BioImmersion Inc. *Forward Thinking™*

Chromium, Bio-organic with Beet Freeze Dried

Brief

Patented Technology

Chromium, Bio-organic with Beet is a potent new form of trivalent chromium (Cr III) manufactured through a patented process. The chromium III is covalently bonded to food-derived bio-organic molecules of all natural, water-soluble, proprietary extracts of the cytoplasm of brewers yeast. Since in Chromium, Bio-organic with Beet, only the low molecular weight nucleotides and nucleoside are bound as ligands, there is no allergic challenge and the resultant low molecular weight bound chromium is exceptionally bio-available. The organic molecule of Trivalent Chromium weighs less than 1000 M.W., which accounts for its water solubility and bioavailability. Each capsule contains 500µ of chromium III in a carrier of 250mg of freeze-dried organic red beet-root powder.

Typically, Chromium Yeast has been the only form of trivalent chromium existing in a food-type matrix for supplemental use. Chromium Yeast is a mixture of forms of Cr (III) imbedded in the whole yeast that consists of mostly insoluble yeast cell parts, such as cell wall polysaccharides and insoluble macromolecular proteins. This accounts for its relatively low bioactivity and of its potential as a yeast allergen.

Trivalent chromium is the principle form found naturally in foods and utilized by the body. It is well established that trivalent chromium is an essential trace mineral that can augment glucose metabolism and help maintain healthy blood glucose levels. **More specifically, chromium is known to play a significant role in the proper functioning of the insulin pathway and consequently in the stimulation of glucose metabolism.**

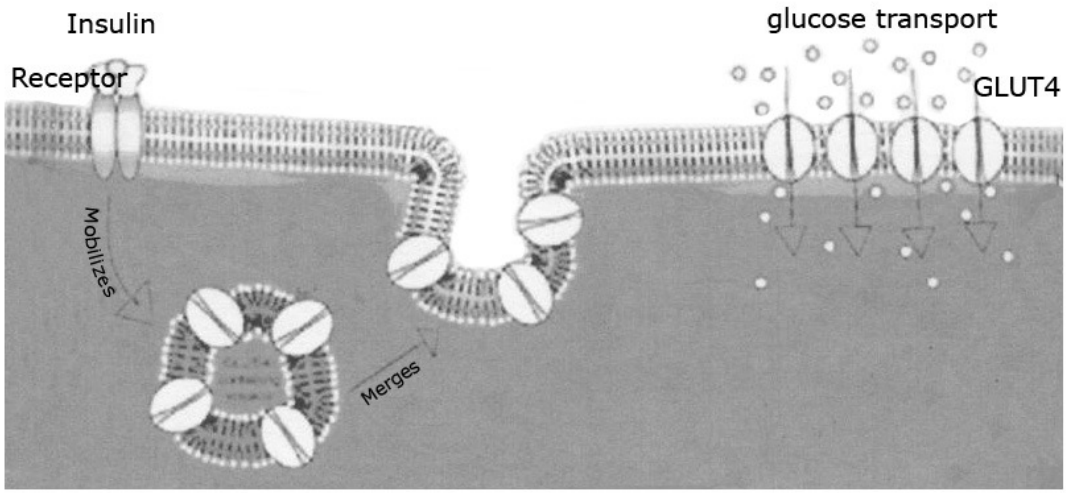
Chromium salt supplements are synthetic complexes of Cr (III) bound to various ligands as salts and tend to be insoluble in water. Scientists still debate the toxicity,

muta-genicity, stability and absorbent efficiency of chromium salts. Oral CrCl3 and Cr Picolinate are absorbed with an efficiency of approximately 0.5%-2%. In contrast, Chromium, Bio-organic with Beet, is absorbed very efficiently, with absorption ranging from greater that 60% at nutritionally relevant doses.

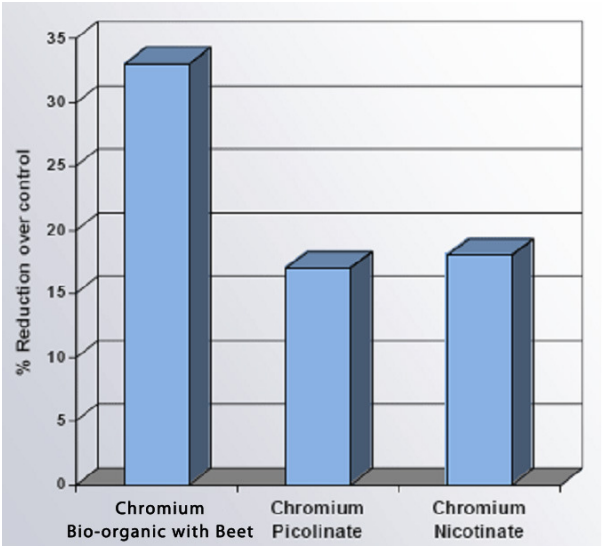
The science of Chromium, Bio-organic with Beet

The element Cr in its trivalent oxidation state is generally considered to have a role in insulin-dependent carbohydrate and lipid metabolism. Rats, for example, receiving a Cr deficient diet have elevated insulin areas (area under a plot of insulin concentration versus time) in glucose tolerance tests, suggesting the development of insulin resistance. The positive placebo-controlled study performed by Anderson et al. in China is the largest study of Cr supplementation of diabetic adults. Subjects received 0, 200, or 1000 mcg Cr as chromium picolinate daily for 4 months. Cr supplementation (both at 200mcg and 1,000 mcg/day) improved levels of fasting serum glucose, insulin, glycosolated hemoglobin, total cholesterol, insulin and glucose concentrations 2 hours after a glucose challenge compare with a placebo. Thus, pharmacological levels of Cr may have beneficial effects on diabetic subjects. Further, Anderson has reviewed studies on the effects of Cr supplementation of type 2 diabetes and concluded that the amount of supplemental Cr was important with a threshold of more than 200 mcg Cr daily postulated for beneficial effects.

Common symptoms of diabetes are insulinemia and insulin resistance. Consequently, substances that have the ability to stimulate glucose uptake independently of insulin could provide important advantages in helping to regulate these disorders. Researchers have suggested that chromium might be one such substance. In recent studies, scientists have confirmed that chromium activates AKt independent of insulin. AKt is a metabolic kinase pathway currently being studied by scientists interested in human metabolic disorders. Activation of AKt by insulin (or chromium) results in increase functioning of the muscle glucose transporter GLUT4. The functioning of GLUT4 is necessary for glucose transport into muscle cells.



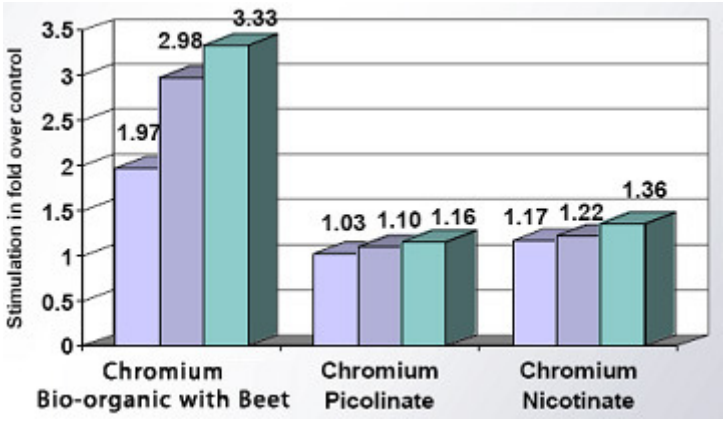
In order to determine the efficiency of Chromium, Bio-organic with Beet, in stimulating AKt activation in glucose uptake in the absence of insulin, scientists tested Chromium, Bio-organic with Beet, on insulin-depleted animals pretreated with Streptozocin. Streptozocin is a substance known to destroy pancreatic beta cells. Streptozocin-treated animals rapidly become insulin-depleted and diabetic. A four-week treatment was initiated. Results from the study showed that Chromium, Bio-organic with Beet, reduced hyperglycemia in insulin-depleted animals by 33%. Other trivalent chromium salts, at equivalent chromium dosage, showed a 17% and 18% blood-glucose reduction. These results indicate that treatment with Chromium, Bio-organic with Beet, most significantly reduced hyperglycemia under insulin-depleted conditions.



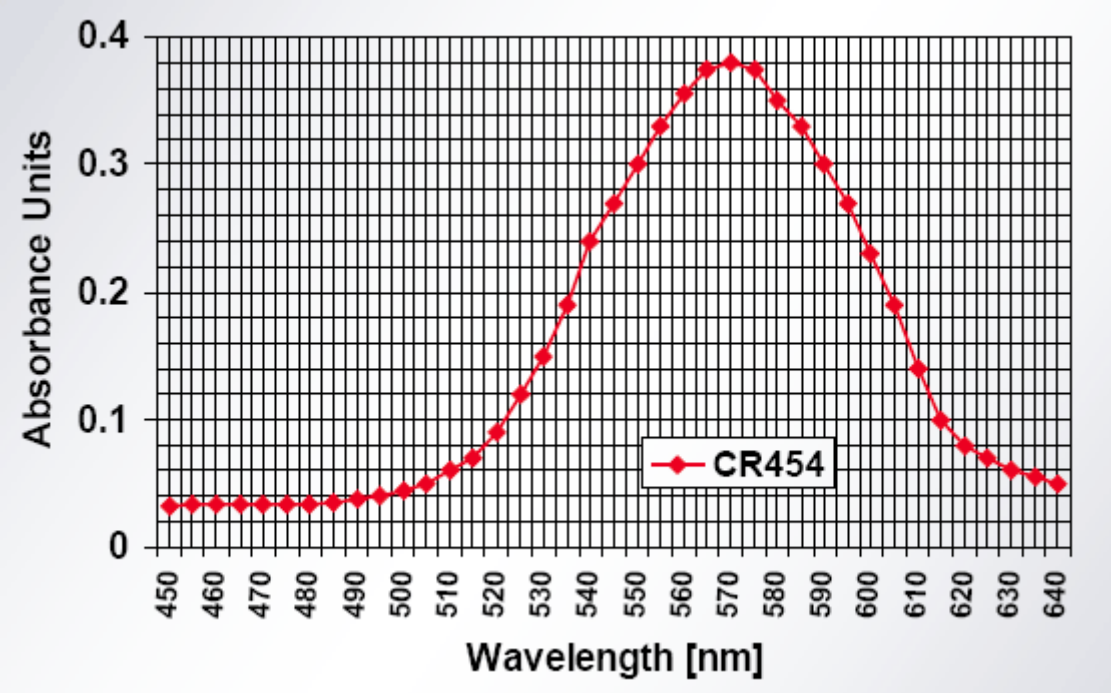
Chromium, Bio-organic with Beet, is superior in stimulating glucose uptake into muscle cells.

Test trials of the glucose-transport-enhancing activity of Chromium, Bio-organic with Beet, in a culture of L6 muscle cells in vitro: L6 myogenic cell lines are commonly used in research for investigation of myogenesis and regulation of metabolic condition such as glucose metabolism and glucose uptake. These different myogenic cells (myoblasts) proliferate in vitro; however, when cultured in a low-serum culture medium, these cells fuse to form multinucleated myotubes and striated fibers. L6 myotubes possess many of the morphological and biochemical properties of mature skeletal muscle tissue, including sensitivity to acute stimulation by insulin for glucose transport into the cells, expression of muscle-specific receptors.

Results: The L6 cells were treated for 2 hours in culture. Total glucose uptake was measured by using fluorescent glucose. Chromium, Bio-organic with Beet, stimulated glucose uptake into human skeletal muscle cells in vitro up to 2.98 times over control. This was superior in comparison to the activity of trivalent chromium salts under the same experimental conditions and at the same chromium concentrations. In comparison chromium picolinate stimulated glucose uptake 1.10 times and chromium nicotinate 1.22 times. These results demonstrate superior dose-dependent glucose uptake enhancing activity of Chromium, Bio-organic with Beet, under these experimental conditions.



In a third line of evidence scientists observed a correlation between the spectral absorption maximums of chromium compounds and their relative hypoglycemic potency. Compounds with maximum peaks between 545 and 580nm were more effective in controlling blood glucose levels in diabetic animals. Other commercially available forms of chromium had absorption peaks out of these limits. According to the visual spectral absorption data presented in the figure below, Chromium, Bio-organic with Beet, is within this desirable range.



Worldwide

Obesity, Insulin Resistant Syndrome and Diabetes are a constellation of medical conditions presenting themselves in epidemic proportions worldwide: 108,330,000 Americans age 20 and older are overweight. Of these, 44,250,000 are obese. In China, an obesity epidemic is imminent with more than 20% of children aged 7-17 in big cities are now overweight or obese. Diabetes in America has increased 49% since 1991, according to the CDC, and threatens to bankrupt our healthcare system. India has the largest number of people with diabetes in the world, with an estimated 19.3 million in 1995 and projected 57.3 million in 2025. An estimated 47 million US

adults have Insulin Resistant Syndrome. Some experts predict that at least half of persons over age 60 would meet the criteria for this syndrome.

In 1988 Dr. Gerald Reaven, cardiologist at Stanford University School of Medicine, gave the Banting Lecture at the American Diabetes Association meeting in New Orleans. He postulated that the body's resistance to insulin, which leads to higher than normal blood insulin, predisposes people to hypertension, hyperlipidemia, and diabetes, which in turn, gather to become a risk factor for CVD. He proposed insulin resistance as a unifying factor as a part of a condition called Metabolic Syndrome X, later to be named Insulin Resistant Syndrome. It has become a popular term that describes the constellation of abnormalities which when presented together, puts the individual at risk to a number of deadly diseases.

Diabetes: A person with the condition of hyperinsulinemia is more likely to develop adult onset diabetes. Researchers have linked certain fat-produced proteins to diabetes 2. One of these, called resistin, counteracts insulin's effects, which suggests that it contributes to resistance to the hormone. Another protein called adiponectin promotes insulin's effects, but its production decreases in obese persons. It is postulated that the increased demand on production of insulin by the pancreatic beta cells eventually wears them out, bringing about the diabetic condition.

Cardiovascular Disease: Insulin resistance can result in fat cells increasing their intracellular hydrolysis of triglycerides, releasing fatty acids into the bloodstream. The increased flux of fatty acids stimulates the liver to increase the formation and excretion of very low-density lipoprotein (VLDL) cholesterol and triglycerides, generating hyper-triglyceridemia. In the plasma, collisions between VLDL and LDL in the presence of cholesteryl transfer protein, result in exchange of VLDL triglycerides for LDL cholesterols, and leads to the formation of small dense LDL particles. Thus, insulin resistance results in changes in plasma lipids and increases the level of triglycerides. An increase in insulin sensitivity on the other hand has the opposite effect. Hence, the changes in plasma lipid and cholesterol concentrations also reflect increases in insulin sensitivity. A person who has high blood pressure, low HDL, high LDL and high triglycerides is much more susceptible to coronary artery disease.

Cancer and insulin resistance: A study published in the New England Journal of Medicine in 2003 looked at over 900,000 subjects over 16 years and found that obesity was related to mortality for the common malignancies (including breast, prostate, colon and pancreas) because it causes high circulating insulin levels. Insulin receptors occur on both normal cells and cancer cells. When insulin is secreted from the pancreas in response to dietary sugar, a related substance, an insulin-like growth factor or IGF-1, is secreted at the same time by the liver. Both insulin and IGF-1 activate an important enzyme in cancer cell proliferation called tyrosine kinase. An Italian study showed that subjects with insulin resistance syndrome had an almost three fold increase in colon cancer mortality compared with control subjects. A National Cancer Institute study published in 2003 showed that obese men had an almost three fold increased risk in prostate cancer. The ACS Cancer Prevention Study, which followed over 400,000 women over fourteen years, demonstrated that obesity results in a 40% to 50% increased risk of breast cancer, and IFG-1 has been associated with breast cancer risk as have elevated circulating insulin levels.

Calculating IRS

The most useful criteria for diagnosing Insulin Resistant Syndrome is a checklist of five conditions set forth by the Adult Treatment Panel III of the National Cholesterol Education Program. Patients with at least three of the criteria are thought to have the metabolic syndrome. The diagnostic criteria for Insulin Resistant Syndrome are:

Feature	Criterion
Abdominal girth	Waist circumference
○ Men	greater than 102cm (40in)
○ Women	greater than 88cm (35in)
Fasting plasma HDL-C	
○ Men	less than 40mg/dl (1.03 mmol/l)
○ Women	less than 50 mg/dl (1.29mmol/l)
Fasting plasma triglycerides	Equal to or greater than 150 mg/dl (1.69 mmol/l)
Fasting blood glucose	Equal to or greater than 110 mg/dl (6.1 mmol/l)
Blood pressure	Equal to or greater than 130/85 mm hg.

Concluding Studies

Supplemental chromium has been shown to significantly improve glucose tolerance, decrease fasting glucose, cholesterol and triglyceride levels, and increase the HDL cholesterol level by increasing insulin sensitivity in normal, elderly and NIDDM patients. Chromium is a critical nutrient in diabetes, and it is also very important in hypoglycemia. In one study, eight female patients with hypoglycemia given 200mcg/day for 3 months demonstrated alleviation of their symptoms. In addition, glucose tolerance test results were improved and the number of insulin receptors on red blood cells was increased.

Chromium levels decrease, as people get older. This deficiency leads to the tendency to put on extra weight, and also increases their risks to be stricken with the age related diseases of cancer, heart disease and diabetes.

Chromium supplementation has been demonstrated to lower body weight yet increase lean body mass, presumably as a result of increased insulin sensitivity. In one study, patients were given chromium picolinate in one of three doses for 2.5 months: placebo, 200mcg or 400mcg. Patients taking the 200 and 400 doses lost an average of 4.2 pound of fat. The group taking the placebo lost only 0.4 pounds. Even more impressive was the fact that the chromium groups gained more muscle (1.2 vs. 0.2 pounds) than the one taking the placebo. The results were most striking in elderly subjects and in men. The men taking the chromium lost more than 7 times the amount of body fat as those taking the placebo (7.7 vs. 1 pound). The 400mcg dose is more effective than the 200mcg dose.

Chromium, Bio-organic with Beet

Chromium, Bio-organic with Beet, provides a superior molecular form of chromium along with betalain rich red beet powder. Betalains are a newly recognized class of antioxidant, 3 to 4 times more potent than Vitamin C. They are a unique bio-molecule class to the beet and cactus family. Betalains induce phase II enzymes (P2Ps) into action, representing the body's endogenous antioxidant system. P2Ps function as the internal defense system against dietary toxins and free radicals. Betalains protect against the oxidation of LDL cholesterol, reduce blood isoprostanes

and neutralize highly oxidative hypochloric acid. The combination of the Chromium, Bio-organic with Beet, with raw organic freeze-dried red beet-root creates an exceptionally powerful product for enhancing healthy blood sugar metabolism and helping to diminish the risk if developing Insulin Resistant Syndrome, Diabetes and Heart Disease. Each vegetarian capsule provides 500mcg of trivalent chromium and 250mg of freeze dried Organic Red Beet Root powder. There are no excipients of any kind.

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