Chromium *Chromium picolinate, Chromium polynicotinate, Chromium histidine, Chromium histidinate, GTF chromium, Chromium chloride*

Common Indications:

- Insulin Resistance, Diabetes, and Blood Sugar Regulation
- Weight loss
- Atherosclerosis, Dyslipidemia
- Atypical Depression

General Comments:

Chromium is an essential trace element often found in grains but with the increased refinement of modern day grains this element has been reduced in the diet. There is only about 7 milligrams of chromium throughout the body but it is key for the internal insulin receptor mechanism (IRS1) to work properly. It is necessary for enzyme activation, ATP production and glucose regulation.

Benefits & Mechanism of Action:

Insulin Resistance, Diabetes, and Blood Sugar Regulation

Chromium supplementation has been shown to be beneficial for insulin regulation and glucose tolerance in people with type 1 and 2 diabetes mellitus, gestational diabetes, and steroid-induced diabetes.[1,2,3,4] Supplementation is often needed as food content of chromium is insufficient for needs in the modern diet. Excessive losses thru increased sugar intake also cause issue. Chromium's beneficial effects on blood glucose levels may be due to its ability to increase insulin dependent membrane-associated GLUT-4 levels.[5]

Recent laboratory research has also found that chromium histidinate may also help correct serotonergic defects caused by insulin resistance or diabetes.[6,7]

Chromium is biologically active only in the trivalent state in which it forms complexes with organic compounds. The most important of these complexes is glucose tolerance factor (GTF), which is comprised of trivalent chromium, niacin, glycine, glutamic acid, and cysteine. In addition to potentiating the effect of insulin, GTF also seems to help lower elevated serum cholesterol and triglycerides.[8,9]

Weight Loss

In a clinical study of 42 overweight women, 1,000 mcg daily of chromium picolinate

produced improvement on the following items: reduced food intake and hunger levels, decreased carbohydrate craving, and weight loss.[10] Carbohydrate cravings were also decreased in a subpopulation of patients taking the chromium supplement when compared with placebo. Additional studies support the decrease in body fat and increase in lean muscle tissue.[11,12,13,14] It is suggested that supplementation occur for at least 16 weeks.[15]

Atherosclerosis, Dyslipidemia

While some studies exist that do not show a direct correlation between chromium and lipid level reduction, there are just as many that do. These studies show chromium supplementation may increase HDL levels, decrease LDL and triglyceride levels, modulate peripheral tissue lipids in patients with insulin resistance, and reducing the increased accumulation of cellular cholesterol induced by too much insulin.[16,17,18,19,20,21,22]

Atypical Depression

Human and animal studies have shows that supplementation with chromium decreases serotonergic 5-HT_{2a} recepter expression, increases 5-HT_{2a} receptor sensitivity, has antagonistic effects on NMDA and AMPA receptors, and has antagonistic effects on dopamine and noradrenergic pathways.[23,24,25,26,27,28,29,30] Chromium can be taken with typical antidepressant medications.[31]

Dose:

Insulin Resistance, Diabetes, and Blood Sugar Regulation

AI[32]* [An AI is established when there is insufficient research to establish an RDA; it is generally set at a level that healthy people typically consume.]

- 0-6 months: 0.2 mcg
- 7-12 months: 5.5 mcg
- 1-3 years: 11 mcg
- 4-8 years: 15 mcg
- 9-13 years
  - Males: 25 mcg
  - Females: 21 mcg
- 14-18 years
  - Males: 35 mcg
  - Females: 24 mcg
  - Pregnant Females: 29 mcg
  - Lactating Females: 44 mcg
- 19-50 years
  - Males: 35 mcg
  - Females: 25 mcg
  - Pregnant Females: 30 mcg

    - Lactating Females: 45 mcg
- >50 years
    - Male: 30 mcg
    - Female: 20 mcg

Weight Loss

- up to 1,000mcg daily[10]

Symptoms of Deficiency:

Chromium deficiency is difficult to determine because there is no testing available to assess levels. Deficiency is associated with glucose intolerance and neuropathy.[33]

Conditions that leave a patient with an increased need for chromium include:

- Diets high in sugar[34]
- Infection[35]
- Acute exercise[36]
- Pregnancy and lactation[35]
- Stressful states, including physical trauma[35]
- Older age at time of diabetes onset
- Diabetes and insulin resistance
- Obesity

Cautions and Side Effects:

There are no known toxicities associated with chromium.

Medication interactions include:

- Medications that alter stomach acidity and reduce absorption and increase excretion
    - Antacids
    - Corticosteroids
    - H2 blockers
    - Proton Pump Inhibitors
- Corticosteroid effects may be increased in the presence of chromium.[37]
- Chromium may increase the hypoglycemic effects of medications for glucose control.[38,39]
- Women receiving hormone replacement therapy may have improved chromium status and enhanced IL-6 inhibition with the addition of chromium to 17-beta-oestradiol.[40,41]
- Lipid lowering qualities of chromium may result in less medicine required for lipid control.[42]

Food Sources:

Good chromium food sources include whole grain breads and cereals, lean meats, cheeses, and some condiments, such as black pepper and thyme.[37] Brewer's yeast is also rich in chromium. Dietary intakes of chromium cannot be reliably determined because the content of the mineral in

foods is substantially affected by agricultural and manufacturing processes and perhaps by contamination with chromium when the foods are analyzed.[11,37]

Nutrient Interactions:

Vitamin C

Vitamin C, found in fruits, vegetables, and their juices, enhances intestinal absorption.[38]

Niacin

Niacin, found in meats, poultry, fish, and grain products, enhances intestinal absorption.[38]

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Insulin Resistance, Diabetes, and Blood Sugar Regulation

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Weight Loss

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Atherosclerosis, Dyslipidemia

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Dosage

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Symptoms of Deficiency

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Nutrient Interactions

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