromium (as picolinate) per day, while the other half received placebo. So there were 4 groups in all, two male groups and two female groups. The students were evaluated for changes in: body weight (bw), the sum of three body circumference measurements (sigma c), the sum of three skin fold measurements (sigma f), and their one-repetition maximums (Irm) for the squat and the bench press. All of the groups had significant increases in sigma c and significant decreases in sigma f. No treatment effects were seen for the strength measurements, although the males experienced greater absolute increases. The only significant treatment effect found was with the female group receiving the chromium picolinate – they gained more body weight (bw) than the other three groups.

Int J Sport Nutr 2 (4): 343-50, 1992 Dec.

Is Chromium Picolinate an Effective Source of Chromium?

The above clinical studies suggest that chromium picolinate may not be an effective source of chromium. In an article published in the Nutrition & Dietary Consultant, the bioavailability of picolinate was questioned.[1] Clinical data were presented to show that increased intake of a mineral picolinate caused more of the same mineral to be excreted in the urine. It was concluded that while picolinates may be absorbed, the minerals were not effectively metabolized or incorporated into the tissues.[2]

1. Ashmead, H.D., "Picolinic Acid Chelates", Nut & Diet Consultant 11:3, Nov 1989.

2. Seal, C., "Influence of dietary picolinic acid on mineral metabolism in the rat," Ann Nutr Met 32:186 (4) 1988.

Additional Research Findings with Chromium Chelavite

Dr. David N. Mowat, of the University of Guelph, has done extensive animal research with Albion's Chromium. Here are two more of his findings with Albion's Chromium:

- Albion's Chromium Chelavite reduced the morbidity in stressed feeder calves by 32% over the course of a year study.
- Albion's Chromium Chelavite had a very positive effect both cellular and humoral immunity factors – This could be a result of its ability to decrease the cortisol levels associated with stress that are known to have negative effects on immunity.

Chromium/Stress/Glucose Tolerance/Aging

Chromium is essential for proper insulin activity. When chromium is deficient, insulin's action is impaired with detrimental alterations to carbohydrate, amino acid, and lipid metabolism. Stress has been associated with an increased urinary loss of chromium. During times of stress, more cortisol is released which stimulates increased glucose utilization. As glucose use increases, so does the body's mobilization of insulin and chromium. Once mobilized, chromium is not reabsorbed, but is lost in the urine.[1,2,3]

Cortisol and insulin are antagonistic to one another. Cortisol causes catabolism of protein and lipids, along with an increase in utilization of glucose. Insulin, on the other hand conveys a 'store, do not release' signal in relation to carbohydrates, proteins, and lipids. Insulin binds to the cells' insulin receptors which recognize insulin specifically. Only a small portion of these receptors need to be bound by insulin for maximum insulin action. These receptors have a short life, and in the presence of high concentrations of insulin they gradually become fewer. The cell's sensitivity to insulin becomes less, which is one basis for insulin resistance. Long term stress gives rise to a continuous release of cortisol, which leads to insulin resistance – glucose intolerance.[4]

In clinical animal studies, Professor Mowat, et al., have found that supplementing Albion's chelated Chromium Chelavite to animals' diets consistently reduced cortisol by 19-27% (3 studies).[1,5,6] The mechanism of this down-regulation effect of chromium on cortisol levels remains unclear. The supplemented chromium chelate may reduce serum cortisol by improving insulin sensitivity, which may lessen the cortisol response to stress.

Aging has also been shown to affect chromium status. Aging results in decreased absorption of inorganic chromium, a decreased conversion of chromium to GTF, and decreased tissue retention of chromium. This may be why the elderly are more prone to adult diabetes, glucose intolerance, and impaired insulin sensitivity. In a recent study by Gatteschi, et al., it was shown that moderate exercise can also cause a loss of significant amounts of chromium.[7] Since the exercise was only moderate, the researchers felt that this was not a cortisol effect. In this study an increase in serum chromium was seen 12 minutes into the subjects' exercise recovery period. The researchers stated that the increase in plasma chromium was to answer an increased muscle requirement and uptake of glucose during recovery in order to replenish glycogen stores.

References

1. Mowat, DN and Chang, X. 1992. Chromium and Immunity of Stressed Feeder Calves. Proc. Univ. Guelph Nutr Conf for. Feed Manufactures pp. 109.

2. Chang, X. and Mowat, DN. 1992. Supplemental Chromium for Stressed and Growing Feeder Calves. J. Animal Sci. 70:559.

3. Anderson, RA. 1988 Chromium. In Trace Minerals in Foods. K. Smith (ed). Marcel Dekker, Inc., New York, pp. 231.

4. A Companion to Medical Studies, Forrester, (Edition in Chief), 3rd Editor. Blackwell Scientific Publications, Oxford, pp. 23.1.1-23.21.

5. Moonsie-Shageer, S and Mowat, DN. 1993. Levels of Supplemental Chromium on Performance, Serum Constituents and Immune Status of Stressed Feeder Claves, J. Animal Sci 71:232.

6. Mowat, DN, Chang, X, and Yang, WZ. 1993. Chelated Chromium for Stressed Feeder Calves. Can J Animal Sci 73:49.

7. Gatteschi, L, et al. "Effects of Aerobic Exercise on Plasma Chromium Concentrations". pp. 199-203. from: Sports Nutrition, Kies and Driskell (eds) CRC Press 1995.

The Bottom Line: Chromium Chelavite is a Superior Chromium Form

Albion's Chromium Chelavite is the first of a new type of chelate from Albion Laboratories. It is a chromium niacin amino acid chelate. In comparative studies based on typical absorption rates and compartmentalization of chromium pools, it was estimated that the total chromium absorbed from Chromium Chelavite was 57.5% compared to 37.5% for the chromium picolinate, 30% for a chromium polynicotinate form, and 30% for the chromium chloride. The absorption of Chromium Chelavite was almost twice that of the chromium polynicotinate and chromium chloride and over 53% better than chromium picolinate. Extensive research, by Dr. D.N. Mowat at the University of Guelph has shown it to be safe and tremendously effective. Chromium Chelavite is the intelligent supplement formulator's chromium of choice!!

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