

The FELIX Letter

A COMMENTARY ON NUTRITION

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THE CHROMIUM CAPER

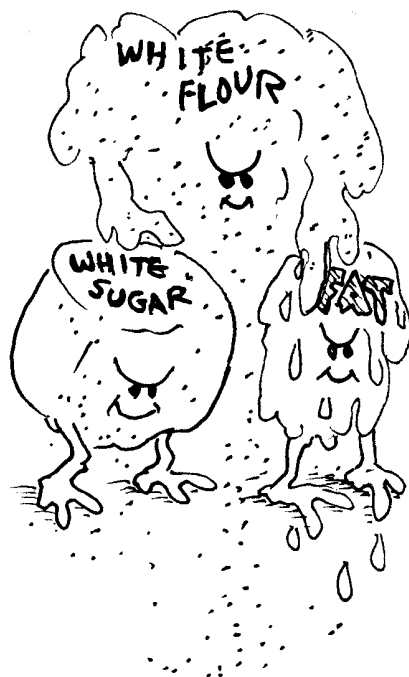
Like a pig trained to root for truffles, I have a passion for sniffing out nutritional clues to medical puzzles, and nothing affords me headier satisfaction than rustling through the dry jargonese of scientific journals and uncovering a real beaut. This time, it came from the December 1981 *American Journal of Clinical Nutrition* (Riales and Albrink). Twenty-three men, aged 31 to 60 years (Rotary Club members, actually), volunteered for the 12-week study. No changes were asked in their lives or diets other than having to take blood tests at the beginning, middle, and end of the study, and ingesting the contents separately of two vials a day, five days a week, for the 12 weeks. For eleven of the men, the vials contained distilled water. For the other twelve, each vial held 100 micrograms of trivalent *chromium* in water. (A microgram is a millionth of a gram; 'trivalent' means chromium had three positive charges.) Neither the participants nor investigators knew which men received which vials until after the last blood tests; it was a "double-blind" study.

Some nice things happened to the men taking the chromium — nothing spectacular, but comforting. For one, they lost a little weight over the 12 weeks, unlike the water-vial group. Their glucose tolerance (ability to maintain normal blood glucose levels after drinking a test dose of glucose) improved more than that of the water-group. The chromium-takers also showed improved insulin sensitivity — that is, they needed to make less insulin because, after chromium supplementation, their insulin was more effective in doing its job (of getting glucose out of the blood and into the body cells where it belongs, as fuel and building materials for the body).

Lastly, unlike the water-vial men, the chromium-takers showed a *significant increase in their blood levels of HDL-C* (high-density lipoprotein cholesterol). HDL-C's are the "good guys" our bodies make to carry

cholesterol through the arteries to the tissues where cholesterol is needed. A high ratio of HDL-C's to other lipid carriers in the blood is good news in terms of little or no risk statistically of coronary heart disease.

In essence, the authors say their study strongly suggests a relationship of two major illnesses—diabetes and coronary heart disease—to a deficiency of chromium.



Chromium has been acknowledged as an essential element for only a decade or so. We require it in microgram doses (it can be toxic in large amounts), and the prevailing view in medicine and orthodox nutrition circles is that our diet provides enough.

Not Enough Cr?

A small but persistent band of researchers, however, have repeatedly challenged this. Isabel Tipton analyzed human tissues from different areas of the world and found that while high levels of chromium existed in infants and children from both Western and

nonWestern cultures, and remained high even into old age in Africans, Near Easterners, and other non-Western people, *the level of chromium in Americans declined precipitously after childhood and was barely detectable in the tissues of those over the age of 50.*

Dr. Henry Schroeder, a pioneer trace-mineral researcher, and other medical workers like John Yudkin, T.L. Cleve, and Carl Pfeiffer, have explained the decline in this way: Starches and sugars in our digestive tract eventually are converted to glucose, which enters the blood stream and triggers (a) the release of insulin from the pancreas and (b) the release of chromium from tissue stores to permit insulin to do its job effectively. A preWestern high-fiber diet of starchy whole grains, beans, unrefined sweetening agents, vegetables, and fruits releases glucose at a comfortably slow rate into the blood. Consequently, insulin production by the pancreas is modest, and the chromium which is released from tissues to work with insulin can be replenished, after it is excreted, by amounts present in the foods.

Enter the Villains

The American/Westernized diet, however, is *absurdly high in white sugar, white flour, and fats*, and low in complex carbohydrates (whole grains, potatoes, yams, beans) — not only when compared with nonWestern societies, but also in relation to American and European diets of up until a hundred years ago. From eating foods high in refined sugar and low in fiber, the swift release of large amounts of glucose into the blood (the "quick energy" the candy- and sodapop-makers cheer about) stimulates heavy insulin production in the pancreas and the release of proportionate amounts of chromium from tissue stores.

Since sweet teeth are endemic and great industries have evolved in the last 100 years to cater to them, we tend to repeat the above pattern not just once

in a great while (as would happen to primitive man, say, if a honey-filled beehive were found), but *many times each day, many days each week*. Our chromium stores drop. This may be one reason for stepped-up insulin production. Without adequate chromium, insulin is less effective, so the body makes more. (This is not good news, because chronically high insulin levels are considered a risk factor for atherosclerosis and heart disease.)

Where Did Cr Go?

But we still need chromium. An 'essential' nutritive substance is one that our body needs, can't make, and must derive from outside sources. Unfortunately, the typical Westernized diet (65 percent of calories from white sugar, white flour, fats, and oils) is a profoundly poor source of chromium. By the time a kernel of wheat (a good source, like many whole grains, seeds, and nuts) is milled to white flour, only 13 percent of the original chromium remains. In refining sugar from cane, the final molasses, which goes to farm animals, contains 95 percent more chromium than the sugar extracted from it.

We now enter a No Exit situation, and it's only a matter of time, Drs. Schroeder, Yudkin, and Cleve believe, before some manifestation of abnormal functioning may begin — whether it's chronically high levels of insulin, or abnormalities in blood sugar and blood fat levels — all portents of trouble in the cardiovascular system. I'm describing one possible contributor to the health problems affecting as many as one in three men in the U.S. and one in six women who may suffer heart disease or stroke before age 60; or the five million Americans who have diabetes — so we are not talking small potatoes.

Not Brewers Yeast Again!!

In the 1950's researchers Klaus Schwarz and Walter Mertz found that rats which were raised on purified diets containing all the essential nutrients known at that time, suffered from impaired glucose tolerance *unless certain foods such as brewer's yeast or kidney powder* were added to their diets. "After five years of purification and fractionation, the active ingredient was identified [in 1959] as trivalent

chromium" ("The Essential Trace Elements" by Walter Mertz, *Science*, 18 Sept. 1981).

Although funding for trace-mineral nutrition research is chronically meagre, a fair number of studies since then have been conducted which confirm that chromium is a potentiator of insulin and that diabetes-like symptoms develop in both rats and men with chromium depletion; also, that chromium deficiency is associated with atherosclerosis and elevated blood cholesterol. (Incidentally, diabetic persons often also develop atherosclerosis.)

The authors of the present study have not just reconfirmed that chromium can improve glucose tolerance in reasonably healthy middle-aged men. They've put the frosting on the cake by demonstrating that *chromium was responsible for raising the blood levels of HDL-C's* — the cholesterol carriers that protect against heart disease.



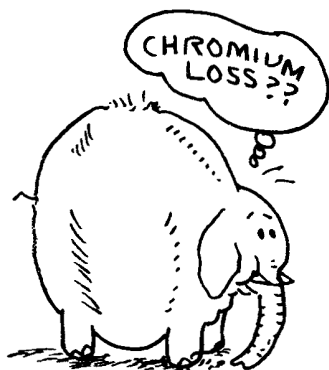
So we've got animal and human studies since 1959 — almost a quarter-century's worth — suggesting that chromium depletion in our diet may be a factor in heart attacks, strokes, and diabetes . . . and now we have another nifty little study saying that merely adding chromium to diet may have a protective effect against these ailments.

I know that's too simple and artless for most of the medical fraternity to accept. Nowadays, they tend to view man as a smoldering hotbed of diseases-about-to-happen and themselves as SWAT teams armed with drugs and machines to uncover and quell the invaders. I, on the other hand, prefer the older view of man as a remarkable creature who, like all others that evolved on Earth, was destined for robust health, as long as his environment retained its nurturing climatic and dietary characteristics. We were evolved where dietary chromium was plentiful and where sugar removed from food did not exist. I'm too optimistic by nature to believe it inevitable that we be felled by strokes, heart attacks, and diabetes before it's time for each of our natural clocks to stop ticking. Dr. Schroeder in *The Trace Elements and Man* (Connecticut: Devin-Adair, 1975) has as a recurrent theme the postulate that "all natural raw foods contain the micronutrients necessary for their metabolism" [in man]. Only when society exercises its presumptuousness in the form of refining, processing, and so on — do these nutrients diminish or disappear.

Getting Healthy

Fortunately, we have the right to exercise our own common sense, too, augmented by this and other marvelous information from thousands of nutrition research workers (unsung, underpaid, . . . and unread!) — information which, as I've noted in all my newsletters, may take half a lifetime to be incorporated into medical clinical practice, or may never reach the clinicians at all. If one has any suspicion that blood sugar levels are misbehaving, or that diabetes, heart disease, or strokes "run in the family," — or even if these conditions are already being treated —, the possibility should be considered that chromium deficiency may be an overlooked factor. For those who can take a few tablespoons of brewer's yeast a day without getting a lot of gas, it's the finest food source of chromium known, in the biologically active form best utilized by the body to amplify the effects of insulin. If not, one could discuss with one's doctor the advisability of a chromium supplement (probably in the 100 to 200 microgram range). If he's never heard of it or thinks it's a weird idea, it's possible to buy it at drug or healthfood stores and let him know. It's not a medicine but

an essential trace mineral and many diets — if they include a lot of bread and bakery goods made with white flour, and fair amounts of sweets or soda pop every day — are not replacing it fast enough. For those who feel that mineral (or vitamin) supplements are unnatural, the other foods most able to supply chromium are those we should be eating anyway: raw nuts, whole grains and seeds, beans, mushrooms, beets, liver, and seafood.



The authors offer an interesting theory for the modest but significant weight loss observed in the chromium-group. Recently, it has been suggested that muscle tissue is more resistant to insulin than adipose (fatty) tissue. Thus, in the absence of chromium's potentiating effect on insulin, less glucose can enter muscle cells, as fuel for energy. Adipose tissue, however, is more sensitive to the resulting high levels of insulin, and much of the blood glucose which should provide fuel for muscles enters the adipose cells instead, where it is quickly converted to fat.

Fat From Low Cr?

In the twelve Rotarians receiving chromium supplement, insulin-sensitivity probably improved in muscle cells, permitting the ready acceptance of glucose for energy from the blood, and reducing the amount available to be stored as fat in adipose tissue. It occurs to me that this hypothesis offers one possible explanation for the apparent sluggishness and low energy of many fat children and adults who have great difficulty losing weight, even when their food intake is restricted. Their powerful craving for sweets may arise in part from their unmet energy needs, but when indulged, may prolong a vicious cycle of chromium depletion, high insulin levels, insulin-resistant muscle tissue, and further prompt sequestering of blood glucose in adipose tissue as fat.

Does that ring any bells? Are there those among my readers who have struggled valiantly with 800 calorie diets, only to find themselves, weeks later, still at Square One weightwise — with the added aggravation of being accused (by doctors or family) of having cheated? If so, perhaps another approach might be attempted: one that combats high insulin levels by using only foods that release glucose slowly and moderately into the blood stream and that are rich in chromium besides. In future *Felix Letters*, we'll tackle weight-loss programs from this and other aspects.

A TASTE OF SALT

A good friend sent me a reprint of Michael Jacobson's "The Deadly White Powder" (*Mother Jones*, July 1978) listing the salt content of a few commonly eaten foods — which was so outlandishly high, it startled even a processed-foods-cynic like me. These last five years, there's been a strong push from many physicians and nutritionists to reduce the salt in processed foods because it may be a major factor in high blood pressure. One medical text notes: "the average intake of sodium chloride (salt) by the normal adult is 7 to 15 grams daily." This is 7,000 to 15,000 milligrams, and since salt is 39 percent Sodium, the "normal" adult takes in 2700 to 5800 milligrams each day.



A salt-restricted medical diet, however, for high blood pressure or kidney disorders, sets dietary goals as low as 250 milligrams of Sodium up to 2000 milligrams for milder restriction. (For the rest, I'll refer to Sodium instead of salt, as most dietary tables do, but if it helps to visualize it, one teaspoon of salt contains 2100 milligrams of Sodium.)

Not having access to the sources Michael Jacobson used for his salt contents (he is editor of *Nutrition Action*, published by Center for Science in the Public Interest, and a relentless stinger in the Corporate Food derriere), I consulted my trusty *Agriculture Handbook No. 456, Nutritive Value of American Foods** and came up with this little group.

PROCESSED FOODS

Item	Portion	Milligrams of Sodium
Biscuits from mix	Two (2-inch)	550
Bread	Two slices	300
Pretzel sticks	Ten (3 x 1/2 inch)	840
Regular butter	One tablespoon	140
Cheeses, natural cheddar or swiss	2-oz. slice	400
American cheese, processed	2-oz. slice	640
Canned soups: chicken-vegetable, minestrone, split pea, etc.	One cup, prepared with 1 can water to 1 can soup	1,000
Canned beans with frankfurters	One cup	1,400
Canned beans in tomato sauce	One cup	900
Canned green beans, solids & liquid	One cup	600
Frankfurter	One, 2-oz size	700
Bacon	4 slices	500
Cured picnic ham	3 1/2 oz. slice	1,200
Potato chips	Twenty	400
Mustard	One tablespoon	200
Ketchup	One tablespoon	200
Italian salad dressing	One tablespoon	300
Sour or dill pickle	One, large	2,000
Bouillon cube	1 cube to 1 cup water	960

UNPROCESSED FOODS

Item	Portion	Milligrams of Sodium
Unsalted butter	One tablespoon	1
Pork chop	3 1/2 oz.	60
Green beans, cooked with no added salt	One cup	5
Raw cucumber	One, large	9
Baked potato	One, large	6

* Honest, no household should be without it; it and its predecessors are a tribute to the conscientiousness of a great staff of government scientists, workers, and editor Catherine Adams. Some bookstores have it, or it can be ordered from the Supt. of Documents, U.S. Govt. Printing Office, Washington DC 20402, for around \$8.50.

It set me to thinking about so many of the good things in life being illegal, improper, or fattening — and how seductive-addictive are the two major additives in food: sugar and salt. As I do when seeking some perspective on a food problem, I pictured a primitive tribe, living near the sea which had rescued from extinction and cradled man's ancestors during the twelve million drought years of the Pliocene** and still generously yielded its bounty. How much sodium would they get from their food in a perfect state of nature? The diet that I dreamed up was a little exotic for my trusty Handbook No. 456, so I substituted prosaic but roughly similar foods, as noted in the following table — assuming this to be a realizable daily intake for an active primitive man. My imagined rations of fish, seafood, berries, fruits, nuts, seeds, leafy vegetables, and fleshy tubers are not very different from those well-documented as forming much of the diet of primitive island and sea-coast cultures a few hundred years ago. Since plants and sea creatures very much like these have existed for eons, I see no reason why such a diet would not have similarly nurtured early man.

Please note the total Sodium. Even with a substantial contribution from dried kelp, there is only about as much as would be called for on a *medically salt-restricted diet*. I've eaten these foods frequently — all except coconut water, which is a rare treat in my world but a staple thirst-quencher in the tropics — and found them quite palatable without added salt. To my thinking, no sacrifice whatever, tastewise, is entailed in eating them *au naturel*.

Wrong Na/K Ratio?

The key may lie in the amounts of minerals present. Richness of essential mineral content in foods often is manifested to us as satisfying flavor — perhaps a useful instinctive trait. As I hunted up Sodium values in No. 456, I was struck by the high Potassium ones and decided to list them as well. When we compare the approximate milligrams of Sodium and Potassium (1,000 and 6,000) eaten by our mythical primitive man on his not too mythical diet, we find a Sodium-to-Potassium ratio of 1-to-6 (one part Sodium eaten to six of Potassium).

By contrast, in nutrition and medical textbooks, a *Sodium-to-Potassium ratio of only 1-to-1 is considered a hopeful goal to shoot for*, because of the common problem of high Sodium and low Potassium intake. Only time and more research will reveal whether high blood pressure is related not only to too much salt, but to the prevailing topsy-turvy Sodium-to-Potassium ratios.



PRIMITIVE DIET

Food	Portion	Grams 1 oz. = 28 gms	Calories	MGS Sodium	MGS Potassium
Banana	Two medium	350	200	2	880
Fresh coconut	Two pieces, 2 x 2 in.	90	310	20	230
Coconut water	Three cups	720	160	180	1,060
Salmon	8 oz.	227	360	230	880
Dried kelp	½ oz.	14	—	425	750
Sweet potato	One	180	170	15	367
Cabbage	One cup, chopped	90	22	18	210
Sprouted Mung beans	One cup	105	37	5	234
Shrimp	3½ oz.	100	90	140	220
Walnuts	14 halves	28	185	1	128
Blackberries	One cup	144	84	1	245
Sunflower seeds, shelled	½ cup	72	400	22	660
Tangerines	Two large	270	90	4	250
Totals			2,108	1,063	6,114

The lure of salted foods is partly habit and partly taste; but it may also imply a hunger for other minerals. Animals in the wild sometimes frequent a "salt-lick" (which also is high in potassium and other minerals, along with salt), but, for the most part, do just fine on the Sodium found in natural vegetation and in the tissues of prey. With a little primitive imagination, it's not all that hard to concoct a so-called low-salt diet for ourselves that could invoke visions of golden sands and warm lagoons . . . and have our arteries murmuring "Hallelujah!"



** At least this is one theory, accepted by a number of anthropologists and elucidated with savory wit and insight by Elaine Morgan, the Welsh writer, in *The Descent of Woman* (New York: Stein & Day, 1972), now in paperback.

The Felix Letter is published monthly except December. \$10 for 12-issue subscription in U.S.A., checks made out to Clara Felix, Box 7094, Berkeley, CA 94707.