Maybe not. According to the USDA, 9 out of 10 adult Americans are not getting enough chromium in their diets. Odds are you're one of the nine. "So what?" you may say.

In the first place, chromium is essential to human health. This means if you are not getting adequate amounts you simply can't be healthy. The dire results of this inadequacy are obesity, Syndrome X, heart disease, diabetes, and a diminished life span.¹ In fact, death from these diseases typically strikes its victims 10 to 20 years sooner than longevity forecasts would dictate.

Each year in the United States, heart disease and diabetes alone account for more than 60 percent of all deaths. Obesity, now reaching epidemic proportions, is increasing these figures.

¹ Syndrome X is an insulin-resistant condition (the cells don't take up insulin) that is considered to play a causative role in obesity, heart disease, and diabetes. See Nutrition News, "Blood Sugar Blues" and "Can't Lose Weight? Read This!".
Considering that 90 percent of the population doesn’t get enough chromium, imagine the possibilities of improving your health just from the addition of a simple supplement. Chromium can promote healthy blood sugar and cholesterol levels, help maintain heart health, influence body composition by increasing lean body mass and reducing fat tissue, and convert sugar into energy. In short, adequate amounts of chromium in your diet support a healthy, active life.

Shining Health

Chromium is a trace mineral. And yes, the same shiny element that makes your car sparkle can — in its nutritional form — give you a healthy shine. But getting adequate chromium into your body isn’t as easy as chrome-plating a trailer hitch. To better understand this, let’s take a look at how chromium works.

The main importance of chromium is its relationship with the hormone insulin. Chromium is an essential co-factor of insulin. Essential means that insulin CANNOT function without chromium. Chromium does many jobs in our bodies. These include metabolizing fat, turning protein into muscle, and converting carbohydrate into energy. Although all of these processes are important, the emphasis here is on the relationship between chromium, insulin, and carbohydrate.

In the body, all carbohydrates are broken down to their basic sugars. One of these is glucose or blood sugar, the body’s main fuel. Once in the cells, glucose is “burned” as energy. Glucose is transported into the cells by insulin. Doing this, insulin regulates the amount of glucose in the blood.

Sadly, the standard American diet is overly high in poor carbohydrate choices, such as sugar (for example, soft drinks), white flour (pasta), and potatoes (fries). This means the body has too much glucose to process efficiently.

Over a period of time, two things can happen: glucose intolerance and insulin resistance. First, the body is limited in the amounts of glucose it can use or store as glycogen (stored glucose). Whatever it can’t use, it stores as fat. Most importantly, more blood sugar than the body can process leads to glucose intolerance. Secondly, insulin is constantly being secreted to process the sugar. When the body is overloaded with insulin, its insulin receptors begin to shut down. Insulin resistance is the result.

You already know that too much sugar in the blood is a bad thing. However, too much insulin is also like poison. In too high amounts, both of these substances have deleterious effects on our health:

Ultimately, glucose intolerance and insulin resistance result in obesity, Syndrome X, heart disease (and high blood pressure), and diabetes.

These conditions used to be the problems of people who were well into middle age. No longer. Because of poor diet (including inadequate chromium) and insufficient exercise, these conditions are appearing earlier and earlier in life.

In the last 10 years, diabetes has increased by an unheard of 33 percent. During that time, diabetes among GenXers (30 year olds) has increased by a whopping 70 percent!!!

Lastly, besides its ability to promote tissue uptake of glucose, insulin is also necessary to the metabolism of fat and protein. It increases the synthesis and retention of protein in skeletal muscle and other tissues. Other important functions of insulin include the stimulation of activated immune cells and increased metabolic rate. Insulin also enhances brain uptake of tyrosine and tryptophan. These amino acids are important as the precursors of mood-elevating neurotransmitters, including serotonin.2


Why Don’t We Get Enough?

Bad diet is the main reason people do not get enough chromium. To make matters worse, chromium is not well absorbed, and uptake decreases with age. Further, soil depletion has resulted in is less chromium in the food supply now than occurred in the past. Also, lower levels of chromium can be caused by strenuous exercise, stress, and some diseases.

Chromium-containing foods include liver, egg yolk, brewer’s yeast, beef, poultry, broccoli, whole grain cereals, bran, wheat germ, and oysters. However, most Americans restrict their intake of these foods to beef and eggs. It isn’t enough.

Again, we are eating too many insulin-stimulating foods. These are the very foods that need chromium to support their metabolism. Besides the health problems this diet inherently causes, it can increase urinary chromium losses up to 300 percent.

This loss is intensified by two interlocking factors: 1) a high sugar diet means we need more chromium; 2) only 10 percent of us are getting enough chromium in the first place. Furthermore, sugar is a stressor. Without enough chromium to offset it, the stress load we are already carrying from psychological and environmental sources is magnified.

We mentioned that faulty diet is made worse by low amounts of chromium in the food supply and by poor human absorption. Whatever small amounts the plants may contain are often removed by processing. According to Biochemistry of the Essential Trace Elements (1984), processing destroys as much as 80 percent of naturally occurring chromium.

Secondly, chromium is difficult to assimilate. Only 0.5 percent of chromium chloride – the most commonly sold chromium supplement – is absorbed by the body. To better grasp this minute amount, consider 100 parts of chromium chloride as 100 pennies (chrome-plated, of course), for every 100 cents eaten, your body absorbs 1/2 cent worth.
In 1957, Drs. Walter Mertz and Klaus Schwartz postulated the existence of a new dietary agent which they identified as the glucose tolerance factor or GTF. GTF is a biologically active form of chromium that facilitates normal insulin function. It is thought that GTF holds insulin molecules to their receptors on the cell surfaces. Just as insulin doesn’t function without chromium, chromium alone can’t produce glucose tolerance. When the correct elements are available, our bodies make GTF. The compound includes chromium, the B vitamin niacin, and the amino acids glycine, glutamic acid, and cysteine. As with many other substances, many people lose their ability to make GTF as they age. This is complicated by a tendency of mature people to also lose their sensitivity to insulin. Up to 25 percent of mature Americans have impaired insulin sensitivity.

There are no statistics to indicate the number of younger persons and even children whose bodies are already injured. A sedentary lifestyle, overweight, and a diet of overly refined foods all contribute to the trend. Again, these variables increase the risk for high blood cholesterol, hypertension, heart disease, and diabetes.

It makes sense for all Americans to enhance their chromium intake with dietary changes, a multivitamin-mineral formula, and a chromium supplement.

### Body Composition

In 1989, chromium entered the consciousness of the American public not as an essential nutrient but as a magic bullet for weight loss and increased lean muscle mass. Since that time, a number of studies have confirmed this action. The positive impact of chromium on body composition is explained by insulin’s action in regulating protein metabolism in muscle and other tissues. Insulin promotes protein synthesis and decreases protein breakdown. We include the information here because overweight has reached epidemic proportions in the US and has huge implications for the development of heart disease and diabetes.

A number of double-blind, placebo-controlled studies show that chromium supplementation reduces fat mass, increases lean body mass (LBM), and can lead to weight loss. These studies have evaluated the use of chromium as part of a healthy diet and/or exercise program. Over time, studies have shown that women and overweight persons are more likely to have positive results. Although effects among athletes are not unknown, they are less likely among persons who already have a very low percent of body fat and among men in general.

This does not mean that active people don’t need chromium. Everybody needs chromium. Further, exercise induces chromium losses and may lead to chromium deficiency and subsequent impaired insulin function. What it does mean is that athletes, particularly males, may not see increased LBM or decreased body fat percentage.

For nearly 10 years, these studies were conducted using a particular type of chromium binder called picolinate acid: chromium picolinate (CP). A 90-day study was published in Current Therapeutic Research (Kaats, et al., 1998). The 122 participants received either 400 mcg (200 mcg, 2x/d) of CP or a placebo. Everybody tracked daily calories and exercise.

This study showed significant improvements in body composition. The treatment group lost more weight (17 lbs vs 4 lbs) and fat mass (17 lbs vs 3 lbs); and had a greater reduction in percent body fat (13% vs 2.6%) without any loss of lean mass (defined in the study as “fat-free mass”). These are impressive results.

The findings in this and similar studies are particularly important because ordinarily dieters lose a great deal of lean body mass (muscle). Because muscle is the tissue that burns calories, losing it becomes a formidable obstacle to maintaining a new and healthier weight. The other major chromium binder is nicotinic acid (niacin): chromium nicotinate (CN). Studies with CN have produced similar results to those with CP. However, one study is of particular interest. This study was conducted by Grant, et al., Exercise Physiology and Metabolism Laboratory, University of Texas at Austin, and published in Medicine & Science in Sports & Exercise, (1997). Forty-two obese women (18-35 years of age) participated over a nine week period in the double-blind, placebo-controlled study. The women were assigned to one of four groups: 1) chromium picolinate; 2) exercise only (no chromium supplement); 3) exercise with chromium picolinate; and 4) exercise with chromium nicotinate. This study is interesting for a number of reasons. However, the results were very surprising.

The only significant weight loss was experienced by the women in group 4: the chromium nicotinate (CN) plus exercise. Women in group 1 who didn’t exercise and took chromium picolinate (CP) gained a significant amount of weight. The latter anomaly has yet to be satisfactorily explained.

### Heart Health

Heart disease continues as the number one cause of death among Americans. Over the last 30 years, research has accumulated indicating that sufficient chromium may help reduce the risk of heart disease and help prevent the buildup of plaque in arteries by lowering harmful low density lipoprotein (LDL) and increasing beneficial high density lipoprotein (HDL).

One the other hand, insufficient chromium is at cause for these developments. In 2002, researchers at the Harvard School of Public Health presented a study to
Heart Health (continued)

attendees at the American Heart Association’s annual conference. According to their findings, low chromium levels increased the risk of heart disease in overweight men.4

Herein lies the connection between heart disease and diabetes. Remember, without chromium, insulin is unable to work efficiently. The body compensates by producing more of it. The result is high blood insulin (hyper-insulinemia, a situation similar to diabetes). This leads to increased fat storage, elevated LDLs, decreased HDLs, and high blood pressure—all heart disease risk factors.

Back in 1981, a study published in the American Journal of Clinical Nutrition showed that supplementing with 200 mcg of chromium daily resulted in a 11 percent increase of HDLs. At the same time, of the 23 men participating, insulin levels were normalized in those who had elevated levels prior to supplementation. Both CP and CN chromium have been awarded patents for their cholesterol-lowering capacity. In general, research into this area occurred in the early 1990s, used 200 mcg of chromium per day, and consistently showed improved lipid profiles, including decreased triglyceride levels (the amount of fat in the blood), improved insulin sensitivity and/or decreased insulin levels, and, in some cases, healthier blood pressure.

Blood Sugar Blues

Over the last 30 years, dozens of studies have reinforced the need for chromium to normalize blood sugar disturbances from glucose intolerance to diabetes. In the last five years, chromium has been shown to play a role in gestational diabetes and steroidal diabetes as well as adult onset diabetes (type 2) and glucose intolerance. In some cases, the use of chromium has made the need for supplemental insulin altogether unnecessary.

In fact, USDA studies have found that many middle-age diabetics (diabetics are highly insulin resistant) can overcome their symptoms by taking a chromium supplement. Oppositely, the USDA findings suggest that very low chromium intake may eventually lead to full blown diabetes in many people, and that the process could be reversed by simply taking a chromium supplement. Their actual comment was “getting enough chromium each day can nip this process in the bud.”

The National Research Council’s 1989 Recommended Dietary Allowances (RDAs) state, “In the majority of all chromium supplement...studies in the United States, at least half the subjects with impaired glucose tolerance improved upon receiving chromium supplementation... suggesting that the lower ranges of chromium intakes from typical U.S. diets are not optimal with regard to chromium nutrition.” In other words, be sure you get enough chromium so you can be healthy instead of on the road to heart disease and diabetes.

Give Me Chromium!

The National Research Council has established 50 to 200 mcg as the safe and adequate daily intake of chromium for adults. Studies reviewed for this newsletter used from 200 mcg to 1000 mcg to get there results. Do not exceed 1000 mcg and take it in divided doses.

In his literature review, Richard A. Anderson, PhD, well-known for his chromium research at the USDA, remarks that the requirement for chromium is related to the degree of glucose intolerance. He writes that 200 mcg/day is adequate to improve glucose uptake in those who are mildly glucose intolerant while several studies involving people with full blown type 2 diabetes have gotten beneficial results from 1000 mcg/day. (Journal of the American College of Nutrition, 1998.5)

All nutritional chromium supplements use the trivalent form of the metal. In this issue, we have limited our discussion to studies involving the two most popular types: chromium picolinate as found in Chromax® (CP) and chromium nicotinate (CN, sometimes referred to as polynicotinate) as ChromMate®.

Chromium can only bind to picolinic acid in one way. However, this is not true of nicotinic acid (niacin) binding. ChromMate is a proprietary form of niacin-bound, oxygen-coordinated chromium. According to Recommended Dietary Allowances, experiments have demonstrated substantial differences in the biological activity of different chromium compounds. How do CP and CN compare in bioavailability? Several years ago, a research team from the University of California compared chromium nicotinate as ChromMate with chromium picolinate and chromium chloride. Chromium nicotinate was found to be better retained in the body by over 300 percent. (Olin, et al., Annual Meeting of the American College of Nutrition Symposium on Advances in Clinical Nutrition, 1992.)

The toxicity of trivalent chromium is so low that there is a substantial margin of safety between the amounts normally consumed and those considered to have harmful effects. However, since the early nineties, serious questions have been raised about the safety of picolinic acid.

In particular, Gary Evans, PhD, the principal developer of picolinic acid as a binder, acknowledges its toxic effects in his booklet The Picolinites. He reports that elderly people taking just the RDA of zinc picolinate per day became anemic after only a few months. Other researchers have shown that picolinic acid removes iron from the cells and may inhibit cellular growth. Further, medical literature shows that picolinic acid competes with niacin in the body, creating an opportunity for a niacin deficiency. In 1983, one research team stated “the documented toxicity of picolinate detracts from any therapeutic value it may have.”

There are now five documented and published instances of toxic responses to chromium picolinate: two cases of renal failure, two of extreme dermatitis, and one episode of cognitive, perceptual and motor changes. There have never been any reports of this kind involving niacin-bound chromium.

Frankly, when I began this newsletter, I hoped to produce an even-handed report of the chromiums. However, I find myself convinced that niacin-bound, oxygen-coordinated chromium is the safe and effective supplement to take.

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