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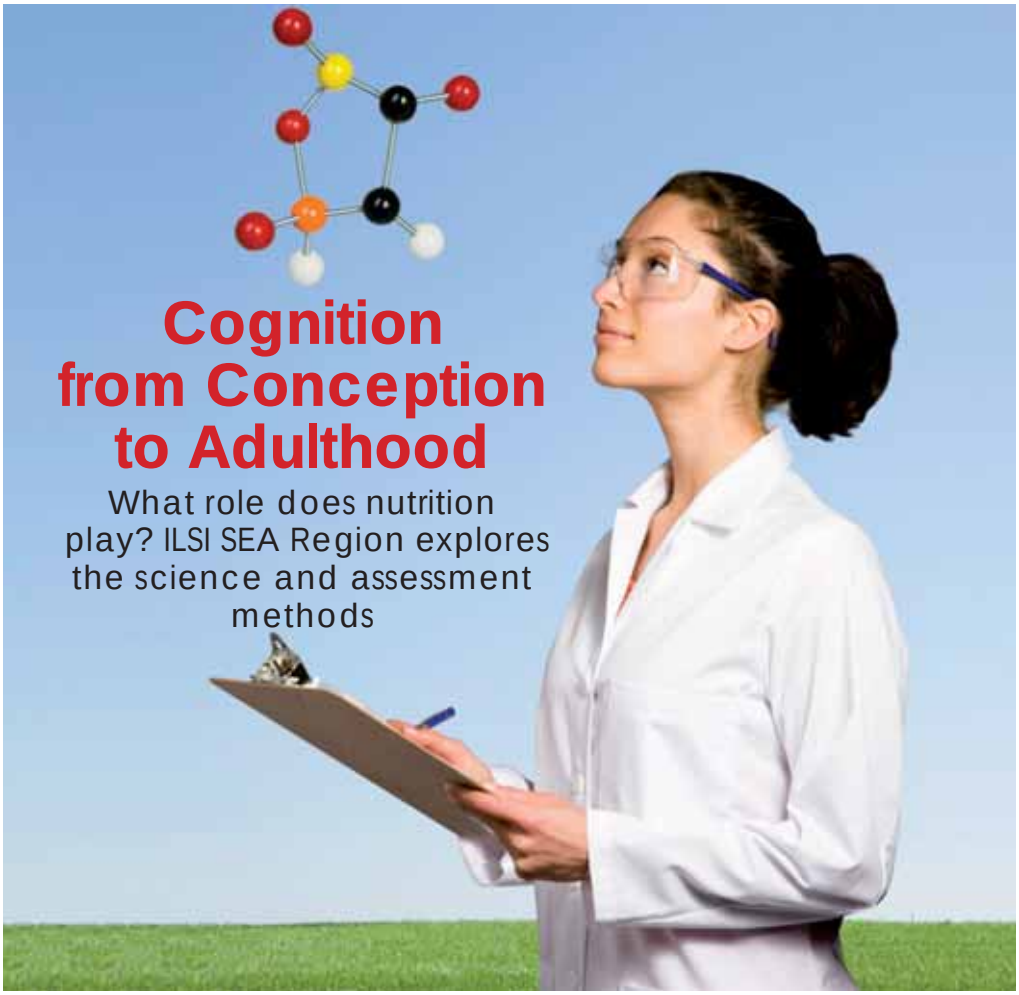
ILSI SOUTHEAST ASIA REGION

ScienceInSight

News and Updates on Nutrition, Food Safety and Health



Cognition from Conception to Adulthood

What role does nutrition play? ILSI SEA Region explores the science and assessment methods

STACKED EVENTS IN GM CROPS Science, Safety and Regulatory Approaches **FOOD-BASED DIETARY GUIDELINES IN THE REGION** Spurring New Efforts to Overcome Barriers and Forge Harmonization **INTERVIEW WITH CHAIR OF ILSI BOARD OF TRUSTEES** Prof Sushila Chang Shares Her Views on Science, Research and Collaboration

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International Life Sciences Institute

From the Executive Director

A New Way To Share Our News

ILSI SEA Region is proud and excited to share with you this edition of our newsletter – the first issue of a new decade!

Over the past couple of years, you may have noticed that our newsletter has undergone some gradual transformations, all with the aim of giving you - our valued audience, a more enjoyable and insightful read. We have received much positive and encouraging feedback, and we truly thank you for your support.

In continuing to improve and refresh our newsletter, we have named the publication Science InSight. Our goal is still to bring you the latest news of our scientific activities and endeavors, but in addition, we may also include some key scientific issues and output of relevance and significance to our region addressed by other colleagues, partners or institutions. It is our hope to share with you a better insight to our organization and the admirable people we work with while striving to achieve the common goal of using sound science for decision making in improving public health in the Southeast Asia and Australasia regions.

In this first edition, we feature highlights of two successful meetings organized by ILSI SEA Region in the second half of 2010 – Symposium on Nutrition and Cognition: Towards Research and Application for Different Life Stages, and Seminars on Science and Regulatory Perspectives on Stacked Events in Genetically Modified Crops. Both meetings addressed emerging and promising areas of science and technology, where expertise and knowledge in our region is still limited. Our aim is to provide opportunities to share the latest science as well as encourage research and science-based application. We also bring to focus again Dietary Guidance for Southeast Asian populations, an important area where ILSI SEA Region has established strong links and facilitated tripartite collaboration between the scientific community, regulators and policy makers, all of whom are key stakeholders in improving dietary intake and public health.

As you read through the following pages, we warmly welcome you to share your thoughts and suggestions with us. We also wish you a very happy festive season and a fruitful 2011!

Boon Yee Yeong
Executive Director
ILSI Southeast Asia Region

In This Issue...

Understanding Cognition and the Role Nutrition Plays

Are our cognitive functions determined or influenced by our nutritional status, even from conception? As we age, can we optimize our cognitive performance, or prevent cognitive decline in our later years? These questions relating to cognitive health and the role that nutrition plays have generated much research interest, and ILSI SEA Region has organized an international symposium to share the latest science and findings in this exciting field of research, with particular focus on studies conducted in Asia.

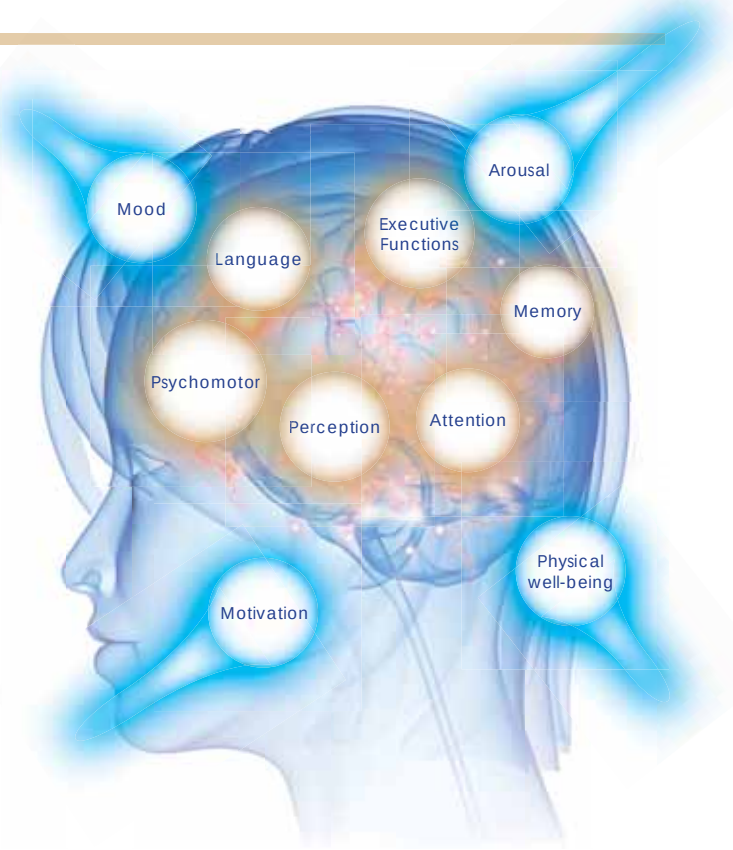
Collaborating with the Nutrition Society of Malaysia (NSM) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia, the Symposium on Nutrition and Cognition: Towards Research and Application for Different Life Stages was held from October 19-21, 2010 in Kuala Lumpur, Malaysia. In addition to sharing the latest research findings, the symposium highlighted current methodologies in assessing cognitive functions, with specific discussion on the applicability of these assessment tools and research considerations for the region. Issues relating to scientific substantiation of claims and consumer understanding in the area of nutrition and cognition were also discussed.

Defining Cognition – A Complex System with Many Influencing Factors

In the symposium's opening plenary, Prof David Benton of the University of Swansea, UK, and Prof J Steven Reznick of the University of North Carolina at Chapel Hill, USA, provided overviews of the different domains of cognition and the many factors that influence cognitive function across life stages.

The term "cognition" includes a range of functions and processes that allow us to perceive, evaluate, manipulate, store and use information obtained from the environment. Cognitive functions can be clustered into six main domains and each of these cognitive domains can be further subdivided.

Various factors that influence cognitive function can be categorized into three broad domains i.e. biological infrastructure, environment, and mental mediation. They affect different domains of cognitive functions at different intensity depending on the life stages. These different domains and influencing factors interact and provide a challenge to cognitive measurement.



Cognitive Development and the Role of Nutrition

Do our diet and nutritional status affect our cognitive development? Human brain development starts from conception and continues throughout adulthood, with most development occurring during the first year of life. Adequate nutrition is required for optimum brain growth, development and maturation. Exposure to maternal undernutrition during gestation not only alters brain development during fetal or postnatal life, but also causes lasting effect on cognitive abilities.

In many developing countries in Asia, micronutrients deficiency is prevalent. Even in developed countries, micronutrient inadequacy is common among pregnant women with prenatal supplements not taken during the most critical periods. The impact of micronutrients deficiency on child development is therefore of public health significance.

Noted researchers exploring the role of nutrition in cognitive development shared their knowledge and findings in relation to specific nutrients. Dr Saskia Osendarp of Unilever R&D Vlaardingen, the Netherlands, Dr Peter Willatts of University of Dundee, UK, and Prof Namsoo Chang of Ehwa Womans University, Korea highlighted the role of micronutrients, long-chain polyunsaturated fatty acids (LC-PUFAs) and maternal nutrition, respectively.

Several micronutrients are known to be essential for brain structure, for healthy neurochemistry and for brain growth and maturation. Infants with iron deficiency exhibit lower cognitive, motor, and social emotional development. Iron deficiency seems to have long-lasting irreversible effects in children below two years, but may be reversible if it occurs later in childhood. Iodine deficiency during pregnancy can also cause irreversible neurological, cognitive, and motor deficits in children, and results in lower IQ scores in some cases.

For other micronutrients, in particular B vitamins, folate and zinc, evidence for positive effects of supplementation

on improved mental development is emerging. Zinc is an essential component of our central nervous system. Maternal folate deficiency is linked to neural tube defects and delayed intellectual development in the offspring, while maternal vitamin B6 deficiency may cause brain and neurological disorders in the offspring. Interventions with multiple micronutrients are shown to provide beneficial effects on short-term memory, attention and concentration.

In a developing brain, the demand for proteins and LC-PUFAs is far greater than that in an adult one, and these macronutrients are important for the synthesis of nucleic acids, neurotransmitters, growth factors and brain structures. LC-PUFAs, especially docosahexaenoic acid (DHA) and arachidonic acid (ARA), are key building blocks in the brain. They are uptaken rapidly by the infant brain, beginning in the third trimester of pregnancy and continuing throughout the first two years of life. As LC-PUFA synthesis is inefficient, a supply of preformed LC-PUFAs is necessary through the placenta, breast milk, or infant formula.

LC-PUFAs contribute to the development of several cognitive abilities in infancy such as information processing and problem solving. Although follow-up studies are limited, it appears that optimal provision of LC-PUFAs early in life may have long term benefits for cognitive function e.g. ensuring efficient information processing in later childhood. In contrast, the effects of LC-PUFA supplementation on cognition in older children are less clear. Although LC-PUFAs may have cognitive and behavioral benefits for children with learning difficulties such as dyslexia or ADHD, LC-PUFA supplementation in normal children shows little or no effects on cognition and behavior.

Regional Studies Focusing on Children

Ms Lindawati Wibowo on behalf of NEMO Study Group, Prof Srinivasan Krishnamachari of St John Medical College & Research Institute, India, and Prof Pattanee Winichagoon of Institute of Nutrition Mahidol University, Thailand, each presented their research in the region.

The NEMO study looked at the effect of a 12-month micronutrient intervention containing iron, zinc, folate, vitamin A, B6, B12, and C, in well-nourished and marginally-nourished school children in Australia and Indonesia, respectively. In Australia, supplementation significantly improved verbal learning and memory, but not the general intelligence and visual attention. Similarly, supplementation showed slight improvement in verbal learning and memory among the Indonesian girls. Multiple micronutrients fortification seems to show benefit even in an adequately nourished, school-aged population.

St John's Research Institute has conducted several nutrient intervention trials and cohort studies in school children in India. Champion study looking at effects of micronutrients and ω-3 PUFAs supplementation showed improvement on short-term memory, fluid reasoning retrieval ability, cognitive speediness, and overall cognitive performance. The Mysore Parthenon birth cohort showed that maternal plasma folate impacted the children's cognitive test scores while maternal vitamin B12 and plasma homocysteine concentrations did not show clear associations. While many factors influence the functional outcome of nutritional intervention in children, baseline nutritional status and home environment are particularly critical.

Institute of Nutrition Mahidol University has also conducted a few micronutrient intervention studies in children and pregnant women. Micronutrients fortification trials in Thailand and Vietnamese school children showed better performance in various cognitive tests. A long term follow up study in Bangkok however, showed no benefit of iron and zinc supplementation at infancy on cognitive outcomes at 9 years old. The institute is currently conducting a trial on iodine supplementation during pregnancy and cognitive outcomes of the offspring.

Cognitive Performance and Degeneration Among Adults

Prof Michael Fenech of CSIRO Food & Nutritional Sciences, Australia, Prof Andrew Sinclair of Deakin University, Australia, and Dr Paramjeet Singh of Cerebos Pacific Limited, Singapore covered the role of micronutrients, LC-PUFA, and amino acids on cognitive function in adults and the elderly.

Incidence of dementia is increasing rapidly. Alzheimer's disease (AD), the most common dementia among older adults, is a neurodegenerative disease characterized by neuron damage with memory loss symptoms and other mental functions impairment including mood and language. Currently, no medication is able to reverse or prevent AD progression. Between normal aging and dementia lies a condition called Mild Cognitive Impairment (MCI), with affected individuals experiencing cognitive decline affecting their daily function but not the functional activity. 10-15% MCI cases progress to AD every year, but MCI may be reversible if detected early.

Malnutrition may cause DNA damage, demyelination, reduced ability of cells to regenerate, and brain atrophy, all of which lead to cognitive decline. Deficiency in nutrients required for genome maintenance such as folate or vitamin B12 may impact the regenerative potential of neural cells. Dietary factors such as vitamin E, folate, vitamin B12, niacin, fish, ω-3 PUFAs, moderate wine intake, fruits and vegetables, reduced calories and saturated fat and a Mediterranean-type diet are associated with reduced risk of AD. The link between vitamin B12, folate and the risk of cognitive impairment is the most compelling thus far. Choline is also important in neurotransmission

and membrane function and abnormal regulation or inadequate choline uptake may result in cognitive impairments.

ω-3 PUFA may influence neural function through its effects on proteins/enzymes function in brain membranes, on neural gene expression and neuroblood vessel protection, and its anti-inflammatory properties. Recommended ω-3 PUFA intake is around 500mg/day, but estimated intake is often less than 200 mg/day. Cell culture and animal models show promising mechanistic support for DHA in AD through attenuation of amyloid and dendritic pathology. Post-mortem studies reveal lower DHA in brains of AD patients. Epidemiological studies suggest some benefit of dietary ω-3 PUFA in AD prevention. Clinical trials of ω-3 PUFA supplementation are limited and vary in the study design and outcomes, but suggest that DHA may benefit patients with milder forms of AD.

Proteins and amino acids are also key components of brain cells. About half a dozen amino acids are involved in the brain chemistry, mainly as promoters or precursors of neurotransmitter synthesis. The measured cognitive benefits of dietary amino acids and proteins in well nourished populations however have been less than inspiring. Under normal conditions, dietary amino acids have little/no effect on amino acid in the brain, but may have some effects when the regulatory controls is disrupted. There is increasing evidence for brain benefits of intake of short peptides that are naturally present in the human brain, such as carnosine and tryptophan. Able to pass through the blood-brain barrier, carnosine is suggested to possess neuroprotective and anti-AD properties while tryptophan may affect cognitive functions through its serotonergic activity.

Functional Ingredients and Herbal Substances

Prof Andrew Scholey of Brain Sciences Institute, Swinburne University, Australia, Prof Rachel Galli of Simmons College, USA, and Dr Rema Vazhappilly of Abbott Nutrition R&D Asia-Pacific Center, Singapore, shared the potential role of functional and herbal substances in cognitive performance.

Asia offers great potential for functional ingredients for cognitive functioning with its vast usage of Indian Ayurvedic or traditional Chinese medicine. Certain plants possess a combination of properties which may affect multiple neuronal, metabolic and hormonal systems and offer a more promising approach rather that a single compound. Ginseng, sage, and cocoa polyphenols are some of the few promising candidates shown to offer cognitive benefits. In any intervention using herbal extracts, it is important for the extract to be standardized and characterized to ensure the trials can be replicated.

Animal models show that the cognitive deficits as seen in aging can be slowed or even reversed by supplementing a normal diet with blueberries, walnuts, or other fruits and vegetables rich in polyphenols. Oxidative stress and inflammation may be involved in impairments of motor and cognitive skills observed in neurodegenerative disorders and in normal brain aging, in which polyphenols might be of help.

Assessment of Cognitive Functions

The complexity of cognition involving the different domains and the many influencing factors requires one to carefully consider the appropriate assessment to obtain meaningful data. Cognitive assessment tools need to be sensitive and selective enough for one to measure the subtle effects of nutrition. The socio-cultural environment of the population will also affect the response to cognitive assessment and brings up the issue of validity.

Infants and Young Children

In assessing cognitive function, the important questions are what to assess and how to assess it. One strategy for measuring cognitive development is to view it as a broad and general phenomenon, e.g. characterizing cognitive ability as intelligence and measured as IQ scores that can be compared with age-matched peers. While these IQ tests can predict success in school and related outcomes particularly for children who are represented in the group norms, this broad characterization of cognitive development is not oriented towards identifying specific components of cognitive development, measuring individual differences, and

Regional Studies on Nutrition and Cognitive Ageing in Older Adults

Prof Ng Tze Pin of National University of Singapore, Singapore and Prof Susana Shahar of Universiti Kebangsaan Malaysia, Malaysia each shared their findings of their respective cohort studies.

Along with a growing elderly population, the prevalence of dementia in Singapore has reached around 6% in 2008. The Singapore Longitudinal Ageing Studies (SLAS), an observational prospective cohort study of older adults aged 55 and above, assessed nutritional and health status and cognitive functions of the participants along with other factors. Folate, vitamin B12, ω-3 PUFA, turmeric, and tea are some of the nutritional factors found to be associated with cognitive function.

In Malaysia, the population is also ageing and experiencing increasing rate of MCI. A cross-sectional study in an urban area of Malaysia reported an overall prevalence of MCI at 21.1%. Similar to the Singapore findings, Malay ethnics have higher prevalence of dementia. The major predictors for men were hypercholesterolemia and smoking habit. In women, risk of MCI was higher among women who were married, not exercising regularly, overweight and obese. Preliminary data of an ongoing study investigating the effect of 12-months fish oil supplementation on MCI among Malaysian elderly suggests improvement in global cognition, executive function and memory function.

assessing cognitive development in children not well represented in the group norms.

An alternative approach is to identify and develop valid and reliable techniques for measuring specific aspects of cognition. Measurement of early cognitive development may focus on cognitive abilities such as memory, attention, language, and knowledge. While a general IQ score may answer some questions about influences on cognitive development, any sophisticated question would probably be best addressed with assessment of specific age-appropriate cognitive development aspects that are linked to the underlying mechanisms mediating the influence. For example, in children fed with a breakfast that could enhance their attentiveness, their performance on attention tests should differ on days when they receive the target breakfast versus a control breakfast. Studies examining the role of LC-PUFAs on infant cognitive development could also provide such example. Many have reported no effects of LC-PUFAs on measures of performance obtained with global tests of infant development such as the Bayley Scales. However, these findings are generally inconclusive as global tests do not adequately assess important cognitive abilities developing during the first two years of life and are originally designed to detect delayed development with undue emphasis on perceptual and motor skills. When studies looked at specific cognitive functions such as information processing or problem solving, supplementations showed positive effects.

For research in this region, the process of adapting cognitive tests to suit Asian children is also important. Cognitive tests of Western origin may be inadequate to assess children in developing countries living under different environments. Since cognitive test scores are known to predict school performance of children, tests need to be culturally appropriate. Test adaptation involves: accurate translation for reliable and valid application in the target community; substitution of aspects that cannot be translated and applied reliably due language, culture, or psychometric differences; and pilot testing to evaluate the cultural appropriateness. Test adaptations can only be adequate if they meet both judgmental and statistical adaptation criteria.

Adults and Elderly

The decline in cognitive functioning begins in the early twenties and continues throughout adulthood. This observation raises many methodological issues as experimental designs need to match the phenomenon being studied with dietary interventions starting at young adulthood and monitoring over many decades. Although findings from randomized controlled studies are most desirable, such approach would be difficult given this perspective.

An approach is to study individuals at a high risk of developing dementia or are displaying early symptoms e.g. MCI. With the increased sensitivity, the impact of dietary interventions can be monitored. Another approach is to consider biomarkers that can reliably predict cognitive decline. Brain imaging techniques may also measure brain shrinkage in areas known to change with dementia. Such associations between neurochemical or physiological parameters and cognitive performance have yet to be established although several combined approaches are potentially useful.

Cognitive functions are primarily measured by performance testing. Selection of appropriate performance tests is important in designing a sensitive and meaningful experiment. Factors such as aims of a study and the intended use, test sensitivity, level of difficulty and feasibility need to be considered when constructing a test battery. Adequate test administration and planning, taking into account standardization of procedures, managing confounding factors e.g. subject state and environment, as well as potential learning and practice effects, have an important impact on the quality and validity of the data. Correct interpretation of the findings, in terms of effect specificity, interaction between cognitive domains, speed-accuracy trade off, etc, will lead to an accurate picture of the effects of a particular nutritional intervention on cognitive functioning.

The Australian Imaging, Biomarker & Lifestyle (AIBL) Flagship Study of Ageing is a cohort study with the aim of deriving early and robust predictors of AD and elucidating potential health and lifestyle interventions. A positive measurement of β-amyloid deposition with PiB neuroimaging scan was shown to best predict AD conversion in persons with MCI. The prevalence of a positive PiB amyloid scan parallels the prevalence of AD 15 years later. However, looking at the association with cognitive function, higher Aβ burden was correlated weakly with lower episodic memory, but not other functions. Healthy woman with PiB positive scans performed more poorly on episodic memory tests, but longitudinal data is essential to examine this further.

Improving the Efficacy of Assessment Tools

The ability of cognitive assessment tools to measure changes due to nutritional influences is very crucial. The applicability or validity of these assessment tools also need to be considered. There are no "one size fits all" cognitive battery tests for use in the nutrition intervention studies as assessment tools need to be tailored to the target groups and the research need. Careful understanding is needed on the background of the population of interest, e.g. socioeconomic, education, etc.

Generally, assessments that measure specific cognitive functions will perform better in measuring nutritional influence than those that measure general cognition e.g. IQ. Assessment of physiological and neurochemical changes will be useful to provide understanding on the mechanism, but these changes need to be correlated to cognitive or behavioral changes. Collaboration between nutritionists, psychologists and neurologist is very important for research in this area.

Claims Regulations and Scientific Substantiation

Europe

Dr Willatts provided an overview of the European Food and Safety Authority's (EFSA) regulations in this area. In 2006, EU adopted a new regulation concerning nutrition and health claims made on foods. Article 13.1 of the regulation refers to 'general function' health claims, which includes psychological, behavioral and neurological functions. EFSA sub-working group for mental and nervous claims developed the procedures for reviewing such claims. Claims are initially screened for the following criteria: food constituent is adequately characterized; health relationship is meaningful and measurable; target population is identified; and conditions of use of the food constituent are adequately specified.

When evaluating the scientific evidence, only pertinent articles provided by the claimants are considered by the review panel. If there is sufficient evidence to support a claim, a literature search is undertaken for any omitted negative evidence. When cause and effect relationship has been established, the claim is upheld. Proposed wording is then reviewed and recommendations are made for conditions and restrictions of use. Whether a claim receives a positive opinion depends on the quality of the scientific evidence provided by the claimant, and the quality of the application.

Japan

Prof Toshio Shimizu of Nagoya-bunri University, Japan, shared that a regulation on Foods for Specified Health Uses (FOSHU) allows health claims on maintainance or improvement of certain marker, physiological and organ functions, or providing short-term changes in body condition. To obtain FOSHU approval, the efficacy, safety and analytical requirements need to be met. Systematic evaluation of efficacy and safety evidence from human study and consumption history is required as well as human intervention studies using the final product containing characterized effective components with the mechanism defined by animal and in vitro studies.

At present, there are no approved FOSHU claims relating to cognition. Various difficulties such as the accreditation of assessment tools, the consistency of health claim wording with the human study result, and reaching significant differences from control, must first be overcome. Japanese researchers are now conducting research in the field of cognitive functions such as prevention of memory loss, fatigue recovery, etc toward FOSHU approval.

Southeast Asia Region

Dr Tee E Siong of TES NutriHealth Strategic Consultancy, Malaysia, mentioned that there are few officially approved claims on nutrition and cognition in SEA region. Malaysia has one approved function claim on sialic acid while Singapore has approved few function claims on DHA, AA, choline and taurine, with all for use only in foods for infants and young children. Nonetheless, most authorities in the region provide opportunities to apply for new function claims with systems in place to review such applications by relevant appointed experts. Submissions need to include the proposed wordings and the scientific substantiation of the intended claim with data preferably be from human intervention trials. For specific nutrients or food components that are not in the current permitted lists, applications for the use of such ingredients must first be submitted.

From the few applications on such claims on cognition or mental performance in Malaysia, several considerations are suggested: the proposed wordings have to be specific, clear and match the scientific evidence; the intended claims must be measurable; and the methodologies used in substantiation must be appropriate for the intended claim and also socio-culturally appropriate for the subjects being studied.

Industry Perspectives

Dr Rob Winwood of Martek Biosciences, USA, provided an industry perspective of nutritional products for cognitive development using DHA as a case study. Building the case for the addition of DHA to infant formula for brain development has been a long process. DHA requirement has recently been established; WHO suggests convincing DHA benefits for brain and visual development in infants and DHA is now recommended during pregnancy and lactation by various health authorities in Europe, Australia, and USA. Educating the consumer also takes time; DHA is mostly linked to heart health than brain function. USA has authorized "Structure/Function" claims on DHA. Meanwhile, EFSA has also provided positive opinions on DHA and maintenance of normal brain function under Article 13 although EFSA opinion has not been reached for claim related to brain development under Article 14.

Consumer Understanding

Dr Josephine Wills of European Food Information Council, Belgium, shared that consumer research on perceptions of associations between nutrition and brain health, cognition or mental alertness, is limited to a few examples at different life stages. In pregnancy for example, surveys among Irish and UK women attending ante-natal clinics showed that most respondents knew folic acid could prevent neural tube defects, but only a fraction actually take it peri-conceptionally. While in adolescence and adult, US consumers link caffeine to mental alertness, improved mental performance and reduced risk of AD and Parkinson. Food labels, health professionals, magazine/newspaper, internet, etc, have been cited as important sources of nutrition information. Information available online showed that "brain food" is mostly associated with nuts, salmon, berries, etc; while the accuracy of these information is not established, many consumers refer to it. More efforts are needed to understand consumer insight on nutrition and cognitive functions.

The Symposium on Nutrition and Cognition was attended by over 160 participants. Lively Exhibition and Poster sessions were held alongside the symposium. A total of 17 posters were displayed together with exhibitions and displays by Abbott Nutrition, Martek Biosciences, Mead Johnson Nutrition, Cerebos, ILSI, Nutrition Society of Malaysia and CSIRO. Best Asia Poster awards were given to 3 presenters from Asia in recognition of their effort and to encourage more of such research in the region.

Participants viewing the poster displays

Participants at the symposium session

Abbot Nutrition

Martek Biosciences

Cerebos

Nutrition Society of Malaysia

Mead Johnson Nutrition

Speakers and organizers of the symposium

Recipients of Best Asia Poster Awards:
Dr Koh Woon Puay, Dr Saptawati Bardosono, Dr Tippawan Pongcharoen

Stacked Events in GM Crops – Science, Safety and Regulatory Approaches

As genetically modified (GM) crops containing multiple, or 'stacked', traits become increasingly prevalent on the global market, it will be very important for regulators and other stakeholders in Southeast Asian countries to understand the science and regulatory implications of this new trend.

In order to fill in the information gap on this issue, ILSI SEA Region organized a series of back-to-back Seminars on **Science and Regulatory Perspectives on Stacked Events in Genetically Modified Crops** in Bangkok, Thailand on September 19-20, 2010 and Jakarta, Indonesia on September 21-22, 2010. The seminars were organized in collaboration with international partners from the ILSI International Food Biotechnology Committee (IFBiC) and CropLife Asia, as well as regional partners such as the National Center for Genetic Engineering and Biotechnology (BIOTEC) in Thailand, and the Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development (ICABIOGRAD) in Indonesia. There were about 60 participants at the Bangkok seminar and 70 participants at the Jakarta seminar, consisting of regional regulators as well local scientists involved in agricultural biotechnology research.

Adopting GM Crops for Food Security

In their opening addresses in Thailand and Indonesia respectively, both Dr Chanin Charoenpong from the Thai Food and Drug Administration and Dra Kustantinah from the Indonesian National Agency for Food and Drug Control (BPOM), stressed the important role that GM food crops will play in the future in achieving food security. This is due to the lower cost of food production using GM crops, since they are able to resist plant diseases and require less pesticide usage, which in turn provides access to affordable and nutritious food to consumers. However at the same time, the speakers also emphasized the need for comprehensive science-based risk assessments of GM crops and foods derived from GMOs, in order to provide assurances to public health and safety. Dr Ir Agus Pakpahan, Chair of the Indonesian Biosafety Committee on Genetically Modified Products, further reiterated these comments in his keynote address by highlighting the potential usefulness of GM crops in dealing with food security concerns associated with climate change. He also encouraged technology developers to consider the social implications and farmers' welfare when developing new GM crops.

Commercial Environment for Stacked GM Crops

Adoption and commercial planting of GM crops, particularly those with stacked traits, are on a rising trend. This was the main message that Dr Sutat Sriwatanapongse of the Biotechnology Alliance Association in Thailand, and Dr Randy Hautea of the International Service for the Acquisition of Agri-biotech Applications (ISAAA) provided to the audience. According to information gathered by ISAAA, in 2009, 14 million farmers in 25 countries have planted 134 million hectares of GM crops – an increase of 7% or 9 million hectares from 2008. As of 2009, 11 out of these 25 GM-planting countries have been growing GM crops containing stacked traits. Also, 41% in the USA and 70% in the Philippines of the total area planted with GM crops are stacked products. Ms Natalie Weber, Registration Manager for Pioneer Hi-Bred/DuPont, further brought to light that stacked products are becoming increasingly popular among consumers (growers) and developers (agri-biotech companies) alike. This is because they can be customized to suit specific customer needs, while at the same time require less time and cost for development. Hence, developers would likely be submitting more stacked-trait products for regulatory approval than single-trait products in the future.

L-R: Dr Randy Hautea, Ms Natalie Webber, Mr Jack Bobo, Dr Flerida Carino, Dr Dedi Fardiaz, Dr Muhammad Herman

L-R: Ms Sonny Tababa, Dr Anne Bridges, Dr Kim Hae-Yeong, Ms Natalie Webber

Science as the Basis for Risk Assessment of Stacked Events

Nevertheless, as they are relatively new to the market, there have been questions raised among the regulatory and scientific community on how risk assessment should best be approached for these stacked-trait products. In order to provide a basic understanding of a science-based risk assessment process, Mr Jack Bobo, the Senior Advisor for Biotechnology at the US Department of State, shared with the audience the Codex Alimentarius principles for risk assessment of food and feed derived from modern biotechnology. He explained that the Codex principles are based on the concept of 'substantial equivalence'. Dr Flerida Carino of the University of the Philippines-Dilliman, further provided an overview of risk assessment approaches in ASEAN, highlighting the fact that many countries in the region do not have instruments to conduct risk assessments despite having regulatory regimes (Cambodia, Lao PDR, Myanmar). Those that do mainly follow Codex principles (Indonesia, Philippines, Singapore and Thailand), with some having additional data requirements (Malaysia), while others also providing for risk assessment to be waived if it has already been assessed in 5 other developed countries (Vietnam). To complement the overview provided by Dr Carino, Dr Prasartporn Smitamana of Chiang Mai University and Dr Dedi Fardiaz of Bogor Agricultural University shared the Thai and Indonesian perspectives respectively on risk assessment of foods derived from GMOs in their countries. As mentioned by Dr Carino, both countries adopt Codex guidelines in their approach.

Safety Concerns Due to Genetic Instability and Protein Interactions?

Thus far, two of the safety concerns raised by the regulatory community in relation to plants containing stacked events are – 1) the genetic recombination of the two or more transgenes in a stacked GM plant that lead to the production of altered proteins; and 2) the interaction of proteins produced by the separate transgenes in a stacked GM plant. In both cases, if there are unintentionally altered proteins or protein interactions in a stacked GM plant, these end products could potentially be harmful by being toxic or allergenic. Thus, further risk assessment would be required to determine whether this would be the case.

To help the audience understand the scientific background of these concerns, Dr Curt Hannah, Professor of Plant Molecular and Cellular Biology and Horticultural Sciences at the University of Florida, first provided an introduction to the scientific principles related to plant breeding, gene transfer and stacking in transgenic plants. One of the salient points raised by Dr Hannah was that the stacking of genes is not a new concept, and has also been used by conventional plant breeders to develop resistant plant varieties. Furthermore, he explained that conventional breeding techniques are often less precise in the process of transferring desired genes into a final plant product compared to genetic modification methods. As such, with regard to the concerns that genetic interaction and instability would cause the production of altered proteins, Dr Hannah explained that this is largely unfounded. This is because the likelihood of recombination between two or more transgenic genes within an organism is extremely low, as only the promoter and terminator sequences are homologous, and the total number of copies for these transgenes is very low compared to the entire plant DNA. Even if such homologous sequences on transgenes were to occur, the coding region would remain unchanged since it is rarely homologous, and therefore the resulting protein would also not be altered.

Dr Hannah however stated that the second concern, regarding metabolic interaction of the transgene products, is in principle valid and requires more study. Nevertheless, for stacked products containing existing transgenes for insect-resistance and herbicide-tolerance traits, as it is known that the

gene products function in different biochemical pathways and are located on different chromosomes, it can be concluded that there is an extremely low likelihood of protein interaction. Therefore, in such cases it would not be necessary to conduct further risk assessment for these stacked products, as long as safety assessments have already been performed on the parental GM plant lines. However, in cases of stacked products where enzymes or its substrates do function in the same metabolic pathway, there is a higher possibility of interaction. Hence in such cases, a targeted hypothesis-driven approach to characterize the nature of any potential hazard should be taken for the risk assessment of such products, and it should be done on a case-by-case basis. This is because the interaction of transgene products is not inherently hazardous, as it can be intentional and desirable. An example of this is the stacking of genes that code for sub-units of an enzyme that catalyzes starch production, for the purpose of increasing the starch content of a plant.

Testing and Detection of Stacked Events

How do we test for GM crops containing stacked events and differentiate them from those with only single events? This is another question raised by regulators. Hence, Dr Anne Bridges, consultant and chair of the AACC International Approved Methods Technical Leadership Committee, was invited to provide an overview of the current methods available to test for the presence of stacked events in GM products. Prior to describing the available methods, Dr Bridges stressed that before the conduct of any actual laboratory analysis, development of a proper sampling plan is absolutely essential in obtaining reliable analytical data for interpretation. She then explained that for the detection of genetic events in GM products, the polymerase chain reaction (PCR) technique is commonly used. Both qualitative and quantitative PCR techniques (such as Real-Time PCR) are available, with the latter being able to help quantify the amount of transgenic material present in a sample. Dr Bridges explained that while it is possible to detect individual transgenic events in a particular batch of grain, current standard PCR techniques are unable to detect stacked events when the transgenes are located on two or more different chromosomes in the same organism. Also, it is not possible to differentiate single events from stacked events in a bulk sample, as it would be impossible to determine the origin of the transgenic DNA in the final test sample at the laboratory level. In addition, in commodities trading, it is highly possible for commercial seed stacks to be present in the same shipment as field stacks, thus making it difficult to differentiate between intended or unintended stacked products. As such, the only method to test for stacked events in GM crops is through an analysis of individual seeds, with an approximate minimum number of 100 seeds needing to be tested if the intention is to verify that not more than 5% of a particular batch of grain contains GM material.

Current Regulatory Approaches

Due to the complex issues related to the science and testing methodologies for GM crops containing stacked events, it was important for the regulators and risk assessment scientists to learn from each other As such, regulatory perspectives on stacked events were shared from Australia, Philippines and Indonesia. Dr Janet Gorst from Food Standards Australia New Zealand (FSANZ) explained that in Australia, there is no requirement for separate approval of food derived from stacked events, as long as each of the parental lines used to produce the stacked product has been previously approved by FSANZ. The consideration for this approach is due to the consensus that it is highly unlikely that interbreeding of existing approved GM plant lines would pose any additional risks after thorough assessment of the individual GM plant lines have already been conducted. However, FSANZ is currently in the process of evaluating the current

Demonstration by Dr Anne Bridges on sampling

regulatory model in light of potential new traits and stacked products being introduced to the market in the future. Dr Saturnina Halos of the Department of Agriculture, Philippines, provided an overview of the Philippine model for assessing stacked products, which follows a two step process – whereby if it is found that there is no likelihood of gene product interaction, no further risk assessment is required. However if gene product interaction seems likely, a further risk assessment will be required following Codex guidelines. Dr Roy Sparingga from BPOM on the other hand, shared that while Indonesia does not have an articulated policy on risk assessment of stacked event products, the considerations for such policies would depend on the development of scientific criteria for safety assessment of such stacked products. He observed that existing international approaches and data requirements for assessing stacked products are not yet harmonized around the world.

What Are the Trade Implications?

As adoption and trade of food and feed products derived from GM crops containing stacked events increase in the future, Mr Jack Bobo explained that there are important trade-related implications at stake. Countries that require additional approvals for stacked products as well as those that do not have feasible low-level presence (LLP) policies will be impacted in their trade of such agricultural products. Trade of such stacked products will also be affected worldwide due to asynchronous approvals of GM crop varieties between different national authorities. As the number of new traits and the number of potential new stacked product combinations increase, countries that require individual approval for every new stacked product will likely have their regulatory system be overwhelmed. With regards to LLP policies, countries that adopt of a "zero tolerance" LLP policy will likely face problems with imports of essential agricultural products, which could affect the availability of food and feed to its consumers. One example given by Mr Bobo is a case in Europe, where unapproved transgenic material from corn dust was found in a soybean shipment to the EU, which was subsequently rejected and resulted in severe economic losses. Therefore, Mr Bobo stressed that while economic considerations should not take precedence over legitimate food safety concerns, an understanding of the cost/benefit of new regulatory policies is very important.

Glossary

Genetic modification	A scientific method that allows the selection and transfer of individual genes from one organism into another, also between non-related species. It is also commonly referred to as "genetic engineering", "modern biotechnology", "gene technology" or "recombinant DNA technology".
Genetic recombination	A process by which a molecule/sequence of DNA is broken and then joined to a different but similar (homologous) molecule/sequence of DNA. It can occur naturally as well as through the application of genetic modification.
Stacked events	The use of plant breeding to combine two or more genetically modified traits into a single plant variety.
Seed stack	A plant containing stacked traits in which genetic events have been deliberately combined through plant breeding processes to be present in every seed in a particular lot.
Field stack	A plant containing stacked traits containing adventitious combination of genetic events, such as arising from pollination in the farmer's field.
Promoter	A region of a DNA molecule that facilitates the transcription of a particular gene.
Terminator	A region of a DNA molecule that marks the end of a particular gene for transcription.
Coding region	A portion of a DNA molecule/sequence known to contain genetic information that is transcribed.
Low-level presence	When used in relation to genetically modified materials, it refers to the incidental presence of GM materials in food, feed or grain at levels that are consistent with generally accepted agricultural and manufacturing practices.

Prof Sushila Chang

Chair of Board of Trustees, ILSI
Vice President, ILSI SEA Region

Prof Sushila Chang is the current Chair of ILSI's Board of Trustees, as well as the Vice President of ILSI SEA Region. Based in Brisbane, Australia, she is a Professor and Director of Undergraduate Education at the University of Queensland (UQ), Australia. At UQ, Prof Chang also teaches and coordinates courses in the Master of Biotechnology program. Prior to her current appointments, Prof Chang was a Senior Director of Ngee Ann Polytechnic, Singapore and the Director of the Polytechnic's School of Life Sciences and Chemical Technology.

Question: In your extensive career in academia and scientific research, what are some of your most exciting experiences?

Sushila Chang: In the academic learning space, one engages a lot with students. I gain great joy when my students do well in life, and I especially rejoice when those who are challenged with learning, physical or personal issues eventually achieve their goals. I think all academics and researchers have a great mentoring role. Many of my students still keep in touch with me, and I would like to think of myself as a mentor to them. In the area of research, it is exhilarating when knowledge or technology is translated and commercialized so that others can enjoy the outcome of our work. I was a founder member of a research spin-off company, and even though the venture eventually failed, I wear this "failure" as a badge of honour for I have learnt immensely from this experience both scientifically and in the business and professional area. If another opportunity arises for me to bring my research to market, I will try again, and succeed!

Q: Having moved from Singapore to Queensland, Australia, could you share some of your thoughts on how science, research and technology is being advanced to benefit public health in the country?

SC: The research environment in Australia is quite vibrant, and academics and researchers collaborate extensively within Australia as well as internationally. There is a lot of sharing, and outcomes can perhaps be achieved faster. Besides collaborating within the discipline, there is also a lot of interdisciplinary collaboration which I find so interesting, eg. between the humanities (psychology, social sciences) and the science and technology areas. This gives a totally inclusive and wholesome feel to the research, and a richness that is quite extraordinary. Funding is also highly competitive and one learns very fast that you need to have good research ideas to be innovative, and a good research team and collaborative partners to be successful. Intellectual property and commercialization are also very much part of the game, and researchers are knowledgeable in this area as well.

Q: As the current Chair of ILSI's Board of Trustees, what are your priorities in strengthening ILSI's role and resources in generating science and translating knowledge into practical solutions?

SC: I truly admire ILSI and its contributions to public health. I would like ILSI to play an even more important role – to be an agency that is a good resource to all stakeholders and one that can take a lead in all areas of public health. ILSI has to its credit good science-based research, good researchers, good image and good networks. I think we can be out there and be the first name that one would think of looking at when seeking solutions to global public health challenges.

My priorities will be to establish more collaboration between the branches and encourage more sharing of resources and science. The 18 branches are at different stages of development, and there is a lot of synergy that can be better harnessed. The sharing of best practices is one that is on-going. We also need to collaborate even more with other organizations, and of course communicate better. Our stakeholders need to better understand ILSI as an organization, our strengths and what we can offer.

Communicating Health Through Nutrition Labeling and Claims

Consumer understanding and expectations of health and nutrition-related information presented on packagings of food products continue to change and evolve. As such, national regulations on nutrition labeling and claims in the region are being reviewed and updated regularly. Codex Alimentarius has also recently updated its guidelines for nutrition labeling and use of nutrition and health claims.

Since 2001, ILSI SEA Region has organized regular meetings to share the latest updates in nutrition labeling and claims regulations with regional stakeholders. The most recent meeting – the **6th Seminar and Workshop on Nutrition Labeling, Claims and Communication Strategies for the Consumers** was held on September 20-21, 2010 in Kuala Lumpur, Malaysia in collaboration with Food Safety and Quality Division of Ministry of Health, Malaysia. The meeting also discussed the concept and use of nutrient profiling for claims and Front-of-Pack sign-posting schemes as communication tools. The meeting was attended by over 200 participants including industry professionals, scientists and regulators.

Overview

Dr Tee E Siong, Scientific Director of ILSI SEA Region, opened the meeting by providing a summary of the work of Codex Alimentarius in the area of nutrition labeling and nutrition and health claims. He also discussed activities on nutrition labeling and claims in the Southeast Asian region, highlighting that ILSI SEA Region's series of seminars and workshops since 2001 has provided a platform for officials from regulatory agencies in the region as well as research scientists from China, Japan, Korea, Australia/New Zealand and the European Union to network regularly, exchange experiences and explore possibilities in harmonization of food recommendations, defining standards for healthy diets, recommendations on foods to eat or avoid, as well as communicating and evaluating consumer understanding of these healthy eating messages. It is always best to communicate healthy eating messages to consumers in the context of total diets and other dietary guidance tools. Consumer research is crucial to know if consumers understand what the messages are, and what they mean. Dr Dwyer emphasized that ***"In the future, healthy eating messages must be tested for their understandability before they are released, post-tested for consumer understanding and impact, and re-evaluated as science and food consumption problems in population change."***

Panel discussion L-R: Dr Tee E Siong, Dr Johanna Dwyer, Dr Stephane Vidry, Ms Hazel Fowler

nutrition labeling and claims regulations in the region. Dr Tee concluded that ***"There is increased general consumer expectations and acceptance of nutrition information on food packages. Regulatory authorities are sensitive to the challenges faced by industry, thus opportunities for dialogue, such as during meetings organized by ILSI SEA Region, are important."***

Updates from America

Dr Johanna Dwyer of Tufts University, USA, shared recent updates in the US and abroad involving the concept and use of nutrient profiling to promote healthy eating. Some of the challenges faced include difficulty in converting nutrients to

Current Status in Southeast Asia

Representatives from seven Southeast Asian countries provided updates on the current status of nutrition and health claims regulations in their countries.

Brunei Darussalam: Nutrition claims are permitted in Brunei, but claims related to vitamins and minerals are not allowed. Several misleading statements are also prohibited, including therapeutic or prophylactic claims, claims that a food is a source of energy or protein, or claims of medical nature, etc. A Healthy Choice Logo scheme was launched in 2004 in Brunei.

Indonesia: Nutrient content claims, nutrient comparative claims, nutrient function claims as well as health benefit claims are allowed. Certain functional components have been approved and claims other than those approved may be considered. Indonesia is currently developing regulations on nutrition and health claims (revision of functional food regulations), tolerance level for nutrition labeling as well as regulations on serving size and reference quantities.

Malaysia: Labeling of core nutrients is mandatory for a wide variety of foods. A total of 52 nutrient function claims have been permitted, but health claims are prohibited. The latest amendment of the regulations also includes the replacement of the term 'nutrient supplement' with 'added nutrient' and includes an approved list of food components which, when added singly or in combination to food, improves the nutritional value of the food.

Philippines: Philippines has adopted Codex Guidelines on Health and Nutrition Claims since 2007 and allows nutrient content claims, nutrient comparative claims, nutrient function claims, other function claims, and disease reduction claims. The Department of Health is revising general labeling guidelines and pushing for mandatory nutrition labeling of food product being distributed locally. Sign-posting or nutrient profiling is now being introduced on the labels of food products imported and distributed in the Philippines, and on local products produced by multinational companies.

Speakers and Organizers of the Seminar

Singapore: All packaged food must be labeled with a Nutrition Information Panel (NIP) when a nutrition claim is made. The list of more than 60 permitted nutrient function claims is available on AVA's website. Five nutrient-specific diet

HPB Healthier Choice Symbols

related health claims are allowed for products that are already approved as Healthier Choice by the Health Promotion Board.

Thailand: Nutrition labeling is mandatory only for foods with nutrition claims; foods using nutrition for sale promotion; foods for specific target groups; and other foods as prescribed by the Thai FDA. Currently, a total of 29 nutrient function claims have been approved by Thai FDA. The Ministerial notification is being drafted for health claims, based on relevant Codex guidelines. Presently, two guidelines and criteria have also been developed to support the safety, quality and efficacy evaluation of probiotics and prebiotics in food products.

Vietnam: A new Food Safety Law was established in August 2010 to regulate the safety conditions for food as well as export requirements. Several decrees and regulations on labeling and disclosure remain in effect in Vietnam, including regulation on labeling of goods for goods produced for domestic circulation, import and export goods for consumption in Vietnam and goods production for export; circular on food labeling guidelines; labeling of prepackaged foods; guidelines on nutrition labeling, and general standard for the labeling of food additives.

Nutrient Profiling - Approach and Application

America: In the US, consumers were advised to seek out nutrient-rich foods in preference to discretionary calories. The new approach of rating or ranking foods based on nutrient composition has become known as nutrient profiling. Dr Adam Drewnowski of University of Washington, USA shared a model called the Nutrient Rich Foods (NRF)

My5 Logo Developed for the Nutrient Rich Coalition

index that measures nutrient density and has been extensively compared with other methods and validated with respect to a healthy diet. The NRF index is based on 9 nutrients to encourage (protein; fiber; vitamins A, C, and E; calcium; iron; potassium; and magnesium) and 3 nutrients to limit (saturated fat, added sugar, and sodium). The NRF index can rank foods based on their nutritional value and can be applied to individual foods, meals, menus, and the daily diet. Dr Drewnowski added that ***"Communicating nutrient information to the consumer simply, accurately and at a glance is an important aspect of food selection. However, consumers may also be looking for taste, enjoyment, low cost and sustainability."***

Europe: The European Regulation on the use of nutrition and health claims for foods lays down harmonized EU-wide rules for the use of health or nutritional claims on foodstuffs based on nutrient profiles. Dr Stéphane Vidry from ILSI Europe, Belgium shared that, however, there is no clear agenda for setting nutrient profiles in Europe. The EU has not been able to reach a consensus on how to establish those nutrient profiles as the nutrients to be included, reference quantities, feasibility and application are still being discussed. ILSI Europe has been in the forefront of scientific discussions related to health claims and nutrient profiling. Dr Vidry noted that the management of any adopted system needs to be dynamic to allow for revisions when new scientific knowledge emerges.

Southeast Asia: In Southeast Asia, the use of nutrient profiling is only limited to a few countries. Indonesia plans to use nutrient profiling for

evaluation of health claims and is in discussion with the food industry, while in Singapore, limited use of nutrient profiling is adopted for the Healthier Choice Symbol program.

Currently, the World Health Organization (WHO) is developing a framework, including a decision tree on nutrient profiling.

At the panel discussion, it was recognised by the experts that the approach towards the usage of nutrient profiling is still an area of debate where all stakeholders need to agree on the scientific basis and merit.

Front of Pack Sign-posting

There are several formats of front of pack (FOP) sign-postings, including Healthier Choices Logo/Symbol, Traffic Lights, Guideline Daily Amounts (GDA), Keyholes, etc. Both GDA and healthier choice logos could be present on the same food label. However, too many signposts present could cause confusion among consumers, thus in Europe, there are guidelines stipulating the maximum number of logos allowed on packagings.

Although the use of official FOP schemes has only been established in Singapore and Brunei, many retail chains and NGOs have implemented voluntary FOP sign-posts in the region, such as in Malaysia and Thailand.

Consumers also need education on the usage of these sign-posts so as to not mistake them as mere advertisements. A recent survey conducted in Malaysia showed that consumers may prefer certain formats but they did not know how to use the information of the FOP Sign-posts. Before developing and implementing any official FOP Sign-posting program, regulatory agencies should be very clear about the objectives, criteria and format of the scheme; the messages that they wants to communicate to their consumers. Besides helping consumers to make better food choices, the criteria for sign-posts should be flexible, practical and reviewed regularly, taking into consideration the current consumption pattern of the country and consumers' nutrition knowledge,

Effective Communication of Nutrition Information on Food Labels

Consumers report in surveys that nutrition information is important to them and that they use it frequently, but how accurately does this reflect consumers' priorities and decision making behavior in the supermarket? Since 2001, Food Standards Australia New Zealand (FSANZ) has been conducting consumer research to determine how consumers use, understand and perceive nutrition information on food labels, and if there is any effect of this information on consumers' perceptions and their purchase intentions. Ms Hazel Fowler of FSANZ, Australia reported some key findings from the recent research. She highlighted the difficulty in analyzing consumers' thought processes in relation to food products and emphasized that ***"There is a need for new methods to uncover what consumers are looking at and what effect this has on decision making".***

Dr Gerd Harzer of University of Munich, Germany also shared findings from two recent large European studies on how widespread the nutrition information on labels is; how consumers understand and use the information in stores; and whether it helps them to make healthier food choices. The studies showed that nutrition claims and guideline daily amounts (GDA) were the most prevalent forms of nutrition information on the FOP, averaging 25% each. Most consumers were aware of and have good understanding of different labeling systems and were able to make healthier choices using these systems, but less than one-third of consumers had looked for nutrition information on the packaging. Dr Harzer highlighted the need to create motivation and interest in using nutrition labels and acting on them. Combined efforts of food industry and government with consistent communication messages would be more.

At a workshop session following the seminar, regional regulators exchanged experiences in consumer understanding of nutrition labels and health claims. It was observed that consumers prefer positive claims (e.g. nutrient function claims) over negative claims (e.g. some disease reduction claims). They also concurred that more surveys need to be conducted among the regional consumers to better understand their interpretation and usage of nutrition information and claims. The survey results will help regulatory agencies to develop, review and implement better regulatory systems.

Discussions on FOP labeling for the region

Development of Science-based Dietary Guidance

Sharing the Latest Knowledge, Spurring Efforts for Harmonization in Southeast Asia

Recognizing the need to promote science-based nutrients standards and intake references and dietary guidance (eg. RDAs and FBDGs) for the general population within the Southeast Asian countries, ILSI SEA Region has encouraged and facilitated a harmonized approach to their development in the region. Collaborating with FAO, ILSI SEA Region established an expert Working Group and conducted a series of workshops from 1997 to 2003. The successful outcome of this effort was a harmonized framework of RDAs appropriate for the Southeast Asia region developed by the expert Working Group, and the publication of an ILSI SEA Region Monograph titled *"Recommended Dietary Allowances - Harmonization in Southeast Asia"* in 2005.

To identify follow-up actions in this important area, ILSI SEA Region has conducted a survey among health officials, policy makers and experts in the region working in this field. A 1-day workshop, attended by representatives from health authorities in Southeast Asia, was organized and held on November 12, 2010 in Bangkok, Thailand with the objectives of sharing the key results from the survey; identifying data gaps, barriers and research areas in the development of RDAs and FBDGs; discussing challenges and opportunities in harmonizing frameworks for the development of RDAs within the region. A discussion was also held to share approaches on dietary guidance through FBDGs and strategies to better communicate FBDGs to Southeast Asian consumers.

Understanding Nutrient Reference Values

Prof Lynne Cobiac of Flinders University, Australia provided an overview of the various concepts and definitions of a range of nutrient reference values, focusing on their different usages. Estimated Average Requirement (EAR), Recommended Dietary Intakes (RDI), Adequate Intake (AI) and Upper Level of Intake (UL) were explained. AI was established when there was insufficient scientific evidence to set an EAR/RDI whereas UL is the maximum level of intake of average daily nutrient that poses no adverse health effects to almost all individuals in the general population. RDI can be used for assessing diets of individuals but not for assessing intakes of groups.

There were also two additional nutrient reference values developed in Australia that are related to prevention of chronic diseases, namely Acceptable Macronutrients Distribution Range (AMDR) and Suggested Dietary Target (SDT). Prof Cobiac explained that AMDR is an estimation of a range of intake for macronutrients, expressed as % contribution of energy, which could provide good health outcome. SDT refers to an average daily intake of certain nutrients that could help in prevention of chronic diseases, and was developed based on the evidences which suggested the chronic disease prevention effect of certain nutrients at levels of higher than RDI.

Harmonization of RDAs – How Do We Move Forward?

SEA Country Updates on Status of Dietary Recommendations

At the session chaired by Dr Corazon Barba of the Philippines, experts, health officials and regulators representing key Southeast Asian countries (Indonesia, Malaysia, Philippines, Thailand, Singapore and Vietnam) shared their experiences and views on the harmonization process for RDAs in Southeast Asia.

The definition and application of various forms of dietary recommendations, such as RDA, AI, EAR, and their advantages or limitations were discussed. Although currently there is a set of "harmonized" RDAs (developed through the previous expert Working Group and published in ILSI SEA Region's Monograph) for use as a reference by the various countries, it was agreed that the concepts of DRI, EAR, RDA, AI and UL and even SDT and AMDR could be considered. However, the lack of crucial data, such as food consumption and usual intake data, would pose a big challenge to efforts to develop various sets of dietary recommendations. Since the publication of ILSI SEA Region's Monograph in 2005, there has also been scientific updates and new developments on nutrients and their requirements.

Achieving Consensus and Planning for Next Steps

It was recommended by the representatives present that a new Southeast Asia RDA Expert Working Group comprising representatives from Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam will conduct a literature review of the nutrients and their requirements based on new scientific developments and new recommendations since 2004. In addition to the 14 core nutrients covered in the 2005 RDAs, several new nutrients would be added to this review process, including Fat, Water, Dietary Fibre, Vitamin E, Vitamin K, Vitamin B 6 and B12. With each of the countries agreeing to focus on a few of the nutrients, ILSI SEA Region will coordinate and facilitate the work processes for the literature review.

It was further agreed that the Expert Working Group's first progress report will be submitted to ILSI SEA Region in March 2011, and a follow-up workshop is being planned in July 2011 in conjunction with Asia Congress of Nutrition 2011 in Singapore.

Development of FBDGs

Data Gaps and Barriers

Food-based Dietary Guidelines (FBDGs) and nutrition labeling are both vital tools for consumer education. Dietary guidelines should not be based on nutrients, but should be food based and related to the health outcomes of the population, taking into consideration of the country's food supply, food sustainability and impacts on environment.

Representatives from different Southeast Asian countries shared on the development of FBDGs in their respective countries, and identified the data gaps and barriers encountered during the development process. Lack of baseline data and resources such as experts and funds were some common barriers faced by most of the countries. It was recognized that cultural issues and traditional food practices is one of the barriers faced when developing FBDGs. Thus, there are no one-size-fits-all FBDGs, and they must be adapted to the local cultures. Most countries also found it a challenge to communicate FBDGs to consumers effectively.

Success Factors for Effective FBDGs

To move forward in the development of FBDGs in the region, it was suggested that the bases and concepts of FBDGs would have to be reviewed. The participants agreed that factors such as food security, sustainability, the impact on our environment and cultural sensitivity must be considered when developing effective FBDGs. Sustainable and supportive environments are also important contributing factors. Non-supportive policies and environment could make the implementation of FBDGs more difficult. Thus, it was agreed that economic, environmental, social and cultural context must all be considered when developing and promoting FBDGs. Periodic food consumption surveys are also useful tools to assess the efficacy of the FBDGs.

FBDGs for Different Population Groups?

Ideally, FBDGs should be developed to meet the needs of various target population groups, for instance, infants and young children, and the elderly. Many regional countries have already developed FBDGs for various population groups. Currently, there are FBDGs for both children and adolescents as well as for adults in Singapore. Singapore is also in the process of developing FBDGs for older adults (50 years and above). Philippines also has FBDGs for different age and physiologic groups. In Thailand, the FBDGs for infants and young children (below 6 years old) have just been developed, consisting of two sets of simple and easy-to-understand messages (i.e. 0 - <1 year old and 1- <6 years old). During the development, energy and protein requirements as well as consumption and the feeding practices were reviewed. Besides FBDGs for adults, Indonesia has also started to develop FBDGs for specific groups, including infants and young children, pregnant mothers and the elderly. In Vietnam, there are only FBDGs for healthy adults. Australia has dietary guidelines for children, adolescents, adults and the elderly, and the country is currently developing new guidelines for infants and lactating mothers.

Consumer Understanding of FBDGs

Importance of Communicating the Right Messages

All participants agreed that communicating of FBDG messages

is the key challenge faced by health promoters. Consumer-friendly messages and the use of appropriate communication tools are crucial to the success of FBDGs. However, there is still a lack of large-scale studies on the understanding and application of FBDGs messages.

The methods of communicating FBDGs to consumers in different countries were shared. It is important for the frontliners, especially nutritionists, dietitians and health promoters, to understand the FBDGs thoroughly, so that they can convey the messages effectively to the target population. Thus, training of frontliners on FBDGs and an effective mechanism of training evaluation are important. Effective and creative education tools should be developed and tested for various population groups, eg. health professionals and consumers. It is also vital to educate the media on FBDGs so they can convey the messages accurately to consumers.

Follow-up Activities

It was suggested that a framework or matrix is needed to document the development, evaluation and implementation of FBDGs, including best practices in communicating and evaluating the guidelines. Regional countries would provide relevant information on the developmental process, evaluation and best practices, while additional input from scientists working on FBDGs would be obtained. In addition, ILSI SEA Region would assist in the process for the development of evaluation tools for FBDGs to assess consumers' understanding and utilization of FBDGs.

Glossary

Adequate Intake (AI)	When no RDA has been established due to the lack of information, AI is established based on observed or experimentally determined estimates of the average nutrient intake that appears to maintain a defined nutritional state in a specific population.
Dietary Reference Intakes (DRI)	Refers to a set of reference values for energy, vitamins, minerals and other nutrients important to human health. DRIs are specific to age group, gender, and reproductive status for women.
Estimated Average Requirements (EAR)	Refers to the amounts of nutrients that are expected to satisfy the needs of 50% of the people in that age group based on a review of the scientific literature.
Recommended Dietary Intakes (RDI)	Refers to the levels of intake of energy and nutrients that are considered adequate for the maintenance of health and well-bing of nearly all healthy persons in the population.
Upper Levels (UL)	ULs are used to evaluate the highest amount of daily nutrient intake that is unlikely to cause adverse health effects in the long run in almost all people (97 to 98%) in a population.

Highlights of ILSI SEA Region Survey on RDAs & FBDGs

ILSI SEA Region has conducted a survey among regional scientists, health officials and policy makers from 6 Southeast Asian countries (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam) to collect data regarding the development, application and effectiveness of RDAs and FBDGs in these countries. Here are some highlights of the survey results.

Key Guiding Concepts and Principles Used to Develop or Revise RDAs

- Latest scientific developments and knowledge relating to nutrients and health
- National data and context (eg. food consumption, anthropometric data etc)
- Nutrient reference values from other countries (eg. US DRIs)

Uses of RDAs

- Development of nutrition education programs among population
- Evaluation and ensuring of adequate food supply, food quality and food consumption
- Development of national health and food/nutrition policies

Top 3 Barriers to Development of RDAs

- Lack of national or local data (ranging from scientific information on key nutrients, to food composition and food consumption data)
- Lack of sufficient expertise and experts to review and develop RDAs
- Lack of funding and other resources

Top Priority Research Area for RDA Development

- Research and data collection relating to local population (ranging from anthropometric data to information on ethic/social and feeding practices, metabolism of nutrients and food consumption)

Have Population–specific FBDGs been Established in Your Country?

- "Yes" for 5 (Malaysia, Philippines, Singapore, Thailand and Vietnam) out of 6 countries
- Although there are currently no population-specific FBDGs in Indonesia, the country is in the process of developing guidelines for children and pregnant mothers, and older adults (> 51 years)

Bases Used for Development of FBGDs

- National / local data (eg. food consumption data, health trends, food availability, local culture etc)
- RDAs and nutrient goals
- Food groups and variety within food groups

Does Your Country Assess the Usage of FBDGs by Consumers

- Malaysia, Philippines and Vietnam reported that they have conducted some studies to assess consumer understanding and usage of FBGDs in their countries

Top 3 Data Gaps / Barriers Relevant to FBDGs in Your Country

- Food availability, dietary/customary practices and consumption patterns among population
- Relationship between dietary intake and health status of local population
- Lack of funding and other resources

Calendar of Activities 2011

MEETINGS

9th ASEAN Food Safety Standards Harmonization Workshop and Seminar on Food Contaminants: Emerging Issues and Risk Management Strategies Singapore	January 11 – 12
ILSI Annual Meeting 2011 USA	January 21 – 26
Workshop and Roundtable Session on Evaluation of New Ingredients Indonesia	March
Dietary Fiber Seminar and Training Workshop Thailand	March / April
2nd Expert Consultation and Workshop on Infant and Young Child Nutrition Singapore	April 17
ILSI SEA Region Annual Meeting 2011 Singapore	April 19 – 20
Science Symposium on Carbohydrates and Wholegrains Malaysia & Singapore	April 18 & 19
Seminar on Infant and Young Child Nutrition Thailand	May
Workshop on Environmental Risk Assessment of GM Crops (tbc) Indonesia / Vietnam	2nd Quarter
Asian Congress of Nutrition 2011 • **Symposium on Functional Foods** • **Workshops on RDAs and FBDGs** Singapore	July 13 and 15
International Conference on Asian Food Security 2011 • **Plenary Paper and 1/2 Day Workshop on Safety and Risk Assessment (tbc)** Singapore	August
Training Workshop on Nutrition and Health Claims Vietnam	3rd/4th Quarter
Workshop on Assessment of Cognitive Function for Infants and Young Children Thailand (tbc)	September
ASEAN Food Consumption Data and Exposure Assessment Training Workshop Malaysia	September / October
Symposium on Vitamin D Singapore / Philippines (tbc)	November

RESEARCH, COLLABORATIVE PROJECTS AND INTERVENTION PROGRAMS

ILSI Asian Branches Collaborative Project on Harmonization of Analytical Methods and Food Safety Standards in Asia *In collaboration with ILSI Japan, ILSI Korea and ILSI Focal Point in China*	On-going
Study and Market Trial on Iron-fortified Rice in Philippines, Cambodia, Vietnam *In collaboration with ILSI Japan CHP, local governments and research institutions*	On-going
Survey on Regulatory Status of Mandatory and Voluntary Fortification in SEA Region	On-going
ILSI Global Water Project, Priority Area 1 – Quality of Water Used in the Production of Fresh Produce *ILSI global project led by ILSI Europe, in collaboration with ILSI SEA Region and ILSI South Africa*	1st Quarter
School Intervention Program for Obesity Prevention *In collaboration with health promotion agencies and education ministries in Singapore and Indonesia*	Under Discussion
ILSI Project SWAN in Indonesia *In collaboration with ILSI Japan CHP and SEAMEO Community Nutrition Center, Indonesia*	2011 / 2012
Review and Update on RDAs in SEA Region	2011- 2012
Review of FBDGs and Food Guides in SEA Region	2011- 2012
Scientific Review on Sodium Intake, Sodium Sensitivity, Homeostasis Regulation and Blood Pressure (tbc) *In collaboration with CSIRO, Australia*	Under Discussion

PUBLICATIONS

Meeting Report on "Seminar on Young Child Nutrition: Improving Nutrition and Health Status of Young Children in Indonesia" *Asia Pacific Journal of Clinical Nutrition*	1st Quarter
Meeting Report on "Fundamentals of Nutrigenomics and Its Applications in Nutrition Research and Dietetics Practice" *Journal of Nutrigenetics and Nutrigenomics*	1st Quarter
Meeting Report on "Symposium on Nutrition and Cognition - Towards Research and Application for Different Life Stages" *Asia Pacific Journal of Clinical Nutrition*	3rd Quarter

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