

Nutriview 2005/1

Contents in brief:

■ <i>Editorial: Bargain hunters beware!</i>	2
Good quality has its price. Where the health of the nation is involved, only the best is good enough. It is essential that efforts to improve nutrition set minimal standards that are strictly controlled.	
■ <i>Chinese national survey shows way for future nutrition activities</i>	2
The results of China's first national comprehensive survey show that the diet and nutrition status of the urban and rural populations have improved significantly. In light of these results, the Chinese government has started to address the most urgent needs, while adhering to the principle of seizing opportunities and giving guidelines according to different categories/issues.	
■ <i>Enhancing absorption of iron from fortified foods</i>	3
This SUSTAIN task force consensus on available strategies helps in the selection of a technically feasible and efficacious solution.	
■ <i>Towards a common agenda for micronutrients</i>	5
The IVACG, INACG and IZiNCG meetings in Peru provided a new opportunity to share the latest scientific findings on ways to reduce "hidden hunger". Participants agreed that single deficiencies of micronutrients seldom occur in isolation, and only a comprehensive approach can hope to improve global health.	
■ <i>News in brief</i>	7
Gut flora in health and disease: potential role of probiotics. International workshop highlighted changes in scientists' views. Zinc deficiency common in Nigerian cataract patients. Might also contribute to incidence of night blindness.	
■ <i>Events</i>	7
■ <i>Vignette: Probiotics</i>	8
Regular intake of certain live microorganisms in adequate amounts can have beneficial effects on human health.	

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Editor/Design and layout

Anthony Bowley, ABCommunications, Hochwaldstrasse 37, CH-4143 Dornach, Switzerland. Fax: +4161/7030257

Scientific advisors

Dr Alfred Sommer, Dean, School of Hygiene and Public Health, Johns Hopkins University, USA-Baltimore MD 21205

Dr Ricardo Uauy, Professor of Human Nutrition, Institute of Nutrition and Food Technology, University of Chile, Casilla 138-11, Santiago, Chile

Dr Aree Valyasevi, Chairman of the Executive Board, National Health Foundation, Bangkok 10900, Thailand

Coordinator

Dr Max Blum, Scientific Expert, DSM Nutritional Products Europe AG, Postfach 3255, CH-4002 Basel, Switzerland

Internet + Email

<http://www.nutrivit.org/vic/staple/index.htm>

Email: nutriview@bluewin.ch

■ Editorial:

Bargain hunters beware!

When criminal manufacturers flood the market with cheap copies of luxury goods, such as jewelry, watches and designer clothes, you might be inclined to shrug your shoulders, thinking that nobody suffers. People usually know they are buying a counterfeit, and would probably be unwilling or unable to pay the price asked for the original, anyway.

It is a different matter, however, when shopping for food. We expect it to be safe, nutritious and reasonably priced. Often we associate these qualities with a particular brand name. As ordinary consumers, we are seldom able to identify inferior quality food products on the supermarket shelf. So we rely on our country's regulatory system, and the honesty and experience of the retailer to give us what we expect.

Unfortunately, it is all too easy for

unscrupulous manufacturers to fool the system, at least some of the time. Even sophisticated markets in North America and Europe are not immune, and need to keep a watchful eye on developments.

In most cases, the inferior products are identified sooner or later without any major damage being done to consumers' health. But it would be wrong to treat such matters complacently. In 2004, the Chinese authorities had a major scandal on their hands after 50 infants fed a fake baby milk powder died, and hundreds of others suffered acute malnutrition. The affected families were among the poorest section of the population, who thought the product was a good bargain, because of its low price.

With the growing pressure on manufacturers in developing countries to

improve the nutritional value of their products through fortification, it is also becoming increasingly important for them to be sure they can trust their premix supplier. In Nigeria, for example, several manufacturers, in an effort to minimize expenses, planned to use a vitamin and mineral premix that was offered to them at a surprisingly competitive price. The authorities discovered that this premix fell short of the required specifications, and so were able to prevent a serious setback in the country's nutrition efforts.

What we can learn from such experiences is that good quality has its price, and, where the health of the nation is involved, only the best is good enough. It is essential that efforts to improve nutrition set minimal standards that are strictly controlled. – A. Bowley ■

■ Feature:

Chinese national survey shows way for future nutrition activities

On October 12, 2004, Wang Longde, Vice Minister at the Chinese Ministry of Health, presented the results of China's first national comprehensive survey ever that covered diet, nutrition and hypertension, diabetes, obesity and abnormal blood lipid levels. This survey, which was conducted from August to December 2002 under the joint leadership of the Ministry of Health, the Ministry of Science and Technology and the National Bureau of Statistics, has basically collected the information relating to the Chinese people's diet, nutrition and disease conditions, and by this it has provided the government with scientific and reliable evidence to formulate relevant policies and development plans for the future.

The results of this survey show that with the sustained and rapid economic development in China, the diet and nutrition status of the urban and rural populations have improved significantly, and the prevalence of malnutrition and nutrition deficiencies has decreased. In the meantime, however, China is also facing the dual challenges

of nutrition deficiency and nutrition imbalance. Generally speaking, energy and protein intakes of the urban and rural residents are basically satisfactory, and there has been a significant increase in the consumption of meat, eggs and poultry, with an increase in good quality protein. Compared with 1992, the diets of the rural population in China have changed significantly and their dietary patterns have become more reasonable.

The growth of children and teenagers has improved steadily. Average infant birth weight was 3,309 grams, with low birth weight occurring in only 3.6% of cases, (a level similar to that found in industrialized countries). Growth retardation in children under 5 years was 14.3%, which marks a 55% decrease compared with 1992. Prevalence of low body weight in children was 7.8%, a decrease of 57% compared with the figure in 1992. Prevalence of malnutrition among children has decreased. However, in the poorer areas, 29.3% of children under 5 years show growth retardation and 14.4% have a

low body weight. In addition, insufficient intakes of calcium, iron, vitamin A as well as other micronutrients remain a common problem in both urban and rural areas.

The prevalence of anemia among the Chinese people averaged 15.2% (24.2% among infants and children under two years; 21.5% in people over 60 years, and 20.6% among women of child-bearing age). The prevalence of vitamin A deficiency in children was 9.3%; the prevalence of marginal vitamin A deficiency was 45.1%. The average calcium intake among the urban and the rural populations was only 391 mg, (41% of the recommended intake).

Chronic disease risk increasing

The main issues for concern in the nutrition and health status of Chinese people are the high dietary energy and fat intakes, and the low levels of physical activity. These are closely related to overweight, obesity, diabetes and abnormal blood lipid levels.

The prevalence of hypertension among adults in China was 18.8%. This means that about 160 million people in the country are suffering from high blood pressure, an increase of more than 70 million people compared with 1991. There is now no significant difference between urban and the rural areas in the prevalence of hypertension. The survey results indicate that the risk of hypertension is closely related to high salt intake and alcohol drinking. The prevalence of diabetes among adults was 2.6% (meaning that more than 20 million people in China are suffering from diabetes), and the prevalence of abnormal blood lipid levels was 18.6%.

Two hundred million Chinese adults are overweight (22.8%) and over 60 million are obese (7.1%). In big cities, the prevalence of overweight and obesity are 30.0% and 12.3% respectively. The prevalence of obesity among children has reached 8.1%. This requires greater attention. Compared with the nutrition

survey results of 1992, the prevalence of overweight and obesity have increased by 39% and 97% respectively.

Proposed actions and measures

In light of the results from this survey, the Chinese government has started to address the most urgent needs, while adhering to the principle of seizing the opportunities and giving guidelines according to different categories/issues. It will consolidate its work to improve people's nutrition status and to control and prevent chronic diseases through policy support, market guidance and mass education.

To strengthen government leadership it will expedite relevant laws and regulations and integrate the improvement of people's nutrition and health into the 11th Five Year Development Plans at national and local levels.

It will consolidate scientific guidance in the fields of agriculture, food manufacturing, distribution and marketing, and

bring into play their important roles in improving people's nutrition and health status.

It will strengthen public education, advocate a balanced diet and healthy lifestyles, and enhance people's awareness and capabilities for self-health protection.

In order to make full use of the information derived from this survey, relevant government ministries, commissions and agencies will be organized to prepare and publish the white paper on the Chinese people's nutrition and health status, and a series of monograph and popular scientific books. The survey database will be open to the public and information sharing will be realized. ■

Source: Press Release by State Council Information Office, October 12, 2004, Beijing.

■ Feature:

Enhancing absorption of iron from fortified foods

Iron deficiency remains a major global health problem affecting some two billion people. In 2002, the World Health Organization ranked it 7th among the preventable risks for disease, disability and death. Efforts to eliminate iron deficiency through dietary diversification (promoting consumption of iron-rich foods) is hindered by the difficulty in achieving behavioral change as well as by the predominance in developing countries of plant-based diets deficient in the more bioavailable heme form of iron. Supplementation interventions have been mainly targeted at high-risk groups such as pregnant women and young children. They often fail due to lack of compliance following adverse effects from the high doses used or because of supply/distribution problems.

Fortification of staples such as wheat and maize flour, or condiments such as salt, fish sauce or soy sauce offers a more cost-effective approach to providing additional iron to most segments of the population. Infants and young children

can be specifically targeted through fortified infant formulas and cereal-based complementary foods. A major technical barrier that remains, particularly for cereal flours and salt, is to find an iron compound that is sufficiently bioavailable but does not cause adverse sensory changes to the food vehicle. Another barrier to successful food fortification is the inhibitory effect of dietary components such as phytate, phenolic compounds and calcium, which can prevent acceptable amounts of iron absorption even from compounds such as ferrous sulfate.

To address these barriers, and to assess the different strategies available, SUSTAIN set up a Task Force consisting of nutritional, medical, industry and government experts. This task force reviewed successful iron fortification programs, and summarized the key issues in relation to each of the iron absorption enhancers, emphasizing the relevance to finished food staples and widely consumed condiments. Following discussions at a workshop held in Washington, DC, in March 2003 (Workshop

on Innovative Ingredient Technologies to Enhance Iron Absorption), and subsequent consultations with other experts from industry, government and the scientific community, the task force has formulated a consensus statement on each of the strategies under consideration. The main points of this consensus statement are summarized in Table 1.

Ascorbic acid, NaFeEDTA, ferrous bisglycinate, and dephytinization all enhance the absorption of fortification iron, but add to the overall costs of fortification. While every strategy cannot be recommended for all food fortification vehicles, individual strategies can be recommended for specific foods. With further development, dephytinization could become an alternative for low-cost cereal-based foods in developing countries. Encapsulation of iron salts in lipid coatings, while not an iron absorption-enhancing strategy in itself, can prevent soluble forms of iron from interacting undesirably with some food vehicles and hence broaden the application of some fortificants.

Table 1: SUSTAIN consensus on choice of iron enhancing technology for fortified foods

Strategy	Suitability	Effect	Limitations	Relative cost*
Ascorbic acid	Dry products (e.g. powdered milk, precooked infant foods). Effective in molar ratio 2:1 (low phytate content) to 4:1 (high phytate content).	2–3x dose-dependent increase in iron absorption (intrinsic and added iron)	Instability in aqueous solutions and during prolonged heat processing. Needs packaging that excludes oxygen.	5.0–7.0
Other organic acids (e.g. citric, lactic, tartaric acids)	Fruit drinks. Effective only at high molar ratios (>100:1 acid:iron).		Cause unacceptable flavor changes in most foods	
Iron EDTA chelates (NaFeEDTA)	Soy and fish sauce; condiments; high-phytate flours. No adverse effect on metabolism of other nutritionally important metals.	Iron bioavailability from high-phytate meals 2–3 times higher than with ferrous sulfate.	Ambiguous regulatory status. Not recommended for infant foods. Packaging needs to protect EDTA against UV degradation. Additional research on stability and organoleptic effects needed.	4.6–14.8
Amino acid chelates (e.g. ferrous bisglycinate)	Milk and beverages.	Iron bioavailability from bread and milk 2–3 times higher than with ferrous sulfate.	Further research needed.	7.1–18.5
Phytate degradation	Cereal- and legume-based weaning foods.	Complete phytate removal can improve iron absorption 2–12fold.	Requires near-complete removal of phytate to work.	See footnote**
Microencapsulation of ferrous sulfate/ferrous fumarate in oil	Dry products stored at low temperatures (e.g. infant foods, condiments, “sprinkles”).	Resolves sensory and stability issues that limit addition of soluble iron forms to foods. May protect against oxidation.	Food preparation involving heat may melt the capsule material and result in unacceptable organoleptic changes.	2.15–8.4

* This calculation is based on the cost of a fortification strategy expected to have the same impact on iron status as 10 mg ferrous sulfate used alone (relative cost = 1.0). The comparison to ferrous sulfate was made because it is a commonly used iron fortificant, not because it is necessarily the preferred choice. The use of different enhancers is food-product specific, so this analysis should not be used to rank enhancers or make direct comparisons between an enhancer and ferrous sulfate. It only indicates the relative cost of the enhancer when used in an appropriate food vehicle.

** The SUSTAIN analysis suggests that commercial phytate removal from flour would be expensive when compared with other enhancing technologies (estimate based on medium-to-high-volume production with prolonged processing at controlled temperature, ten years' depreciation on capital expenditure and labor costs, as well as cost of the degradation agent). Other approaches, such as soaking and germination, fermentation, and addition of phytase to ready-to-eat foods (for activation during digestion) might be more economical, but were not taken into consideration for this calculation.

Effective fortification depends on the selection of technically feasible and efficacious strategies. Once suitable strategies

have been identified cost becomes very important in selecting the best approach to implement. However it is essential to

calculate cost in relation to the amount of bioavailable iron delivered. ■

This information is taken from the 2004 SUSTAIN Task Force Report: “Enhancing the Absorption of Fortification Iron”. Members of the Task force are: Richard Hurrell¹, Sean Lynch², Thomas Bothwell³, Héctor Cori⁴, Ray Glahn⁵, Eva Hertrampf⁶, Zdenek Kratky⁷, Dennis Miller⁸, Mario Rodenstein⁹, Hugo Streekstra¹⁰, Birgit Teucher¹¹, Elizabeth Turner¹², C. K. Yeung⁸, Michael Zimmermann¹

¹ Institute of Food Science and Nutrition, Swiss Federal Institute of Technology Zurich, Switzerland; ² Eastern Virginia Medical School, Norfolk, Virginia, USA; ³ Department of Medicine, University of Witwatersrand, Johannesburg, South Africa; ⁴ DSM Nutritional Products, Santiago, Chile; ⁵ USDA-ARS Plant Soil and Nutrition Laboratory, Ithaca, New York, USA; ⁶ Institute of Nutrition and Food Technology,

Santiago, Chile; ⁷ Nestlé, New Milford, Connecticut, USA; ⁸ Department of Food Science, Cornell University, Ithaca, New York, USA; ⁹ Unilever, Englewood Cliffs, New Jersey, USA; ¹⁰ DSM Food Specialties, Delft, Netherlands; ¹¹ Institute of Food Research, Norwich Laboratory, Norwich, UK; ¹² SUSTAIN, Washington, DC, USA.

■ Conference report:

Towards a common agenda for micronutrients

From 15 to 19 November 2004 more than 665 policy makers, program managers, planners, and scientists from 79 countries met in Lima, Peru, to discuss ways to improve the micronutrient status of infants, children and women of childbearing age in developing countries. The meetings were hosted by the International Vitamin A Consultative Group (IVACG; its 22nd meeting), the International Nutritional Anemia Consultative Group (INACG; its 4th symposium), and the International Zinc Nutrition Consultative Group (IZiNCG; its 3rd symposium) and coordinated by the Peruvian Ministry of Health, the Pan American Health Organization, USAID/Peru and nongovernmental organizations in Peru. Additional funding was provided by the Task Force SIGHT AND LIFE, the Micronutrient Initiative and several private sector companies. UNICEF and the International Zinc Association also contributed to the support of the IZiNCG symposium.

Watchwords urged for global health

Dr Pilar Mazzetti Soler, Minister of Health of Peru, opened the IVACG meeting, acknowledging that it provided an opportunity to share the latest scientific findings on ways to reduce “hidden hunger” in women and children worldwide. Vitamin A deficiency (VAD), which is only one component of “hidden hunger,” affects approximately 127 million preschool children worldwide. According to Dr Richard Martin, Office of Health Director at the US Agency for International Development (USAID), reducing VAD is an excellent investment for developing countries. He congratulated IVACG for providing a forum to exchange data on how to do this effectively.

In the keynote address, Dr Gerald Keusch, Associate Dean for Global Health at Boston University School of Public Health, urged collaboration, integrity and action as the watchwords for achieving global health in a globalized world. Since micronutrients are only one piece of the public health puzzle, Dr Keusch encouraged partnership across disciplines to achieve public health action. Nutrition, especially with micronutrients, is a conditioning factor for infectious disease mortality and morbid-



The panel at the opening session in Lima (second from the right: Dr Pilar Mazzetti Soler, Minister of Health of Peru)

ity. To control these, better integration of micronutrient and infectious disease programs is vital.

A choice of food-based approaches

Efforts to improve dietary quality through home gardening and animal husbandry continue. As well as increasing intakes of micronutrient-rich foods such as meat, fish, eggs and dairy produce, such programs can help to combat poverty by generating income. Others are looking at ways to increase beta-carotene intakes by promoting consumption of beta-carotene-rich indigenous vegetables, by limiting losses during storage, and by developing new crop varieties (e.g. ‘golden rice’) and eggs with a higher beta-carotene content.

Because populations with VAD are likely to be deficient in other micronutrients as well, researchers have begun to explore the benefits and complications of combining micronutrients. An encouraging new technology is triple fortification of salt with microencapsulated iodine, iron and vitamin A. Microencapsulation (in hydrogenated oil) appears to improve stability as well as ensuring an adequate bioavailability. Nevertheless, more research is still needed to reach an optimal solution.

Screening for deficient populations

Methods to determine vitamin A status are becoming increasingly sophisticated.

Among the methods discussed at the meeting were the modified relative dose response (MRDR), retinol binding protein, blood spot retinol, stable isotope methods and dark adaptation. Dried blood spot methods are ideal for developing countries because samples are easy to collect and do not require centrifuging or freezing.

When screening for VAD, it is important to take into account the suppressive effect of infection on retinol levels. Vitamin A concentrations are also lower during pregnancy, especially in the third trimester.

Multiple supplementation desirable

It is becoming increasingly clear that VAD seldom occurs in isolation, and several speakers showed that multiple micronutrient supplementation can help to correct other limiting deficiencies affecting maternal and infant health.

Several presentations highlighted national vitamin A supplementation programs that successfully replaced National Immunization Days (NIDS) with alternative supplement delivery strategies. Developing these strategies continues to be a major focus of discussion and planning.

Dr Alfred Sommer, Chair of the IVACG Steering Committee, closed the three-day meeting, saying it was gratifying to

hear that real progress is being made in developing enriched cultivars of staple foods through traditional breeding and genetic engineering.

Iron deficiency in early life: challenges and progress

Opening the INACG Symposium on November 18, Dr Frances Davidson, Global Health Bureau, Office of Health, Infectious Disease and Nutrition, USAID, called attention to INACG's focus on state-of-the-art research and innovative programming for the most vulnerable populations: infants, children and pregnant women. Data from Zanzibar suggest that children need to be protected against malaria (insecticide-treated nets and/or presumptive treatment) while taking iron/folic acid supplements. Given evidence that there may be some risk associated with iron supplementation of iron-replete children, further research is needed to evaluate the appropriate recommendations for universal iron/folic acid supplementation in malarious areas and potential strategies for targeting children who are iron-deficient. Studies from Asia and Africa presented at the symposium showed that fortification of staple foods and condiments with iron salts is a valid approach to reducing iron deficiency anemia in children and women at risk. Deworming and vitamin A supplementation also reduced anemia in children in Nepal. Dr Ian Darnton-Hill, Nutrition Section, UNICEF, was very optimistic about emerging strategies to combat anemia.

Putting zinc into the agenda

The IZiNCG Symposium on November 19, entitled, "Moving zinc into the micronutrient program agenda", provided new information on zinc and human function, examined recent experience in assessment of population zinc status in selected countries, and discussed results of recent interventions involving zinc supplementation and fortification. Recent studies have shown that zinc supplementation, when provided daily, reduces the incidence and severity of common infectious diseases of young children, including diarrhea and pneumonia. Several small-scale studies also found a reduction in mortality among zinc-supplemented children.

Results from a recently completed trial in Bangladesh indicate that zinc supple-

mentation provided just once weekly also reduces the incidence of pneumonia. A study conducted in South Africa to determine whether zinc supplements can be safely consumed by HIV-positive children found that the incidence of diarrhea was reduced among zinc-supplemented HIV-positive children and there were no differences between supplemented and control children with regard to the progression of HIV infection. Studies of the effect of zinc supplementation on children's behavioral development have yielded inconsistent results. However, the outcomes of studies in Jamaica, India, and Guatemala suggest that zinc supplementation may improve general indicators of young children's physical activity and exploratory behavior, both of which are likely to be important for the children's future cognitive development.

Investigators from Mexico and New Zealand presented examples of two successful large-scale surveys of population zinc status, which relied on dietary indicators of the risk of inadequate zinc intake and the distribution of serum zinc concentrations, as recommended in the recent IZiNCG report (Assessment of the risk of zinc deficiency in populations and options for its control. Hotz C, Brown KH (eds.). *Food Nutr Bull* 25: S94–S203, 2004). Both surveys were useful to identify high-risk groups within the respective populations. The dietary studies in Mexico also provided valuable information on appropriate foods that should be considered for zinc fortification. During the discussion session, it was concluded that more assessment data are needed from other countries identified as having a likely high risk of zinc deficiency. To assist with this effort, additional information is needed on the zinc and phytate contents of local foods. Moreover, reference material and interlaboratory standardization are needed to improve the quality of serum zinc analyses.

The new guidelines of the World Health Organization for the use of zinc supplements in the treatment of diarrhea (10–20 mg zinc daily for 10–14 days along with oral rehydration solution; see *Nutriview* 2004/4 for details) were reviewed. To facilitate scaling up of diarrhea treatment programs, additional efforts and assistance are needed with regard to production and distribution of appropriate zinc tablets, training of health care professionals,

formative research and social marketing, financing, and program evaluation.

An analysis of previously completed trials in which zinc was provided either alone or with iron indicated that supplementation with zinc alone is safe and efficacious, although zinc may have a small negative impact on children's final hemoglobin concentration. It is still uncertain whether iron may reduce the beneficial effect of zinc on major clinical outcomes.

New information on the absorption of zinc from the two relatively low-cost zinc salts (zinc oxide and zinc sulfate) suggests that both forms are absorbed with similar efficiency from zinc-fortified wheat products, so either can be used in fortification programs. Efforts are underway to establish appropriate levels of zinc for fortification. Although evidence regarding the efficacy and effectiveness of zinc fortification programs is still incomplete, the strategy is considered safe and promising. IZiNCG looks forward to continued collaboration with the other micronutrient consultative groups and to assisting international agencies, governments and NGOs in their efforts to address the problem of zinc deficiency. ■

Detailed reports of the IVACG/INACG meetings will be available in 2005 from the ILSI Research Foundation, One Thomas Circle, NW, 9th Floor, Washington, DC 20005-5208, USA. Tel: 202-659-9024; fax: 202-659-3617; email: hni@ilsf.org. For more information on IZiNCG please consult the web site (<http://www.izincg.ucdavis.edu>).

■ News in brief:

Gut flora in health and disease: potential role of probiotics

The international workshop on probiotics that took place in Amsterdam last April [1] highlighted the revolutionary change in views on beneficial gut microbe-host interactions. During the workshop, 120 experts from disciplines including human nutrition, gastroenterology, nutritional therapy, cell biology, microbiology and immunology discussed new views on microbe-host interactions and the role of probiotics in prevention and alleviation of gastrointestinal, atopic and autoimmune diseases.

There was a general consensus among the experts that administering defined strains can help in preventing and curing diseases related to the gut flora. The first clinical trials show a promising role for probiotics, but the system is very complex,

and most underlying mechanisms are still unclear.

Rapid progress in this field will depend largely on the collaboration between fundamental researchers from different disciplines and medical specialists. In addition, more clinical studies are required to convince authorities and the public of the value of microbial therapies. ■

1. First International Workshop on Probiotics. April 22–24, 2004, Amsterdam, the Netherlands

Zinc deficiency common in Nigerian cataract patients

Asonye et al. [1] randomly assessed zinc status and dietary zinc intake in 500 men and women aged 60 years or older diagnosed with senile cataract, and 500 matched controls, among patients attend-

ing eye clinics at teaching hospitals in midwestern Nigeria.

Plasma zinc levels were below 1050 mg/L in 38% of patients with cataract and 17% of controls; 48% of cataract patients and 21% of controls had a low dietary zinc intake. All the zinc deficient patients complained of prolonged dark adaptation and night blindness.

Zinc deficiency may therefore be implicated in the high prevalence of cataract in developing countries. Additionally, it might contribute to the high incidence of night blindness in areas with high prevalence of vitamin A deficiency. ■

1. Asonye CC, Akhideno JI, Agu GC. Assessment of plasma zinc status of senile cataract and non-cataract elderly patients in midwestern Nigeria- a case study of Edo and Delta States of Nigeria. *AJFAND* 2004; 2. <<http://www.ajfand.net/Index.html>>

■ Events:

Seventh International Graduate Course on Production and Use of Food Composition Data in Nutrition. October 31 – November 16, 2005, Wageningen, the Netherlands.

This course is for those involved in food composition programs as analysts and/or compilers, and will be of value to those teaching nutrition and nutritional aspects of food chemistry.

Aim: to show how the quality and usefulness of food composition data is determined by the quality of the production of analytical data for nutrients in foods, and the compilation of these and other data into food composition tables and nutritional databases.

Applications should be submitted before June 1, 2005. Further details are available from: Ms L.A. Duym-Brookman, secretariat Foodcomp2005, Division of Human Nutrition, Wageningen University, P.O. Box 8129, NL-6700 EV Wageningen, the Netherlands. Tel. +31 317483054; email: lous.duym@wur.nl ■

Foods for the Healthy Elderly: Ripe for Growth. October 6–7, 2005, Amsterdam, the Netherlands.

With a rapidly aging population in the western world, the market for the elderly

is set to grow. This conference is aimed at R&D managers from the food and drinks industry, nutritionists, food technologists, policy makers and others, and will discuss the latest developments regarding foods for the elderly, and help to provide an understanding of changing needs.

Further details: Bastiaanse Communication, P.O. Box 179, NL-3720 AD Bilthoven. Tel. +31 302294247; email: FE@bastiaanse-communication.com ■

6th International Food Data Conference, Pretoria, South Africa, September 14–16, 2005

Pre-ICN satellite meeting, organized by the Agricultural Research Council and the University of Pretoria, on food composition data and the nutrition dilemma.

Further details: <<http://www.arc.agric.za/fooddata/main.htm>> or Dr Louwrens Smit. Tel. +27 126651605; email: louwrens@irene.agric.za ■

Second Pan-African Conference on Information and Communication Technology and Nutrition (ITANA). Cape Town, South Africa, September 16–18, 2005.

This second ITANA congress, organized by the ITANA Nutrition e-Society and the University of Stellenbosch, is offered

as an official Nutrition Safari of the 18th International Congress of Nutrition. It provides an opportunity for colleagues around the world to simultaneously focus on a niche area in nutrition and see another beautiful part of the host country.

For further information contact: Mrs Ursula Petersen. Tel. +27 219389259; email: uap@sun.ac.za ■

18th IUNS International Congress of Nutrition, Durban, South Africa, September 19–23, 2005

Theme: Nutrition Safari for Innovative Solutions. Precongress Nutrition Safaris will be held at selected venues throughout Southern Africa on Sept. 17/18.

As well as creating a platform for dialogue on the newest developments in nutrition science (research, policy, practice) the congress will focus on innovative solutions for global nutrition problems and will aim to build capacity among 'young' nutrition scientists, public health nutritionists, clinical nutritionists, dietitians, food scientists, food service managers, etc.

For further information contact: Nutrition Safari, Private Bag X6001, Potchefstroom 2520, South Africa. Tel: (+27) 18 299 2469/4237; email: safari@puk.ac.za; web site: www.puk.ac.za/iuns ■

Probiotics

A balanced intestinal flora is an important part of the body's immune system. It can be influenced positively by regular ingestion of beneficial microorganisms ('probiotics') and constituents of food known as 'prebiotics'.

What are probiotics?

The FAO defines probiotics as: "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host". The most widely used probiotics belong to the *Lactobacillus* and *Bifidobacterium* families. Not all strains of a particular microorganism have equal probiotic efficacy, however. To qualify as probiotics for human use, bacteria and yeasts should be generally recognized as safe (GRAS) and have no adverse effects on the consumer, remain stable throughout the shelf life of the product, and survive passage through the stomach and small intestine in sufficient numbers to colonize the lower intestine. The best probiotics also inhibit growth of harmful microbes and production of cancerogenic metabolites, do not promote antibiotic resistance, and do not change the sensory properties of the food to which they are added.

Prebiotics are undigestible dietary constituents that selectively stimulate growth and/or activity of probiotics in the intestine. They include oligosaccharides and lactose derivatives found in onions, garlic, chicory root, soybeans, dairy products, etc. Foods containing both probiotics and prebiotics are known as 'synbiotics'.

How do probiotics work?

How probiotics work is not exactly known. Some of the mechanisms proposed are:

- They produce an acidic environment in the intestine that inhibits the growth and survival of pathogenic bacteria, and can modify bacterial enzyme activity;
- They produce metabolites (hydrogen peroxide, bacteriocins) that are lethal for pathogens;
- They compete with pathogenic bacteria for nutrients and for a place to grow and multiply on the gut wall;
- They stimulate immune responses in the intestine.



Lactobacillus acidophilus under the scanning electron microscope

Why are probiotics important for health?

There is increasing evidence that probiotics can have the following beneficial effects:

- They improve digestive comfort and well-being in patients with irritable bowel syndrome and inflammatory bowel disease by reducing constipation, diarrhea, flatulence, intestinal cramps, etc.
- They can help to prevent and treat infectious diarrhea (rotavirus in children, salmonella), traveller's diarrhea and antibiotic associated diarrhea.
- They might decrease the risk of colon cancer by eliminating cancer precursor cells and toxic metabolites, and by stimulating the immune system.
- In-vitro and animal data indicate that probiotics can inhibit the growth of *Helicobacter pylori*, a Gram-negative pathogen responsible for gastritis, peptic ulcers and gastric cancer.
- Probiotic use during pregnancy has the potential to prevent onset of

allergic diseases (atopic dermatitis, asthma) in the offspring.

- There is some evidence that probiotics have a role in preventing urinary tract and vaginal infections.
- Preliminary evidence suggests that probiotics can have cardiovascular benefits by lowering blood pressure and cholesterol levels.

How can probiotics be used?

Probiotics can be supplied as dietary supplements (tablets, capsules, powder) or incorporated into foods (mainly dairy foods). Daily consumption of an adequate level is recommended, especially for long-term benefits. The product must indicate the dosage and duration of use as recommended by the manufacturer of each individual strain based upon scientific evidence, and as approved in the country of sale. Each product should indicate the minimum daily amount required for it to confer specific health benefits.

It cannot be assumed that research published on one strain of probiotic applies to another strain, even of the same species. Therefore, data on the type of organism (genus and species), potency (number of viable bacteria per dose), purity (presence of contaminating bacteria), and extent of published research must be provided for each strain used in a product. ■

Further reading

1. Health and nutritional properties of probiotics in food including powder milk with live lactic acid bacteria. Report of a joint FAO/WHO Expert Consultation, October, 2001. [http://www.fao.org/es/esn/food/foodandfood_probiocns_en.stm]
2. Foundation "Gut Flora in Health and Disease" [<http://www.probiotics-amsterdam.org>]
3. International Scientific Association for Probiotics and Prebiotics [<http://www.isapp.net/>]