

Symposium on Nutrition and Cognition Towards Research and Application for Different Life Stages

October 19 - 21, 2010, Kuala Lumpur, Malaysia

Meeting Summary

Interest in cognitive health has been growing over the years, and much effort has been placed on optimizing cognitive development since conception to prevention of cognitive decline in the later years. Although cognitive functions can be influenced by many factors, there is much focus on the role of nutrition on cognition.

In light of this development, ILSI SEA Region and Nutrition Society of Malaysia in collaboration with the Commonwealth Scientific and Industrial Research Organisation organized a Symposium on Nutrition and Cognition: Towards Research and Application for Different Life Stages on October 19-21, 2010, in Kuala Lumpur, Malaysia. Exciting research was shared on the relationship between nutrition and cognition. The symposium also highlighted current methodologies in assessing cognitive functions, with specific discussion on the applicability of these assessment tools and research consideration for the region. Finally, issues relating to scientific substantiation of claims and consumer understanding in the area of nutrition and cognition were discussed.

Cognition – A Complex System with Many Influencing Factors

In the opening plenary, Prof David Benton of University of Swansea, UK, and Prof J Steven Reznick of the University of North Carolina at Chapel Hill, USA, provided an overview 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: executive functions, memory, attention, perception, psychomotor and language skills; 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.

Role of Nutrition in Cognitive Development

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, each provided an overview of the role of micronutrients, LC-PUFA and maternal nutrition on cognitive development.

Human brain development occurred since conception throughout adulthood, but the development occurs the most during the first year of life. Adequate nutrition is required for optimum brain growth, development and maturation. Exposure to maternal undernutrition during conception can not only alter the brain development during fetal or postnatal life, but also cause long lasting and irreversible effect on cognitive abilities.

Several micronutrients e.g. iron, iodine are known to be essential for the proper structure of brain tissue, for healthy neurochemistry and for the growth and maturation of the brain. Infants with iron deficiency exhibit lower cognitive scores, lower motor development and altered social emotional development. Depending on the stages of brain developments where it occurred, iron deficiency may results in a loss of brain iron in different brain regions and thus affecting different aspect of cognitive development. Iron deficiency seems to have long-lasting irreversible effects in children below two years, but may be reversible when occurred later in childhood. For iodine, its deficiency affects the brain development through its role in the formation of thyroid hormones. Iodine deficiency during pregnancy can cause irreversible neurological, cognitive, and motor deficits. Iodine deficiency may also cause poor development in children, resulting in lower IQ scores.

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 to neurons, enzymes, proteins, etc important to the central nervous system. Maternal folate deficiency is linked to neural tube defects, delayed intellectual development and other mental disorders 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 verbal and non-verbal abilities, including short-term memory, attention and concentration.

Micronutrients deficiency is prevalent in many developing countries including in Asia. Micronutrient inadequacy is also common among pregnant women even in developed countries with prenatal supplements not taken during the most critical periods. The impact of micronutrients deficiency on child development is of public health significant.

In a developing brain, the demand for proteins and long-chain polyunsaturated fatty acids (LC-PUFAs) is far greater than that in an adult one, and these macronutrients are known to be critically important for the synthesis of nucleic acids, neurotransmitters, growth factors and brain structures, as well as formation of cell membranes, synapse and myelin.

Long-chain polyunsaturated fatty acids (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. LC-PUFA synthesis is inefficient in both the fetus and young infant, and a supply of preformed LC-PUFAs is necessary through the placenta, breast milk, or infant formula to meet the needs of the rapidly developing brain.

LC-PUFAs contribute to the development of several cognitive abilities in infancy such as information processing and problem solving. Whether these advantages continue into later childhood or gradually disappear over time is of importance. Although the number of follow-up studies is relatively small, 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, studies of 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, studies of LC-PUFA supplementation in normal children have found little or no effects on cognition and behavior.

Regional Studies on Nutrition Status for Cognitive Development and Function in 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 on learning and memory in well-nourished and marginally-nourished school children in Australia and Indonesia, respectively. In Australia, micronutrient supplementation improved verbal learning and memory, but not the general intelligence and visual attention. Similarly in Indonesia, micronutrient supplementation showed non-significant improvement in verbal learning and memory test but only among the girls. Fortification with multiple micronutrients may improve micronutrient status and verbal learning and memory even in an adequately nourished, school-aged population.

St John's Research Institute has done several nutrient intervention trials and cohort studies in school children in India. Champion study looking at effects micronutrients and ω -3 PUFAs supplementation showed improvement on various cognitive tests such as 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. A study on the effect of home environment on cognitive performance in school going children showed that the influence of socioeconomic status on cognitive outcomes was mediated through family asset, family climate and parental involvement with the child.

Institute of Nutrition Mahidol University has conducted few micronutrient intervention studies in children and pregnant women. Trials using food products fortified with micronutrients 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. They are currently conducting trial on iodine supplementation during pregnancy on cognitive outcomes of the offspring.

Role of Nutrition in Cognitive Performance and Degeneration

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 acid on cognitive function in adult and elderly.

Incidence of dementia is increasing rapidly. Alzheimer's disease (AD), the most common dementia among older adults, is a neurodegenerative disease characterized by malfunctioning or loss of neurons with memory loss symptoms and other mental functions impairment including mood and language. The biochemical hallmarks of Alzheimer's disease include amyloid plaques and neurofibrillary tangles, and other factors, including inflammation, may play a role in disease pathogenesis. There are currently no medications able to reverse or prevent the progression of Alzheimer's disease. Between normal aging and the clinical features of dementia, there is a condition called Mild Cognitive Impairment (MCI), with affected individuals experiencing cognitive decline affecting their daily function but the functional activity remains intact. 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, brain atrophy, leading to cognitive decline. Deficiency in nutrients required for genome maintenance such as folate or vitamin B12 may impact the regenerative potential of neural cells and their mitochondrial function. 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 mediterranean 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 of choline uptake or inadequate dietary choline may result in cognitive impairments.

ω -3 PUFA may influence neural function through its effects on proteins/enzymes function in brain membrane, on neural gene expression, neuroblood vessel protection, its anti-inflammatory properties, etc. Recommended ω -3 PUFA intake is around 500mg/day or more, but the 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 revealed lower brain DHA in brains of AD patients. Epidemiological studies reveal some suggestive evidence of benefit of dietary ω -3 PUFA in the prevention of AD. Clinical trials of ω -3 PUFA supplementation are limited and vary in the study design and outcomes, but suggestive that DHA may be of benefit to patients with milder forms of AD.

Proteins and amino acids are also key component of brain cells. About half dozen of amino acids are involved in the brain chemistry, mainly as promoters or precursors of neurotransmitter synthesis. It has naturally followed that dietary amino acids and proteins are considered capable of affecting cognitive functions by influencing the availability of the crucial amino acids. As it turns out, the measured cognitive benefits in generally well-fed and healthy populations have been less than inspiring. Under normal conditions, dietary intake has little/no effect on amino acid in the brain, but when the regulatory controls is disrupted in abnormal situation, dietary amino acids may have some effect. There is increasing evidence for benefits to the brain from consuming a couple of very short peptides, at least one of which is 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 on the role functional ingredients and herbal substances play in cognitive performance.

Asia offers a great potential for nutritional intervention for cognitive functioning with its vast usage of functional ingredients such as Ayurvedic or traditional Chinese medicine. It appears that certain plants have evolved with a combination of properties which, in concert, may affect multiple neuronal, metabolic and hormonal systems and offer a more promising approach rather than a single compound. Ginseng, sage, and cocoa polyphenols are some of the few promising candidates which 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 showed that the cognitive and behavioral 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 are suggested to be involved in impairments of motor and cognitive skills observed in neurodegenerative disorders, as well as in normal brain aging, in which polyphenols might be of help.

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 provided an overview of the findings of the cohort studies.

Along with the increase of elderly population, the dementia prevalence in Singapore has reached around 6% in 2008. The Singapore Longitudinal Ageing Studies (SLAS), a population-based 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 showed that the overall prevalence of MCI was 21.1%. Similar to Singapore findings, Malay ethnic has 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 on 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.

Assessment of Cognitive Functions

Infant and Young Children

Prof J Steven Reznick of University of North Carolina at Chapel Hill, USA, and Prof Srinivasan Krishnamachari of St John's Medical College & Research Institute, India, illustrated on assessment of cognitive development in infants and young children and the process in adapting cognitive tests to Asian children.

The important questions to be addressed are what to assess and how to assess it. One strategy for measuring cognitive development in infants and young children is to view cognitive development as a broad and general phenomenon. An example is characterizing cognitive ability as intelligence and measured as IQ scores that can be compared with group norms / age-matched peers. While these IQ tests can significantly 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 assessing cognitive development in children who would not be well represented in the group norms.

An alternative approach is to identify specific aspects of cognition and to develop valid and reliable techniques for measuring these aspects. Measurement of early cognitive development may focus on cognitive abilities such as memory, attention, language, and knowledge. While some questions about influences on cognitive development may be answered on the basis of a general IQ score, any sophisticated question would probably be addressed most appropriately with assessment of specific age-appropriate aspects of cognitive development that are linked to the underlying mechanisms that would mediate the influence. For example, if children are being fed a breakfast that could enhance their attentiveness, their performance on laboratory tests of attention 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. These findings are generally inconclusive as global tests of development do not adequately assess cognitive abilities developing during the first two years of life; the tests were originally designed to detect delayed development, and place undue emphasis on perceptual and motor skills, rather than important cognitive functions. 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 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, it is important for them to be culturally appropriate. Adaptation involves accurate translation of the parts of the instrument that can be applied reliably and validly in the target community and substitution of parts that cannot be translated and applied reliably due to reasons of language, culture, or inadequate psychometric properties. Instrument items need to be pilot tested items to judge their cultural appropriateness. The reliability and validity can be accessed through application of statistical procedure. Test adaptations can only be adequate if they meet both judgmental and statistical adaptation criteria.

Adult and Elderly

Prof David Benton of University of Swansea, UK, Prof Jeroen Schmitt of Nestlé Research Centre, Switzerland, and Dr Kathryn Ellis of University of Melbourne, Australia, each shared on the research methodological approach, the assessment of cognitive improvement in adults, and the imaging and biomarker approach for early detection of AD.

In later life, there is a decline in cognitive functioning known to begin in the early twenties and continues over throughout life. This observation raises many methodological issues as experimental designs need to match the phenomenon being studied with dietary interventions start at young adult and be monitored over many decades. Although findings from randomized controlled studies are most desirable, such an approach would be difficult given this perspective.

An approach is to study those who are at a high risk of developing dementia or are displaying early symptoms such as individuals with MCI; with the increased sensitivity, the impact of dietary interventions can be monitored. Another approach is to consider not cognitive decline as such, but rather a biomarker that can reliably predict cognitive decline. Such associations have yet to be established although several approaches are potentially useful. Another approach might be to use brain imaging techniques to measure general brain shrinkage or the volume of areas of the brain known to change in those with dementia, A single biomarker alone may not be useful; a combination of imaging measures and biomarkers may be necessary and they must be translatable into visible cognitive and behavioral effects.

Cognitive functions are primarily measured by performance testing. Selection of appropriate performance tests based on various criteria is an important step in designing a sensitive and meaningful experiment. Factors such as aims of a study and the intended use, as well test sensitivity, level of difficulty and feasibility are to be taken into consideration when constructing a test battery. Adequate test administration and planning, taking into account standardization of procedures, managing confounding factors such as 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 aim to derive early and robust predictors AD and elucidate potential health and lifestyle interventions. A positive measurement of β -Amyloid deposition (one of the main hallmarks of AD) with PiB neuroimaging scan was shown the strongest predictive test for 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 A β burden was correlated weakly with lower episodic memory, but not other functions. Healthy woman with PiB positive scans perform more poorly on episodic memory tests, but longitudinal data is essential to examine this further.

Panel Discussion

The discussion covered the consideration for conducting nutritional research and cognitive assessment in the region. The panel agreed that the ability of the cognitive functions 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 is 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, cognitive assessments that measure specific cognitive functions will perform better in measuring nutritional influence than those that measure general cognition e.g. IQ. Assessment on the physiological changes and biochemical changes will be useful to provide understanding on the mechanism, but these changes in the end need to be translatable to cognitive or behavioral changes. Collaboration between nutritionists, psychologists and neurologist is very important for research in this area.

Perspectives on Scientific Substantiation in the Area of Nutrition and Cognition

Europe

The European Food and Safety Authority (EFSA) perspective was provided by Dr Peter Willatts of University of Dundee, UK. In December 2006, European Union 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 and behavioral functions. Article 14 of the regulation refers to claims involving disease risk reduction and child development or health.

EFSA working sub-group for mental and nervous claims developed the procedures for reviewing claims involving psychological, behavioral and neurological function under Article 13.1. Claims are initially screened for the following criteria: the food constituent is adequately characterized; the health relationship is meaningful and can be measured; the target population is identified; and the conditions of use of the food constituent are adequately specified.

When evaluating the scientific evidence, the category of the scientific articles and pertinence of the article to the claim are identified before the relevant articles are thoroughly reviewed. Only the articles provided by the claimants are considered by the review panel. A decision is then taken as to whether the article is positive or negative with reference to the claim.

If there is sufficient evidence to support a claim, a literature search is then undertaken to determine whether there are negative evidence not provided by the claimant. If additional negative evidence is not found, then it is concluded that a cause and effect relationship has been established and 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 two things: the quality of the scientific evidence provided by the claimant; and the quality of the application. Many claims have been rejected because, either the scientific evidence was inadequate, or the health relationship was vague or meaningless.

Australia

Prof Richard Head of CSIRO Preventative Health National Research Flagship shared on the experience on scientific substantiation including their current approach in studying the brain structure. Scientific substantiation using peripheral approaches has been use in the number of

cases, for example in dietary strategies to reduce cholesterol. The learning from this approach can be applied in studying nutrition role in brain.

Understanding the pathology of the disease is also important. The amyloid hypothesis postulated that amyloid beta (A β) deposits are the fundamental cause of AD. Intervention can be potentially done on several processes across the pathway: secretase inhibitors that prevent amyloid production; plaque formation inhibitors that prevent amyloid aggregation; amyloid clearance promoters; and anti inflammatory compounds or antioxidant that alleviates neural toxicity.

Another important aspect of scientific substantiation would be ability to monitor amyloid fibril formation. Real time monitoring of the fibril formation has been possible using Thioflavin T. Screening of food/plant extract for possible A β fibril inhibitor/disruptor properties is also possible using TEM imaging with Ab42.

Japan

Prof Toshio Shimizu of Nagoya-bunri University, Japan provided an overview on health claim substantiation in Japan. In 1991, a regulation on Foods for Specified Health Uses (FOSHU) was established, allowing health claims as follows: maintain or improve a marker determined by self-diagnosis or health check-up; maintain or improve physiological function and organ function of the human body; causes short-term changes in body condition, but not long-term changes.

For a product to obtain FOSHU approval, the requirements on efficacy, safety and analytical determination need to be met. Systematic evaluation of available evidence on the efficacy and safety is required with the mechanism defined by animal and in vitro studies, and the safety data including the human study and consumption history. The health claim is required to be substantiated by the statistical analysis of human intervention studies using the final product containing characterized effective component.

At present, no claims relating to cognition have been approved under the FOSHU regulations. Various difficulties such as the accreditation of measurement tools, the consistency of wording of the health claim with the result from the human study, and achieving significant differences from control, must first be overcome. Japanese researchers are now conducting research in the field of cognitive related functions such as prevention of memory loss, improvement of sleep quality, and fatigue recovery toward to the FOSHU approval.

Southeast Asia Region

Dr Tee E Siong of TES NutriHealth Strategic Consultancy, Malaysia highlighted on claim substantiation in the area of nutrition and cognition in SEA Region, with emphasis on example in Malaysia. There is considerable interest amongst health professionals and the food industry in making health claims relating nutrients to improved mental or cognitive performance, learning capability, and brain growth and development. The nutrients or food components involved include several PUFAs (especially DHA and AA), sialic acid, tryptophan, taurine, phospholipids, iron, choline, zinc, "antioxidants", and even proprietary components. These are targeted mainly at children, but also for adults.

There are currently few officially approved health claims on nutrition and cognition in SEA region. Malaysia has only one approved "function" claim only permitted for use in infant formula and

follow-up formula: “sialic acid is an important component of brain tissue”. Singapore too has a few function claims for use only in foods for infants and young children: “choline helps support overall mental functioning”; “DHA, AA are important building blocks for development of the brain and eyes in infant”; and “taurine helps to support overall mental and physical development”.

Nevertheless, most authorities in the region do provide opportunities to apply for function claims as there are processes and systems in place to review such applications by relevant appointed experts. Information required to be submitted in dossiers include the proposed wordings for the intended claims and the scientific substantiation of the intended claim. Data to support the claim should preferably be from human intervention trials. In the case of specific nutrients or food components that are not in the current permitted lists, applications have first to be submitted for the addition or use of such ingredients.

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

Industry

Dr Rob Winwood of Martek Biosciences, USA, provided 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 not been easy. Human requirement for DHA has been established recently. WHO suggests that it has convincing benefits for brain and visual development in infants. DHA has been recommended for pregnancy and during lactation by various health authorities in Europe, Australia, and USA with some suggesting average dietary intake of at least 200 mg DHA/day. EFSA has also issued scientific opinion on Dietary Reference Values of DHA

Educating the consumer also takes time and is often confounded by misleading messages. DHA awareness benefit varies with different countries with DHA mostly linked to heart health and less on eye and brain function. But there is recognition that diets deficient in DHA will impact cognitive abilities. While USA has authorized “Structure/Function” claims on DHA, for most of the world, the obligation is on manufacturer to be able to back up any on-pack claims. EFSA has also given positive opinions on DHA in relation to maintenance of normal brain function under Article 13; in order to bear the claim, foods should contain 250 mg of DHA in one or more servings. For claim related to brain development under Article 14, EFSA opinions to date have not been reached.

Consumer Understanding

Dr Josephine Wills of European Food Information Council, Belgium, examined consumer understanding on nutrition and cognition. Consumer research on perceptions of associations between nutrients in specific foods or in supplements, and brain health, cognition or mental alertness, appears to be limited to a few examples at different life stages.

In pregnancy, folic acid has been linked to neural tube defects (NTD). A survey on the knowledge and use of folic acid among Irish and UK women attending ante-natal clinics showed that most respondents knew folic acid could prevent NTD but only a fraction take it preconceptionally. In adolescence and adult, caffeine has been linked to mental alertness. When asked of the reason for consuming caffeinated food/beverages, most of US respondents consume them for the taste and also to stay awake or wake up. They also agreed that caffeine help increase energy, improve mental performance and reduce risk of brain and/or nerve disease such as AD or Parkinson.

A survey among Europeans showed the importance of labels as a source of nutrition information along with magazine / newspaper and health association materials. While in the USA, health professionals are the most influential source of information followed by food labels and the internet. Information available online showed that “brain food” is mostly associated with nuts, followed by salmon, berries, etc; while the accuracy of these information is not warranted, many consumers refer to it. More efforts need to be done to understand consumer insight on nutrition and cognitive functions.

Panel Discussion

The discussion covered the opportunities and challenges in the region with regards to claims and consumer understanding on nutrition and cognition. There are opportunities in the region to apply for function claims as processes and systems are in place to review such applications by relevant experts appointed by the authorities. There is no strict guideline on how extensive the evidence should be as the review is done on the totality of the evidence to establish the cause and effect relationship. Nevertheless, not only the review process of claims, but the enforcement has to be upheld. Advertisement is a form of claim and must not publicize unsubstantiated benefit.

In the case of EFSA evaluation process, the proposed wording of claim must match with the available scientific evidence. Currently EFSA does not take the consumer understanding of these wordings into account. It might be necessary to do so in the future but the framework is not established yet.

** The meeting report is under preparation, to be submitted to a peer reviewed journal in the 2nd quarter of 2011.*

Exhibition and Poster Sessions

A lively Exhibition and Poster sessions were held alongside the symposium. A total of 17 posters were displayed together with exhibition by Abbott Nutrition, Martek Biosciences, Mead Johnson Nutrition, Cerebos, ILSI, NSM and CSIRO. The awards for Best Asia poster were given to 3 selected presenters from Asia in recognition of their effort and to encourage more nutrition and cognition research in the region.



Speakers and organizers of the symposium



Over 160 participants attended the symposium



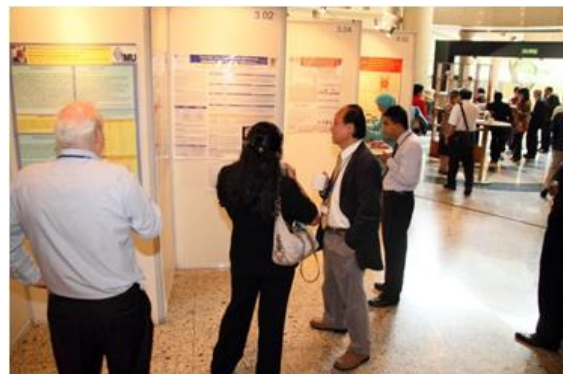
Panel discussion on assessment of cognitive functions



Prof Richard Head of CSIRO asking questions to the panel



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



Participants browsing the poster displays