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Double Fortified Salt, A Major Public Health Breakthrough

*Addition of Iron and Iodine to Salt can Improve the Health of
More than Half the World's Population*

Annual cost will be less than 15 cents per person

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M.G. Venkatesh Mannar, Executive Director of The Micronutrient Initiative, will be available for interviews on Tuesday, May 2 and Wednesday, May 3. Please call 703-820-2244 to schedule a time.

The health of more than half the world's population can soon be improved as a result of a new salt double-fortification technology developed by the Micronutrient Initiative and the University of Toronto. The process permits for the first time the inexpensive addition of iron, along with already commonly added iodine, to ordinary table salt, one of the only dietary staples common to every region of the world.

The discovery is expected to help overcome Iron Deficiency Anemia (IDA) as well as iodine deficiency, all with one simple technology. The announcement coincides with the SALT 2000 Symposium, a meeting of 800 international salt producers, which takes place May 8-11 in The Hague, Netherlands. Salt fortification, along with production and product quality issues will be the primary issues discussed at the conference.

Iron Deficiency Affects Half the World

IDA is an extreme form of iron deficiency -- the world's most prevalent nutritional deficiency. Nearly two billion people, mostly women, but also more than 50 percent of children under five

years in poor countries, are estimated to suffer from IDA. More than one billion others are affected by less dramatic levels of iron deficiency.

The toll taken by IDA is considerable. It reduces both physical and mental capacities of whole populations. Even mild anemia may affect the intellectual development of the very young.

Many people in developing countries have low iron levels because their diets have low iron content or prevent adequate absorption of the essential nutrient. Iron deficient pregnant women can become rapidly anemic because their bodies require higher levels of iron than others. More than half of pregnant women in poor countries are anemic. In some countries, up to 75 percent of pregnant women are anemic. Two hundred fifty thousand of these women die during childbirth annually from conditions associated with anemia.

Young children are at a higher risk of anemia because the iron in their diet is frequently insufficient for their growth needs.

IDA may also be a risk factor for infections before, during and after childbirth and can lead to low birth weight and increased rates of perinatal mortality.

Iron deficiency affects men to a lesser degree, usually resulting in fatigue and diminished work capacity.

The research for the breakthrough technology was undertaken in an effort to address micronutrient malnutrition – a lack of vitamins and minerals – especially among the world’s poor. At the 1990 World Summit for Children, 71 heads of state made a public commitment to combat micronutrient malnutrition, including iron and iodine deficiencies. Canada, a co-chair of the Summit, subsequently created the Micronutrient Initiative, based in Ottawa.

‘Super Salt’: A Carrier for Micronutrients

Double fortified salt has overcome a problem that has puzzled international food technologists and nutrition scientists for more than 30 years – how to fortify salt with both iron and iodine without compromising the effect of either nutrient.

Chemical reactions caused by the combination of these nutrients were a major obstacle in early attempts to double fortify salt. Some attempts failed because the nutrient levels did not remain constant over time. Other attempts resulted in salt with unusual colors, flavors or textures that were not acceptable to consumers.

The iron in the new salt is combined with iodine encapsulated with dextrin, using a process similar to the one used in coating cold tablets. The coating prevents the iodine and iron from interacting with one another or coming into contact with moisture in the salt. Water-resistant packaging is critical to ensure the stability of the nutrients.

Tests completed last year in Ghana and India showed that the new salt has a long shelf life, high consumer acceptability, provides sufficient iodine and iron absorption within the body and has the ability to be produced inexpensively in most developing countries.

“Salt has long been known to be an excellent vehicle for providing nutrients to large populations because almost everyone consumes it, and it is relatively cheap to fortify,” says M.G. Venkatesh Mannar, Executive Director of the Micronutrient Initiative. “We can double fortify salt with iron and iodine for approximately 15 cents per person per year.”

In areas where consumers cannot pay even the small additional cost, it could easily be underwritten by governments, aid agencies or foundations. The cost would be considerably less than that already being used to finance supplement-based iron programs in these regions.

Since equipment requirements are small and the fortification process itself relatively simple, large amounts of double-fortified salt production could be available in the market places of the world as early as 2001.

The Micronutrient Initiative will provide the new double-fortification technology to salt producers at no cost. The group will also assist in transferring the technology to countries and manufacturers to get the process initiated. Introducing the new technology to developing countries will be the primary focus of the group’s effort.

Iron-fortified salt is not a complete solution to the problem, however. Infants and children less than two years of age have a low salt intake. To meet their iron needs, their diets should also include iron-rich foods.

Building on the Success of Universal Salt Iodization

The double fortification of salt comes on the heels of a remarkably successful effort to iodize all of the world's salt, undertaken by the salt industry and supported by development agencies (the Micronutrient Initiative, UNICEF and Kiwanis International) and governments. Using salt as a carrier to reach people with iodine at such scale, and in one decade, makes this one of the greatest public health success stories of the last century. It has been compared to the eradication of smallpox in terms of its public health consequences.

Before 1990 iodized salt was not reaching many developing countries despite the fact that the process has existed since the 1920s. A lack of commitment from governments and salt producers had been preventing the transfer of the technology. However, in the last decade the global iodine fortification effort has achieved more than 70 percent iodization worldwide, up from 10- 20 percent in 1990. The program expects to achieve Universal Salt Iodization (USI) by 2010.

The key to success in nearing USI has been the dynamic partnership of governments, producers and development agencies, and especially the enthusiastic support of private salt producers. In many cases, producers have recognized the important public health benefit of universal iodization and have taken the lead in ensuring that their communities no longer suffer from such an easily preventable condition. These producers have proactively joined together with local and national governments to eliminate the problem.

“The network of salt producers and government agencies that was set up as part of the iodization effort has been highly effective,” says Mannar, “and it gives us the infrastructure to eventually bring double fortified salt to even the most remote areas of the globe. We are confident that producers will be equally enthusiastic about providing this additional nutrient in their products.”

Iodine Deficiency's Devastating Consequences

Iodine deficiency is the most common cause of preventable mental disabilities. Lack of iodine can also permanently lower the IQ of children by 10-15 points. In extreme cases, iodine

deficiency can result in cretinism, a condition in which children are born with profound mental and physical disabilities.

Lack of iodine in the diet can cause pregnancies to end in miscarriage, stillbirth or neonatal death. Neuromuscular, speech and hearing abnormalities are common among children born to iodine deficient mothers. Some 655 million people have developed goiter, a swelling of the thyroid gland in the neck caused by a lack of iodine.

However, iodized salt is now **protecting 85 million newborn children** around the world from a significant loss in learning ability every year.

On the regional level, parts of Asia, Africa and Eastern Europe continue to have relatively low percentages of their salt iodized: 67 percent in Sub-Saharan Africa, 65 percent in South Asia and 25 percent in the former Soviet states.

Furthermore, some industrialized countries have seen their levels of iodized salt drop in recent years. In the United States, for example, iodine levels have dropped more than 50 percent between 1973 and 1991, although the 1973 levels were well above the recommended daily allowance.

Experts believe a secondary explanation for the decreasing iodine levels in industrialized countries is elimination of the use of iodine for sterilization of milk. It is also common for doctors to urge people with health problems to lower their salt intake, which can in turn lower their iodine levels.

China – A Major Success in Reducing Iodine Deficiency

In 1991 Chinese Premier Li Peng signed a declaration calling for Universal Salt Iodization within his country. The declaration was drafted in response to the World Summit for Children, which called for complete global salt iodization by the year 2000. By all accounts, the Chinese have been successful in their task.

As a result of this effort, the coverage of salt containing 20 ppm or more of iodine in China has increased from 54 percent in 1995 to 93.8 percent in 1999. Total incidences of goiter in children

have been reduced from 20.4 percent in 1995 to 8.8 percent in 1999, and the number is expected to decline further. Tens of millions of newborn infants in China have since been protected from a significant loss in learning ability.

“The Chinese people are proud of their success in nearly eliminating Iodine Deficiency Disorders in their country,” says Mr. Dong Zhihua, president of the China National Salt Industry Corporation. “China is the most populous country in the world, and iodine deficiency was a major public health problem for us. But we were able to control the problem at a relatively low cost with the help of our salt producers.”

The success of the Chinese program is attributable to the fact that the national government empowered local governments to work directly with salt producers. Cooperation between these two groups ensured that supplies of iodized salt were sent directly to consumers.

A key factor has been the upgrade of production and packaging facilities at plants across China. The upgrades were funded in part by a \$27 million loan from the World Bank. The Chinese government contributed \$100 million to the project.

New Frontiers for Salt -- Vitamin A Fortification

The Micronutrient Initiative and the University of Toronto are also working on a program to triple fortify salt with vitamin A, further improving the public health value of salt.

Vitamin A deficiency (VAD), which exists in 60 countries, mainly affects children and can eventually rob them of their eyesight and their lives. Pregnant women are also at risk of vitamin A deficiency and can suffer from night blindness if the condition goes untreated.

According to the World Health Organization, some 2.8 million children up to age four have severe vitamin A deficiency, and 251 million others have severe to moderate effects. VAD blinds between 250,000 and 500,000 children every year. Two-thirds of these children eventually die from infections such as measles and severe diarrhea, especially in parts of Asia and Africa. Without adequate vitamin A in the diet, there is almost a 25 percent greater chance of early death.

“The potential for triple fortification will make salt a kind of ‘Noah’s Ark’ of global public health, carrying three major nutrients in one simple delivery system and helping to slash micronutrient malnutrition among more than half of the planet’s population,” says Mr. Mannar. “The frontiers of using salt for public health are boundless.”

With the advent of double fortification of salt and the eventual triple fortification with vitamin A, some of the effects of micronutrient malnutrition can be reversed. However, these nutrients must be introduced to the diet at consistent levels and in regular doses in order for the benefits to be permanent. Even after a country achieves full fortification, it must continue its commitment in order to maintain quality. This means that governments, producers and non-governmental organizations must work together to ensure that complete fortification is maintained.

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The Micronutrient Initiative is an international development agency working to reduce micronutrient malnutrition throughout the world. MI is based in Ottawa, Canada and operates as a secretariat within the International Development Research Centre.

MI is governed by a Steering Committee consisting of the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC), the United Nations Children's Fund (UNICEF), the US Agency for International Development (USAID) and the World Bank. MI supports micronutrient programs in more than 75 countries, working with multilateral and bilateral aid agencies, governments, non-governmental organizations, research institutions, and the private sector to expand access to micronutrient-rich foods, improve the quality of food fortification and dietary supplementation programs, and enhance their impact on the health and well being of vulnerable populations.

MI operates with a staff of 39 professionals located in Ottawa, Canada and South Asia together with a network of consultants around the world.