

Vegetarians, Watch Your Zinc!

Zinc. This four-letter trace element helps the body guard against infections and repair wounds. It's essential for growth and brain development in infants and children.

So ARS nutritionist Janet Hunt wanted to know if vegetarians—at least those who consume milk and eggs—get enough zinc to support these and the hundreds of other biological functions in which the mineral participates.

A recent survey done by the Vegetarian Resource Group tallied nearly 2 million lacto-ovo vegetarians in the United States. More common than vegans, who exclude all animal products, lacto-ovo vegetarians include milk and eggs in their diets.

“But about 44 percent of the zinc in most U.S. diets comes from meat, fish, and poultry,” says Hunt. “These are the foods that all vegetarians exclude.”

She says planning the vegetarian diet to contain as much zinc as the typical U.S., or Western, diet used in the study was challenging.

“It required the daily inclusion of legumes, such as beans and peas, and considerable use of whole-grain products,” says Hunt. And it still fell short—by 14 percent, she says.

Vegetarian diets in the United States typically contain between 10 and 30 percent less zinc than nonvegetarian diets.

And they also contribute a lot of fiber and phytic acid, which tend to tie up minerals and make them less available for absorption. But the net impact of including high-fiber, high-phytic-acid foods such as legumes and whole grains is probably positive, says Hunt. “Absorbing 8 percent of the 3.5 milligrams (mg) of zinc in a slice of whole-wheat bread is still better than absorbing 38 percent of the 0.4 mg of zinc in a slice of white bread.”

Twenty-one women consumed both the vegetarian diet and the typical U.S. diet for 8 weeks each while living at the Grand Forks Human Nutrition Research Center in North Dakota. Hunt and colleagues measured the women's absorption of zinc and another trace element—iron—using nonharmful radioactive isotopes. Although vegetarian diets supply ample iron, the iron in plant foods, called non-heme iron, is not as well absorbed as the iron in animal foods.

The women, indeed, absorbed less zinc from the vegetarian diet—21 percent less. Combined with the 14 percent lower zinc content of the vegetarian diet, the women absorbed a total of 35 percent less zinc. And their blood zinc levels were 5 percent lower after 8 weeks on the vegetarian diet.

“But they absorbed enough zinc to replace the amount excreted and didn't seem to be at any health risk,” says Hunt.

She concludes that lacto-ovo vegetarians, while at greater risk for zinc deficiency, can meet their requirements by eating plenty of whole grains and legumes. She sees a much greater risk of zinc deficiency in economically disadvantaged countries where vegetarian diets contain more phytic acid and less protein, an enhancer of zinc absorption.

The women's absorption of non-heme iron was also lower on the vegetarian diet—70 percent lower. And this diet contained none of the heme iron supplied by the typical U.S. diet, so total iron absorption was even lower. But again, the women showed no signs of iron-poor blood, based on hemoglobin and

several other measurements. One of these—serum ferritin—is considered the most sensitive indicator of iron stored in the body.

“There's a range where people can absorb more or less and still not be at risk of toxicity or deficiency,” Hunt says. “Although several surveys indicate that vegetarians have lower iron stores, blood hemoglobin remains normal, and there's no evidence of impaired function.”

The researchers also assessed the women's balance for several minerals

in addition to zinc and iron. People are said to be “in balance” for a given mineral when they are consuming as much as they are losing through urine, feces, sweat, or other bodily fluids.

The vegetarian diet contained about the same

amount of calcium as the Western diet and a little less phosphorus. But it supplied 27 and 29 percent more copper and magnesium, respectively, and more than twice the manganese. Still, balance measurements didn't differ significantly between the two diets for any of these minerals or for zinc and iron.

“It shows how well the human body adapts to changes in both the amount and form of minerals and maintains an equilibrium,” says Hunt.—By **Judy McBride, ARS.**

Janet R. Hunt is at the USDA-ARS Grand Forks Human Nutrition Research Center, P.O. Box 9034, University Station, Grand Forks, ND, 58202-9034; phone (701) 795-8328, fax (701) 795-8393, e-mail jhunt@gfhnrc.ars.usda.gov ♦

KEITH WELLER (K6027-8)

