Small Wonders

by Mark Witten

Tiny nutrients have a huge impact on world health.

Night blindness was a normal occurrence among pregnant women in the rural village in Nepal that Venkatesh Mannar visited in 2003. Living high in the mountains, the women he met risked their lives walking blindly in the dark on narrow mountain paths. "There was a real danger of them falling down a cliff," he says.

Mannar had traveled to the remote village to treat pregnant women with low doses of vitamin A capsules. After just two doses, the women regained their vision.

Mannar's cure for night blindness was a scientific demonstration of the healing power of *micronutrient* supplements. Micronutrients are vitamins and minerals that everyone needs in tiny amounts for good health. "The women were so thrilled that they could walk and see in the night," Mannar recalls. "You could see the joy in their faces."

Micro Malnutrition

Mannar is president of the Micronutrient Initiative (MI), a nonprofit organization based in Canada. He's also a chemical engineer and an expert in *fortification*, the process of adding nutrients to food. MI supplies vital micronutrients to about 500 million undernourished people in developing countries, helping them survive and thrive. Vitamin A, zinc, iodine, and iron are four key micronutrients.

Vitamin A is found in meats, eggs, dairy products, and green leafy vegetables. A lack of vitamin A in the diet causes children and pregnant women to experience *night blindness*-an inability to see clearly in low light. It also weakens children's immune systems, increasing their odds of dying of diseases such as measles and malaria. A single dose of vitamin A costs 2 cents.

"It takes only two doses of vitamin A every year from age 6 months to 5 years, to help save a child's life," says Mannar. "Vitamin A is a simple, inexpensive way to boost children's immune systems so their bodies can fight off deadly infections and get the best start in life."

Mannar has led a global effort to end vitamin A deficiency. MI has provided more than 5 billion vitamin A capsules to children, pregnant women, and breast-feeding mothers in 75 countries. MI's vitamin pills are estimated to have helped save the lives of more than 2 million children in the past 10 years.

In 2008, a panel of top economists from around the world ranked micronutrients as the best investment in solving some of the world's biggest problems. Health economists calculated that every dollar spent on vitamin A and zinc supplementation programs creates benefits worth more than $17. Zinc supplements help save the lives of young children at risk of dying of severe diarrhea.

Iodine Adds IQ

Mannar, who was born in India, first saw the potential of food fortification while working in his family's salt manufacturing business. He became interested in *universal salt iodization*, the process of adding iodine to salt to solve the global problem of iodine deficiency. Iodine is a trace mineral that protects a child's growing brain. A lack of iodine in the diet is the leading preventable cause of brain damage. It also causes *goiter*, a large swelling of the thyroid gland in the neck.

The Micronutrient Initiative

Venkatesh Mannar inspects a salt iodization machine conveyor belt.

Mannar remembers being in a village in northern India in the mid-1980s where about 30 percent of the residents had goiter. "It was very visible," he says. "Then we got salt iodized all over the country. When I went back to the same village 15 years later, all the goiter had disappeared."

Mannar has used his expertise to develop an iodized-salt testing kit now widely used around the world. Under his leadership, MI claims it has raised global IQ levels by helping nearly 40 countries set up universal salt iodization programs.

Salt iodization programs have been so successful that MI has launched a project, called *double fortification*, to fortify salt with iron as well as iodine. Almost half of all women and preschool children in developing countries do not get the iron they need from foods such as meats, poultry, and fish. That often leads to *anemia*.

People with anemia have fewer red blood cells and don't get enough oxygen to fuel the body. They feel exhausted and are more susceptible to infections. Iron deficiencies also can impair the mental development of babies and young children.

Daniel Sambraus/Photo Researchers, Inc.

Mannar worked with food engineers at the University of Toronto to solve the technical problem of double-fortifying salt with both iron and iodine. "It was quite a challenge getting iron and iodine in salt because they compete with each other," he says. The solution was to spray each iron particle with a vegetable fat that creates a protective coat and prevents the iron from reacting with the iodine.

On a visit to a high school in his native country, Mannar was amazed by the differences he saw in teenage girls who were getting iron on a regular basis. "In India, about 75 percent of women are anemic. Girls like this used to be lethargic and weak," he says. "I've never seen girls so active, excited, and upbeat."

Top 10 Essential Micronutrients

	Sources in a good diet	**Consequences of a deficiency**
Vitamin A	meats, eggs, green leafy vegetables, dairy products	night blindness, weak immune system, less disease resistance
Iodine	seafood, milk, iodized salt	goiter, impaired mental development
Iron	meats, poultry, eggs, dried beans	impaired mental development, less energy
Zinc	dairy, meats, shellfish	stunted growth, less disease resistance
Folic Acid	green leafy vegetables, nuts, whole grains	nervous system birth defects
Calcium	dairy products, tofu, dried beans, nuts	osteoporosis, increased risk of bone fracture
Thiamin	pork, whole grains, legumes	heart problems, nervous system disorders

Riboflavin	dairy products, eggs, meats, vegetables	general weakness, sore throat, dermatitis
Niacin	meats, fish, nuts, mushrooms, whole grains	diarrhea, dementia, dermatitis
Vitamin C	citrus fruits, potatoes, broccoli	susceptibility to infections, scurvy

Source: The Micronutrient Initiative

Name: _____ **Date:** _____

1. The double fortification process involves adding which nutrient(s) to salt?

A. iodine and iron

B. iodine only

C. vitamin A and iodine

D. vitamin A only

2. How does the author describe the healing power of micronutrient supplements?

A. malnourished

B. perplexing

C. impactful

D. benign

3. What words might people who received Vitamin A supplements from Mannar use to describe the supplements?

A. negligible

B. beneficial

C. scientific

D. harmful

4. Look at the "Top 10 Essential Micronutrients chart." The word**deficiency** means

A. need

B. excess

C. problem

D. lack

5. The main idea of this passage is that

A. micronutrients are an important component of people's diet, and deficiencies can cause health problems

B. micronutrients are an exciting scientific discovery that we should incorporate more into treatments

C. double fortification is a more promising solution than a traditional, single fortification process

D. anemia causes more negative health side effects than does a Vitamin A deficiency

6. For children and pregnant women, what are the potential side effects of a deficiency of Vitamin A?

7. What does the author imply about the effects of fortification (iodization) of salt in the town in northern India?

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

Mannar began fortifying foods with micronutrients _____ people would get the vitamins and minerals they needed

to be healthy.

A. however

B. but

C. so

D. although

