Micronutrient Inadequacy: Populations At Risk

Dr. Kate Thomsen and Silky

In the prior issue of Mercer County Woman I wrote an article describing widespread nutritional inadequacies in the U.S. population. We understand that under-consumed macronutrients (proteins, carbohydrates and fats) leads to malnutrition and over-consumed macronutrients leads to obesity. The Standard American Diet, high in calories from carbohydrates/processed foods, has led to an overweight/obesity epidemic affecting 2/3 of the population! 40% of us have diabetes or pre-diabetes!!! These conditions affect both longevity and quality of life but the Standard American Diet also puts us at risk of micronutrient (vitamins and minerals) inadequacies. Deficiencies or inadequacies in micronutrients can also deprive us of healthy aging and lead to a number of chronic health conditions. This paradox of our obesity epidemic has been termed: overfed and undernourished.

Healthy eating plans contain lean proteins, beneficial fats and complex carbohydrates. The latter are derived from a variety of plant-based foods, including fruit, vegetables, legumes, whole grains, and nuts. This is the composition of the Mediterranean diet which studies show has been associated with a longer lifespan and a reduced risk for many age-related diseases like heart disease, cancer, and dementia. It provides enough energy for life, most of the essential micronutrients, and thousands of biologically active phytochemicals (plant chemicals that provide information to our cells).

Micronutrient inadequacies are the result of many factors, the most obvious being insufficient food intake or nutrient-poor food choices. Nutrients that are consumed must be digested and absorbed and this is dependent on the bacteria in the gut (the microbiota), genetic differences, and interactions with other foods and drugs. The nutrients are handled and utilized differently in people based on their current nutritional status, genetic variations, and the differences in their health and disease states and organ functioning. Common specific individualized factors that might affect micronutrient status include the following:

Infants: Since human breast milk does not contain enough Vitamin D, breast-fed and partially breast-fed infants should be supplemented with oral Vitamin D. Breast feeding mothers should be sufficient in iron, B12 and fish oil to pass on to babies.

Adolescents: Rapid musculoskeletal growth, brain changes and sexual development require nutrients. Dietary choices of adolescents can be shockingly nutrient replete. Studies have shown that many adolescents have insufficient intake of the fat-soluble vitamins (A, D, E and K), several minerals (potassium, calcium, magnesium, phosphorous, zinc and iron in some menstruating girls), Vitamin C, and choline (found in egg yolks). A high quality multi vitamin/multimineral would probably be beneficial.

Premenopausal women: Folate (vitamin B9) is recommended for all women capable of becoming pregnant as it has been shown to reduce the risk of birth defects involving the brain and spinal cord which develops in the first month of pregnancy. Iron may be needed in women with heavy menses. Vitamin D and calcium are needed to support bone homeostasis.

Pregnancy: Body adaptations to accommodate a fetus and the "sharing" of nutrients creates stress on the nutrient status of a pregnant woman. Requirements for folate, iron, iodine, magnesium, Vitamin C and zinc are increased. A high-quality prenatal vitamin may come as a packet of several capsules – one should be an Omega 3 oil as the DHA component has been found to enrich the developing brain.

Aging: Micronutrient deficiencies increase with age in the elderly due to increased medical conditions, nutrient interactions with pharmaceuticals, decline in oral health, taste and smell changes, decreased digestive capacity, and perhaps, institutionalization. Vitamin B12 may be inadequate due to atrophic gastritis (low stomach acid fairly common with aging) or use of medications that lower stomach acid. B12 deficiency can cause neurological changes that can mimic dementia. Vitamin B6 deficiency is also seen with aging. Vitamin D is often inadequate in the elderly as their skin is less efficient at making it from the sun and sun exposure may be limited. Calcium should be supplemented with the Vitamin D for bone health which declines with aging. It is not necessary to replace iron unless there is specific iron deficiency. It may be harmful as it can act as a free radical.

Obesity: Obese individuals may have nutrient intake inadequacies. Deficiency of Vitamin D is common because it is sequestered in fat stores. Other micronutrient inadequacies associated with obesity include vitamins A and E, potassium, calcium, magnesium, and Vitamin C. Individuals who undergo bariatric surgery have the upper small intestine area altered which can reduce the secretions needed for nutrient absorption. They will need supplementation of many nutrients including thiamin/vitamin B1, vitamin B12, the fat-soluble vitamins A, D and K, iron, zinc, calcium, and vitamin C.

People with dark skin: Melanin, the dark pigment found in skin, blocks the absorption of UV light from the sun. People with dark skin living in northern latitudes will be deficient in vitamin D. People with light skin living in northern latitudes will be deficient in the winter and all year-round if sunscreen is consistently used.

People with Inflammatory Bowel Disease: People with Crohn's and Ulcerative Colitis have difficulty absorbing nutrients and lose nutrients with diarrhea. Micronutrients at risk in these conditions include iron, vitamin B12, folate/B9, the fat-soluble vitamins A, D, E, and K, and the minerals zinc and calcium.

Effects of alcohol: Chronic alcohol consumption is associated with inadequate amounts of B vitamins especially thiamin/B1 and riboflavin/B2 but also includes niacin/B3, vitamin B6, folate/B9, and vitamin B12. These B vitamin deficiencies contribute to cognitive dysfunction. Zinc and vitamin A can also be deficient. While alcohol depletes the storage of vitamin A in the liver, it can also increase the toxicity of vitamin A when given therapeutically.

Effects of smoking: Smoking cigarettes produces many toxic products in the body. The oxidative damage to cells can be "rescued" to some degree by antioxidants. Vitamin C blood levels are lower in smokers (as they are using it up) and can be replaced with supplementation.

Vegetarians consuming dairy and/or egg protein (ovo-, lacto-vegetarians): Many people consuming a mostly plant based diet choose to add varying amounts of eggs (ovo-vegetarian) or dairy (lacto-vegetarian) or both (ovo-lacto-vegetarian). These diets may still be inadequate in iron, zinc and other nutrients. The iron from plants (nonheme iron) is not well absorbed from the intestines and so its bioavailability is less than that of iron from animal sources. Improvement in the absorption of nonheme iron can be gained by adding ascorbic acid (vitamin C). Plant sources of zinc (nuts, legumes and whole grains) can be suboptimal because of their high content of phytic acid a compound that inhibits zinc absorption. Ovo-. Lacto-, and Lacto-ovo-vegetarians should consider micronutrient testing.

Vegan Diets: A vegan diet excludes all foods of animal origin. People choosing a vegan diet are at risk of nutritional deficiencies and inadequacies in vitamin B12, vitamin D, iodine, calcium, iron, and zinc. Since B12 is only found in foods of animal origin it must be supplemented with fortified foods, a B12 supplement, and/or some specifically made fermented foods. Dairy products and fish are dietary sources of vitamin D unavailable to vegans. Sunlight or supplementation is needed and vitamin D blood levels should be measured for adequacy. Good plant sources of bioavailable calcium include the cruciferous vegetables (broccoli, cabbage, kale, bok choy, mustard and turnip greens). Some plants (spinach, rhubarb, sweet potatoes) contain high amounts of oxalic acid which inhibits calcium absorption. These should be consumed judiciously. A less potent mineral inhibitor is phytic acid (in whole grains, legumes, cereal). Since there is potential for unintended nutrient loss, testing for micronutrient status would be beneficial for people consuming a vegan diet.

Gluten Free Diet: Gluten-free grain products have the bran and germ layers of the grain stripped which depletes the fiber and other nutrients. If not re-fortified, they can be deficient in thiamin/B1, riboflavin/B2, niacin/B3, folate/B9, and iron. A study of people with celiac disease who were using a gluten free diet showed inadequacies of folate/B9, vitamin B12, vitamin D, calcium, magnesium, iron, and zinc. I have noticed that our patients using a gluten free or grain free diet (and not supplementing with a B Complex) have low B vitamin blood levels across the board and are usually complaining of fatigue.

Iodine Free Diet: No fish, no seaweed, and only Celtic or Himalayan Sea salt is iodine deficient. Iodine is needed for proper thyroid function.

Energy Restricted Diet: Weight loss diets are often associated with micronutrient inadequacies.

Testing for Micronutrient Status: Historically nutrient and micronutrient status were evaluated by a dietician questioning the subject using a 24- hour recall form, or having the subject fill out a Food Frequency Questionnaire or keep a 3-day or 7-day Food Record. Obviously, there are many limitations to these "guestimates". Now we have several labs that offer micronutrient testing by taking a blood sample and testing it for the vitamins, minerals, amino acids, and beneficial fatty acids inside the red blood cell or the white blood cell. This has been an invaluable tool in evaluating the root causes of symptoms and health conditions.

Dr. Kate Thomsen's office for holistic health care is located in Pennington, NJ. She is trained in Family Medicine, is Board Certified in Integrative Medicine, and is an Institute for Functional Medicine Certified Practitioner. She has been practicing Functional Medicine for 20 years. For more information see www.drkatethomsen.com or call the office at 609-818-9700.