

The 5th International Symposium on Clinical Nutrition (4-7 February 1996) and The 1st APCNS Training Course in Clinical Nutrition

SECTION 1. Clinical nutrition: past, present and future

1. Historical landmarks in clinical nutrition

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The late E Neige Todhunter, nutrition historian and respected colleague of mine, has written an article, *Historical Landmarks in Nutrition* (Present Knowledge in Nutrition, Fifth Ed. 1984, 871-882) which serves admirably as background for this presentation. Examples of these landmarks will be reviewed in their historical context and their significance assessed in terms of subsequent nutrition science progress. Historical landmarks to be discussed in this framework include: (a) Digestion, a chemical process; (b) Respiration, a chemical process and energy production is measurable; (c) Nutrients are chemicals essential for the health of man; (d) Nutrients are interrelated in metabolism; excesses, deficiencies and imbalances can be harmful; (e) Dynamic state of the body composition; (f) Quantitative requirements for nutrients can be determined within certain limits; (g) Nutritional improvement by dietary means.

2. Role of IUNS in clinical nutrition

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IUNS was initiated in July 1946 by the British Nutrition Society from the meeting attended by 22 scientists from 13 countries. The principle objectives of the Union are three fold, namely: a) to exchange information; b) to organise international nutrition congresses periodically; and c) to disseminate new knowledge derived from scientific investigations.

IUNS Commissions and Committees take major responsibilities in carrying out scientific activities. There are three commissions and each one is composed of eight committees. **Commission I** deals with Food Standards and Terminology, Food Composition Databases, Urban Street Foods, Nutrition and Edible oils; together with Nutrition and Diseases. **Commission II** covers Nutrients and Drug Interactions, Nutrition and Urbanisation, Nutrition and Aging, and Nutrition and Mental Development; in addition, Advanced Nutrition Training, Food gardening and Nutrition Improvement and Isotopes in Human Nutrition Research are also included. **Commission III** focuses on Nutrition and Food Production mainly from animal sources as well as Nutrition and Environmental Pollution.

The IUNS activities cover a wide-range from Food production to consumption focusing on Health Promotion and Prevention of Diseases.

3. Clinical Nutrition In the 21st Century

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All fields of human endeavour are changing at an unprecedented rate. The major opportunities and challenges for clinical nutrition are limitations on the traditional food supply; an increasingly novel food supply; globalisation of culinary traditions and belief systems; dominant

health problems which relate to ageing (degeneration and neoplasia); newer diagnostic and management technologies; clinical decision making enhanced by information science; and health care systems which are coming de-hospitalised and more network based.

For the practising profession of clinical nutritionists this means that It must be more pro-active, contemporary and responsive to change. It must network, manage and use information systems in more capable ways. It must acknowledge a range of pursuits from high dependency bed-based and ambulatory care in the tertiary sector, through to the longer term care of disabled individuals in the secondary healthcare setting, to preventive, episodic and maintenance care in the primary ambulatory setting; clinical nutrition teams which will broaden to involve medical, dietetic, nursing, physical educator and pharmacy graduates; blurring between foods and medicines, need for greater international standardisation of investigatory techniques, outcome evaluation with clinical indicators; and more vigorous continuing education.

Clinical nutrition can ensure its prosperity in this changing environment by stimulating information science; by efforts to improve the basic diagnostic methodologies related to energy and food component turnover and storage; by making nutritional therapy a competitive, quality-of-life and cost-effective mode of management; and by actively influencing decisions about the food supply from ecosystem to point of consumer purchase, preparation and ingestion.

4. Clinical nutrition, past, present & future - Role of the food industry in clinical nutrition

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During the 20th century, there have been tremendous strides in prolonging life and life expectancy. In 1900, average life expectancy was just under 50 years; a child born in an industrialised nation today has a life expectancy of about 75 years. Much of this prolongation of life can be attributed to better nutrition. However, maintaining a global food supply so as to prevent hunger and provide adequate nutrition represents a continuing challenge. Nations worldwide are also experiencing epidemiological transitions as rates of maternal and infant mortality decline and chronic noncommunicable diseases (NCDs) become leading causes of mortality and morbidity. The global increase in NCDs (cardiovascular disease, certain cancers, diabetes, osteoporosis) has been related to changes in lifestyle including diet and food habits. Dietary interventions for NCD risk reduction include lowering cholesterol, total and saturated fat, and sodium consumption and increasing fibre, fruits, vegetables, and complex carbohydrates. Many advances in food and nutrition have and will continue to be made by plant genetic engineering. Biotechnology to improve agronomic properties of crop plants results in improvements in nutrition, pest resistance, taste, and ripening qualities, which will aid both the farmer and the consumer. Thus, biotechnology is expected to play an increasingly important role in the development of new crop varieties. Perhaps the greatest change that has occurred over the past decade has been the desire of consumers for products that contain fewer calories, less fat and lower cholesterol. Advances in technology and new ingredients are a driving force for the development of these foods. National and international public policies regarding the relationship between diet and health and the development of nutritional guidelines for ensuring quality and safety represent future trends. Educating the consumer about sound dietary practices and encouraging the development of new food technologies will contribute toward better clinical nutrition in the 21st century.

5. The role of ILSI in nutrition

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ILSI is a non-profit foundation supported by industry, private foundations and government funding. The Institute has a membership of more than 300 companies and an international network of over 2,000 scientists. ILSI has 10 branches around the world: North America, Europe, Japan, Australia, Korea, Southeast Asia, Thailand, Argentina, Brazil, Mexico and a fiscal point in China. ILSI has two primary work products: research and education. The latter takes the form of workshops, symposia and published proceedings or monographs. There is a long history of nutrition research at ILSI especially concerning safety and health effects of food ingredients. Over the years, there has been a focus at ILSI regarding micronutrient deficiencies. ILSI has served as the secretariat of two international groups (IVACG and INACG) aiming to eradicate Vitamin A and iron deficiency anaemia. Additionally, through its committee structure ILSI has supported nutrition research or educational workshops and symposium in several other areas, including health effects of: sodium, iron, complex carbohydrates, sugars, and trans-fatty acids. A recently funded project concerns obesity prevention in children. This project has two components: 1) research on dietary and exercise requirements in children and adolescents and 2) community intervention to encourage children to eat better and exercise more. Further details of some of these efforts will be highlighted.

SECTION II. Diagnostic methodology in clinical nutrition

6. Measuring body composition in obesity

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The definition of obesity at the body composition level is multiple, depending on the body composition component being measured. The different models of body composition which currently exist must try to take into account differing genetic and acquired bases for obesity, to add function to structure. The different techniques now available to measure different aspects of body composition all have different accuracies, precisions, costs, side-effects and availability for normal weight to obese subjects. In particular, technical, operator and biological errors and assumptions associated with different techniques and models need to be clearly defined when making a choice between techniques. The methods for measuring fat mass differ in normal weight and obese subjects with respect to bias and limits of agreement. The quantity and quality of the non fat mass components of body composition is altered in obesity. In particular, water compartments change, body cell mass quality is altered, bone mineral mass is increased and the distribution of body nitrogen can be altered. Better definition by clinical nutritionists of these changes are necessary to convince our other clinical colleagues to take the clinical consequences of obesity more seriously.

7. Diagnostic approach to nutritionally related immune dysfunction

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Immuno-competence is known to be a functional index of nutritional status. Immuno-incompetence in protein-energy malnutrition (PEM) and micronutrient deficiencies can be reversed with nutritional repletion. With other nutritional indices, such as serum albumin and serum transferrin, immuno-competence (assessed by delayed type hypersensitivity) can be used to determine the prognostic nutritional index (PNI). PNI is useful for predicting morbidity and mortality of nonemergency surgical patients.

Different levels of nutritional disorders, such as eating disorders, malabsorption, metabolic disorders and body composition disorders, through PEM or deficiencies of specific nutrients, are potential contributors of immune dysfunction. On the other hand, there are several diseases or clinical syndromes with underlying immunologic mechanisms, such as food allergy, autoimmune and infectious diseases, which could precede various degrees of nutritional disorders.

Clearly, in conjunction with other nutritional indices, immunological tests should be taken into consideration as a holistic approach of clinical management of at risk individuals.

SECTION III. Epidemiology of diet-related chronic diseases in the Asia-Pacific region

8. Food and health in Australia (1975-95): a review

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The main objective of this paper is to review epidemiological studies with special reference to nutritionally-related diseases in Australia. In order for us to better appreciate the background as to why, how and what, Australian researchers and government agencies have accomplished in the field of nutritional epidemiology this paper will begin with a brief overview of the three axioms in epidemiologic studies in the context of Australia. They are: the Australian continent (the place), the changing composition of Australian populations (the people) and major events in Australia's history of food and nutrition (the time). The apparent relationship between food and health was once described by Brillat-Savarin in 1825 who stated "Tell me what you eat, and I shall tell you what you are". This paper will review food consumption patterns of Australians at large and of special groups. This is followed by an overview of disease patterns and mortality trends. Finally, we will examine studies of food and health in relation to chronic diseases in Australia and discuss public health implications for disease prevention and control.

9. Epidemiology of diet-related chronic diseases in China

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The traditional Chinese dietary pattern is characterised by high intakes of cereal and vegetables but low intakes of animal foods and the incidence of cardiovascular disease and malignancy has been relatively low. But in recent years, with the transition of dietary patterns, malignancy and cerebrovascular disease have become the first and second main causes of death. The incidence of acute coronary diseases is higher in urban populations, while acute cerebrovascular diseases are higher in rural ones, corresponding to higher dietary fat and lower animal protein, respectively. Hypertension and hyperlipidaemia have become two main risk factors of cardio-cerebro-vascular diseases. Although the serum lipids of the Chinese on average are lower than in western countries, their relations to dietary factors are still very significant. The dietary sodium showed positive correlation while dietary animal protein and calcium showed negative correlation to blood pressure. The hypertensives usually had lower serum linoleic acid and higher serum S/P ratio. After 3 years of intervention on stroke risk factors, including dietary control, the incidence declined markedly.

A case-control study of lung cancer showed that dietary carotene, vitamin C and fibre might reduce the risk. Similarly, eating fresh vegetables, fruits and bean products might reduce the risk of stomach cancer. β -carotene and vitamin C were proven to have a protective effect against the development of precancerous gastric lesions. The nutritional intervention trial in Linxian showed that supplementing micronutrients (β -carotene, selenium, vitamin E) for 5 years reduced the RR (relative risk) of oesophageal cancer incidence and death. Higher intakes of meat and

edible oil were risk factors of colorectal cancer, while higher intakes of vegetables were protective factors. These protective effects were not only related to amounts, but also to sources, for example, only vegetable fibre and animal calcium showed the protective effect on colorectal cancer. In summary, high total energy, high total fat, low animal protein, high salt, low calcium, low vegetables and low fruits in the diet may increase the risk of cardio-cerebro-vascular diseases and cancers. A rational dietary pattern is important in prevention of these diseases. There needs to be more research work in the field of nutritional epidemiology to further investigate the role of dietary factors in China.

10. Epidemiology of diet related chronic diseases in Indonesia

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Indonesia started its development after World War II when food shortages, famines, population pressures and poverty were rampant. In its developmental process, it also experienced rapid technological development and immense urbanisation.

Indonesia has succeeded in increasing its food production, controlling its population growth and improving the country's socioeconomic conditions. Invariably it has led to rising affluence, an aging population, change in life style and food cultural shifts, which is reflected in the nutritional status of the Indonesian population and especially the (nutrition related) disease pattern.

There is a tendency for an increasing prevalence of obesity, hypertension, lipid abnormalities, diabetes mellitus and coronary arterial disease.

11. Diseases in the Asia-Pacific Region: Japan

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Japanese dietary situation is characterised as follows: (1) Intake of total energy has been unchanged over 30 years at: 2,000-2,200 kcal. (2) Animal and vegetable components in protein and fats are almost equally balanced. Average intake of fish is a little more than meat. (3) A variety of vegetables such as root vegetables, green vegetables, mushrooms and seaweeds are taken daily. Dietary changes after the Second World War began in 1965. Accompanying Japan's economic growth, intake of meat, milk and dairy products, and fats and oil increased, while that of rice and salt decreased. In accordance with these situations, cerebrovascular disease declined and the mortality rates of ischaemic heart disease, diabetes mellitus, liver cirrhosis increased.

12. Epidemiology of diet-related chronic diseases in Thailand

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Although poor-rural Thais are still facing nutrient deficiency diseases affluent-urban Thais are encountering diet-related chronic diseases like the Western population. The common diet-related chronic diseases in Thailand are atherosclerotic vascular diseases, dyslipidaemia, hypertension, diabetes mellitus (DM), obesity, osteoporosis, and cancer. Based on data obtained from death certificates compiled by the Division of Health Statistics, Bureau of Health Policy, Plan Office of the Permanent Secretary, Ministry of Public Health during 1989-1993, there are increases

in Thai mortality rates due to disease of the heart, hypertension, cerebrovascular disease, and cancers. Non-insulin dependent diabetes mellitus is the most common type of DM found in Thai population. The mortality rate of DM in Thai population increased drastically from 1989 to 1993. Our studies in epidemiology of chronic diseases in affluent-urban Thais show higher prevalence of coronary heart disease (CHD), dyslipidaemia, and obesity in populations with higher age groups and with high total energy and fat intakes. The major type of dyslipidaemia in the affluent-urban Thais is hypercholesterolaemia due to elevated serum low density lipoprotein-cholesterol (LDL-cho). The prevalence of hypertension in men is higher than in women. Affluent urban Thais face the problems of overall and abdominal obesity. Those with abdominal obesity have significantly higher serum total cholesterol, LDL-cho, triglyceride, uric acid, fasting blood glucose, 2-hr postprandial blood glucose and blood pressure levels but lower serum high density lipoprotein-cholesterol levels than normal subjects. Thus they are at risk for the development of CHD.

13. Diet-related chronic disease in the Asia-Pacific region: Preventive and therapeutic strategies

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The dramatic changes in national health revealed in this session present a formidable challenge at a national level for health service and for individual consumers. Traditionally, policy-makers thought of prevention and the health service and consumers of treatment but this is a mistake at all three levels since prevention and therapy are often closely linked.

The neglect of preventive strategies by the health service is understandable because of the dramatic therapeutic benefit displayed by drug use but prevention needs to be built in.

Clinically, the Asian doctor is at an advantage when coping with the major chronic diseases of diabetes, obesity or coronary heart disease because proposed dietary strategies, developed for European or American patients, would ideally require the patient to assume many of the characteristics of a traditional Thai, Chinese or Japanese diet. This is achievable more readily in Asia than in Western patients. The latest WHO preventive recommendations take account of dietary variations across the globe and are relevant to individual therapy which should be linked to family based preventive strategies. The linking of therapy to prevention will be illustrated for coronary heart disease, hyperlipidaemia and hypertension with an emphasis on the value of dietary change in preference to drug therapy. Diet should also be used when drug therapy is necessary.

The preventive challenge extends to cancers as revealed by the regional epidemiological data, new mechanistic insights (in relation to phyto-oestrogens in relation to breast cancer) and new data on the physiological effect of diet (resistant starch, faecal bulking and the prevention of colonic disease).

The Asian challenge, therefore, is how best to persuade doctors to advocate the importance of maintaining many (but not all) of the traditional features of an Asian diet. This advocacy should be consistent at the national level, hospital level and individually, when communicating with patients.

SECTION IV. Obesity: from theory to therapy

14. Aetiology and health consequences of obesity

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Obesity has many causes, including hypothalamic injury, endocrine disorders, a high intake of dietary fat, sedentary lifestyle, medications and genetic disorders. Two syndromes of obesity following hypothalamic injury, one which results from hyperphagia and one from disordered

control of metabolism by the autonomic nervous system. Cushing's disease and the polycystic ovary syndrome are two endocrine causes of obesity. A high intake of dietary fat readily produces obesity in experimental animals, but the data in humans are less convincing. A sedentary lifestyle is an important factor in the obesity of the aging. Phenothiazines, tricyclic antidepressants, glucocorticoids, and some anticonvulsants can cause weight gain. Genetic factors operate through single genes or multiple genes. The discovery of leptin, the product of the ob-gene has opened a new vista for the study of genetics in obesity as have the genome mapping systems.

Obesity, central fat deposition and weight gain in adult life all enhance the risk of early mortality, cardiovascular disease, diabetes mellitus and some forms of cancer. Intentional weight loss will lower the risk of excess mortality from all of these causes.

15. Obesity: dietary and pharmacologic therapy

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Over the last 20 years the management of obesity has been dominated by the results of clinical trials which lasted only for weeks. Such short trials were conducted because doctors are used to rapid drug effects, such as with blood pressure, liver damage or glucose control. Such approaches to obesity therapy are useless because obesity reflects the impact of at least 100 000 excess kcalories in someone who is marginally obese (BMI >30) and 1.65m tall. Traditionally, dietitians advocated diets to induce losses of about 1000 kcal daily, not recognising that this traps the patient into a window of physiological response where extraordinary willpower is needed to overcome the intense desire to eat; animals and humans devise ways of increasing intake when they are food deprived. The energy load in adipose tissue seems to be a bottomless sink which, despite recent findings on the ob-gene, does not dampen food intake once accumulated.

Thus, clinically, there are three main options: (a) reduce carbohydrate intake <50 g/day to induce ketosis and anorexia; (b) manipulate the diet to produce an energy dilute diet which, by gastric bulking, counteracts adaptive responses to a deficit of only 500-600 kcalories; (c) drug therapy. Option (a), with a very low calorie diet (VLCD), is a short-term manoeuvre but now safe with suitable diets. It requires difficult relearning of a new eating pattern to prevent weight regain. Option (b) is currently being assessed. Drug therapy is improving but has to be combined with a dietary approach and essentially should be long term as for treating hypertension. New drugs will be discussed. The surgical option is gaining favour for severe obesity because of the remarkable Swedish finding of less mortality and morbidity after gastroplasty.

Each therapeutic strategy should be considered over at least two years. In medical or non by-pass surgical management, energy intake has to fall permanently by 300 kcal for a 10kg weight loss unless modest but permanent increases in physical activity, such as an extra two hours of walking per day, to induce the use of about 300kcal/d extra. These demand major behavioural changes.

16. Tracking of obesity in school children and influence of weight control program: 3 year follow-up

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Childhood obesity was shown to increase in prevalence in urban areas. The purpose of this study is to demonstrate the tracking of obesity in school children and investigate the influence of weight control programs on the obesity indices. Subjects were primary school children (grades 1-6) residing in Hat Yai municipality enrolled in 1991. Anthropometric data were collected on a yearly basis. Obese children were invited to participate in the weight control program. Results: From 2255 subjects recruited in 1991, follow-up could be completed in 1787 children (79%). Tracking of weight status using BMI percentiles based on NCHS reference was shown in the table.

Three-fourths of children in the upper 15 centiles (obese group) were still in the same centile while 24.5% had BMI in the normal range. There

were no significant differences of BMI and triceps skinfold thickness between the obese children who participated in the weight control program and those who did not. Our findings show that tracking of obesity in this age group is high and weight control program has no long term effect on the outcome of obesity.

1991\1995	<P ₁₅	P ₁₅ -<P ₂₅	P ₂₅ -P ₈₅	>P ₈₅ -P ₉₅	>P ₉₅
<P ₁₅	76	46	35	0	0
P ₁₅ -<P ₂₅	65	66	109	0	0
P ₂₅ -P ₈₅	24	92	888	77	5
>P ₈₅ -P ₉₅	0	0	66	92	23
>P ₉₅	0	0	8	36	78

This study was funded by Songklanagarind Hospital Foundation.

17. Assessment of energy requirements of adult urban and rural males in Malaysia using the factorial and doubly-labelled water (DLW) techniques

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The knowledge of total energy expenditure is important in order to estimate energy requirement for individuals or population groups. Seven normal (mean BMI 22.6) laboratory technicians (urban group) and 7 low-normal (mean BMI 18.6) rubber estate workers (rural group) participated in the study. The parameter measured include anthropometry, 3-day food intake and daily activity pattern, BMR and total daily energy expenditure (TDEE) using the factorial and DLW techniques. Mean energy intakes were higher in rural (8.4±1.3MJ/day) as compared to urban group (7.4±1.2MJ/day). Comparison between the predicted (FAO/WHO/UNU) equation and measured BMR (Deltatrac) revealed that the former overestimated the BMR of urban subjects by 5% and rural subjects by 10%. TDEE of urban subjects showed that the factorial method was about 11% lower than the DLW method while rural subjects recorded 2% higher than that obtained using DLW. The physical activity level (PAL) estimate for urban and rural groups were 1.59 and 1.69, respectively, reflecting a more sedentary lifestyle of the urban group. DLW has provided us with another set of data to validate previous reported local studies and lend support that energy requirements may be lower in the tropics. It is hoped that more DLW studies could be carried out in developing countries to enable us to keep abreast with the recent advances in stable isotope research in human nutrition.

SECTION V. Cancer

18. Cancer risk factors: dietary fibre and wheat bran

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Recent advances in physiological impact of dietary fibre include a better understanding of effects of particular fibre sources (wheat bran, oat bran, psyllium, etc.). Wheat bran has been used as the "gold standard" in faecal bulking (regularity) studies. Several other research efforts have evaluated the effects of wheat bran on risk reduction of colon and breast cancer. A review of 17 experiments regarding wheat bran and chemically induced carcinogenesis indicated thirteen of these studies demonstrated a protective effect of wheat bran against colon tumour development. These data led to the conclusion that wheat bran appears to inhibit colon tumour development more consistently than other fibres (LSRO 1978). Recently Shivapurkar et al. (1995) has reported that raw wheat bran, Kellogg's® All-Bran® and Kellogg's® Complete® Bran Flakes all dramatically decrease aberrant crypts (early precursor of colon tumours) in rats. Two recently published human studies have examined the effects of wheat bran on colon cancer biomarkers specifically recurrence of colorectal adenomas and bile acid excretion (MacLennan et al, 1995; Alberts et al, 1996). Early

animal model cancer studies indicate that high fibre diets including wheat bran can lower mammary tumour incidence and burden as compared to lower fibre diets. One way fibre may affect breast cancer risk is by lowering circulating oestrogen levels. Rose et al (1991) have shown that wheat bran preferentially lowers circulating oestrogen levels as compared to oat bran and corn bran. These and other data will be presented and discussed in greater detail.

19. Effect of dietary fibre type on gastrointestinal transit time

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Soluble dietary fibre (DF) has been shown to have better effect on glycaemic responses than insoluble DF. One of the possible mechanisms appears to slow gastric emptying and increase the intestinal transit time (TT). To investigate the differences between soluble and insoluble DF on TT, normal diet (10-20g DF), high soluble DF diets (normal diet with 10g of conjac) and high insoluble DF diet (40-50g DF) were given to volunteers. In order to determine TT, radio-opaque pellets were used as markers. Several X-ray plain abdominal films were taken at the prescribed time until the markers were evacuated substantially. Mean mouth to ileum transit time (M-ITT), colonic transit time (CTT) and total gastrointestinal transit time (TGITT) were selected as indices. The results were as follows:

1. for normal diets, M-ITT was 9.1 ± 0.4 h, CTT was 15.9 ± 1.0 h, TGITT was 25.5 ± 1.0 h.
2. for high soluble DF diets, M-ITT was 8.8 ± 1.2 h, CTT was 10.5 ± 3.2 h*, TGITT was 18.9 ± 3.0 h*.
3. for high insoluble DF diets, M-ITT was 7.2 ± 1.2 h*, CTT was 13.2 ± 2.1 h*, TGITT was 21.4 ± 2.2 h*.

(* $P < 0.01$, compared with normal diets). Our results suggested that soluble DF - conjac decrease TGITT as well as insoluble DF.

SECTION VI. Impact of nutritional support on nutritional status in hospitalised patients

20. Amino acids metabolism after hepatectomy

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Background: Recently, enteral nutrition (EN) has been reported to be useful in the condition after major surgery. In order to investigate the amino acids metabolism after hepatectomy treated in a combination of EN plus total parenteral nutrition (TPN), we compared free amino acids content in four different blood samples, which were femoral artery (FA), femoral vein (FV), hepatic vein (HV) and portal vein (PV).

Methods: The subjects included 8 patients who had undergone segmental hepatic resection or more. TPN and EN were started on the 1st and 3rd postoperative day (POD), respectively. All patients had catheters inserted in the hepatic vein and portal vein before or during operation to collect blood samples. Free amino acids in four kind of blood, retinol binding protein (RBP), transferrin (Tf), prealbumin (PA) and urinary excretion of 3 MeHis were measured before and on 1, 3, 5, 7 and 14POD. Nitrogen and potassium balances were also calculated.

Results: The levels of total amino acid (TAA) in all samples transiently increased on 1POD. BCAA gradually increased and peaked on 5POD. FA-PV and PV-HV differences of TAA gradually increased from 1POD to 5POD. FA-FV differences of TAA showed the minimum level on 5POD. Glutamine and Alanine peaked on 1POD. Nitrogen and potassium balances became positive on 12POD and 10POD, respectively. RBP and Tf were the lowest on 1POD and gradually increased. PA continued to

decrease during these period. Urinary excretion of 3-MeHis was the highest on 7POD and returned to preoperative value on 14POD.

Conclusion: These results suggest that catabolic phase was finished on 5POD and Glutamine and Alanine were rapidly mobilised from gut and muscle on 1POD.

21. A prospective randomised trial of postoperative nutritional management for thoracic oesophageal cancer: enteral nutrition (EN) versus TPN plus EN

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Introduction: In the past few years, the usefulness of early enteral nutritional feeding has been recognised in the condition of severe injury or the perioperative period compared with total parenteral nutrition (TPN). In order to develop the optimal postoperative nutritional management for thoracic oesophageal cancer patients, we performed clinical prospective randomised trial, which was EN alone versus TPN + EN.

Patients and methods: Fourteen patients, who underwent total oesophagectomy and reconstruction using gastric tube with right thoracotomy cervical manipulation, were preoperatively randomised to either TPN + EN (TPN group (n=7) or EN alone group (n=7). In both groups, EN was started on the 3rd postoperative day (POD) at an introductory dose of 5kcal/kg/day and gradually increased to full strength of over 30kcal/kg/day on 8POD through the jejunostomy (non-protein calorie). In EN alone group, the main nutrient was EN and intravenous infusion whose content was similar to extracellular fluid or 5% glucose was added peripherally. In TPN group, 20kcal/kg/day on 1POD and 30kcal/kg/day on 2POD were infused and total calorie of over 30kcal/kg/day was kept by TPN plus EN on following days. Nitrogen balances was calculated from 0 through 14POD. The nutritional parameters such as total protein (TP), albumin (alb), retinol binding protein (RBP), prealbumin (PA), transferrin (Tf) and urinary excretion of 3-Methylhistidine (3-MeHis) were measured on pre, 1, 3, 5, 7 and 14POD. Other parameters, BUN, CRNN, CRP, Lymphocyte, GOT, Bilirubin were also measured.

Results: The changes of nitrogen balance indicated amonophasic curve in EN alone group and a biphasic curve in EN + TPN group. TP, Alb, RBP, PA, Tf were the lowest on 3rd to 5th POD and 3-MeHis/CRNN was the highest on 3rd to 7th POD. All these parameters returned to the preoperative values on 14 POD and, no statistical difference between two groups was observed.

Conclusion: These results suggest that only enteral nutritional feeding as postoperative nutritional management for thoracic oesophageal cancer is simple and safe method.

22. Early postoperative enteral feeding against thoracic oesophageal cancer

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Introduction: Enteral nutrition (EN) recently has been considered to be a useful means of nutritional supplementation for critical ill patients. We have performed only enteral nutrition without total parenteral nutrition (TPN) as a nutritional support for thoracic oesophageal cancer surgery. In order to make clear the availability of this management, we studied the changes of nutritional parameters and the kinetics of amino acid.

Patients and Methods: The subjects included 8 operated thoracic oesophageal cancer patients. The nutrition was given by EN starting on 3rd postoperative day (POD) without TPN. Nitrogen and potassium balances, total protein (TP), albumin (Alb), rapid turnover proteins (RTP), and 3-Methylhistidine (3-MeHis) in urine were measured. Furthermore, blood samples were collected from femoral artery and vein to measure free amino acids content.

Result: Nitrogen and Potassium balances became positive on 9 and 6 POD, respectively. TP, Alb and RTP decreased from 1 POD to 5 POD and 3-MeHis peaked on 3 POD, however all these parameters returned to the preoperative value on 14 POD. The difference between artery and vein of total amino acid showed a negative level during 1 to 3 POD and became positive level from 5 POD. As to BCAA, glutamine and alanine, they showed negative levels from 1 to 7 POD and the greatest difference was observed on 5 POD.

Conclusion: These results suggest that postoperative nutritional management against thoracic oesophageal cancer can be performed by only EN without TPN.

23. Effect of oral nutritional therapy with a BCAA-riched nutrient (Hepan ED) on the patients with decompensated liver cirrhosis

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Aim: Development of malnutrition causes difficulty in management of decompensated liver cirrhosis patients with ascites and hepatic encephalopathy. Therefore, nutritional therapy has been considered very important for such patients. Thus, the aim of this study was to evaluate the effects of long term nutritional supplemental therapy with BCAA-riched nutrients on outpatients with decompensated liver cirrhosis.

Subjects and Methods: Subjects were 66 outpatients (33 female, 33 male, mean age 59.9 years) with decompensated liver cirrhosis who had a history of hospitalisation. In addition to regular low protein diet (40g protein/day) for management of hepatic encephalopathy, the patients were orally given a nutrient (Hepan ED®). The average doses were 120g: 465kcal and the administration period was 16.3 months. During the course of this study, the presence of ascites and signs of hepatic encephalopathy were regularly checked. Counts of red blood cells and total lymphocytes, blood levels of albumin, cholesterol, cholinesterase, ammonia, and Fisher's ratio were also measured. The Pugh score was calculated as an index of severity of hepatic condition.

Results: 1) Improvement of edema and ascites as well as improvement of hepatic encephalopathy, especially asterixis, were observed in most patients after administration of the nutrient preparation. 2) Nutritional indices relating to the hepatic capacity for protein synthesis including blood levels of total protein, albumin, cholinesterase, and cholesterol were improved. The patients with lower values of these indicates at pretherapy showed more improvement compared with the patients with higher values. 3) A tendency for decreased ammonia blood levels was observed. 4) Hepatic anaemia was improved. 5) During the administration of the nutrient preparation, the Pugh score was significantly decreased.

Conclusion: Nutritional therapy with long-term oral administration of the nutrient preparation for hepatic failure (Hepan ED®) is considered to be useful in improvement of malnutrition associated with decompensated liver cirrhosis and in prevention of hepatic encephalopathy. We concluded that this therapy will improve patient's quality of life.

24. The effects of total parenteral nutrition on protein-energy status in surgical patients

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The purpose of this study is to evaluate the effects of total parenteral nutrition (TPN) in 7 surgical patients with carcinoma of the gastrointestinal (GI) tract. Their means \pm SEM of nonprotein energy and nitrogen intake during receiving TPN are shown in the Table.

The preoperative TPN regimens (D-7 to D-1) were adequate to maintain their protein-energy status evidenced by no significant differences in their body mass index (BMI), serum albumin, transferrin and retinol-binding protein (RBP) levels between D0 and D-7 as well as positive nitrogen balance during D-7 to D-1. The inadequate protein-

energy supply in the presence of stress response to surgery (D0) affecting the protein-energy status was evidenced by the significant decreases in their serum total protein, albumin and RBP levels at D+1 as well as negative nitrogen balance at D0 and D+1. The importance of adequate protein-energy supply in postoperative patients was supported by no further decreases in their BMI, significant increases in serum RBP level at D+7, and less negative nitrogen balance during D+2 to D+7. In conclusion, our study has shown the beneficial effects of TPN in surgical patients undergoing surgery for improving their protein-energy status.

Parameter	D-7 to D-1	D0	D+1	D+2 to D+7
Nonprotein energy (kcal/kg/day)	41.80 \pm 1.91	19.93 \pm 1.55	30.40 \pm 3.68	42.85 \pm 2.13
Nitrogen intake (g/kg/day)	0.23 \pm 0.02	0.03 \pm 0.01	0.15 \pm 0.03	0.23 \pm 0.02

25. Effect of enteral glutamine on intestinal permeability and bacterial translocation after abdominal radiation injury in rats

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We investigated the effect of enteral glutamine on intestinal permeability and bacterial translocation after whole abdominal radiation in rats. Rats irradiated 10Gy to the abdomen were divided into a glutamine-free diet group and glutamine-rich diet group. After 3 days of feeding of each diet, the 6 hour urinary recoveries of the orally administered polyethylene glycol (PEG) 4000 and phenolsulfonphthalein (PSP) were measured in both groups of rats. The endotoxin concentration in the plasma was also measured. A gavage containing 10^7 of *Escherichia (E) coli* labelled by 14 C-glucose was given via a stomach tube in two other groups of rats, and the distribution of bacterial translocations into the mesenteric lymph nodes, liver, spleen, lung and blood was also evaluated.

The 6 hr urinary recovery of PEG 4000 was significantly decreased in the glutamine-fed group compared to the glutamine-free diet group. The 6 hr urinary recovery of PSP was also decreased in the glutamine-fed group. And the endotoxin concentration was significantly lower in the glutamine-fed group compared to the glutamine-free diet group. The detection ratio of the 14 C-labelled *E coli* in the mesenteric lymph nodes was significantly lower in the rats fed glutamine-rich diet.

These findings suggest that enteral glutamine maintains intestinal barrier and reduces bacterial translocation in rats with intestinal injury induced by irradiation.

26. The microbiological safety of tube feeding formulas given to patients with carcinoma of the larynx

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Bacterial contamination in the tube feeding formula may lead to various infectious complications especially in compromised host. The purpose of this study was to evaluate 2 types of enteral formulas, Isocal RTU (a commercial one) and Ramathibodi blenderised formula (RBF: a dietetic-prepared formula) on their bacterial contamination in 60 patients with carcinoma of the larynx. The first 20 patients on Isocal RTU were fed by continuously closed system, the second 20 patients on Isocal RTU by continuously semi-closed system, whereas the remaining 20 patients on RBF were fed by opened intermittent system. Bacterial contamination was determined by pour plate method with dilution before and after each feeding period. Isocal RTU in Tetrapak was sterile. After it was hung for 12hrs in the closed or semi-closed system, it was bacterially contaminated. RBF was bacterially contaminated prior to administration and all were contaminated at the end of 1 to 1½hr feeding. The feeding set was also bacterial 0 contaminated. The most common bacterial contamination was *Acinetobacter calcoaceticus*. Our findings warrant proper care for tube feeding formulas given to hospitalised patients.

32. Effect of Ramathibodi blenderised formula on lipid metabolism in patients with carcinoma of the larynx

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The purpose of this study is to evaluate the effect of Ramathibodi blenderised formula (RBF) on lipid metabolism in 20 patients with carcinoma of the larynx. All of them received RBF via nasogastric tube from the second postoperative day onwards for 5-9 days with a mean daily energy intake of 1902 kcal derived from 12.67%, 37.43% and 49.90% of total calories as protein, fat and carbohydrate, respectively. Their mean daily 18:2n-6, 18:3n-3, 20:4n-6, 22:5n-3 and 22:6n-3 intake were 7.41, 0.72, 0.27, 0.018 and 0.045% of total calories and their mean cholesterol intake was 2918mg. Before the operation, the patients had biochemical linoleate depletion evidenced by lower serum 18:2n-6 but higher 16:1n-7 and 18:1n-9 levels than normal subjects. Two days after receiving fat-free partial parenteral nutrition they exhibited significant decrease in serum 18:2n-6 level. After receiving RBF, their serum 18:2n-6 level was still lower than normal whereas their serum 20:4n-6, 20:5n-3 and 22:6n-3 levels increased significantly with normal serum 18:3n-3 level. Before the operation, their serum total cholesterol and LDL-Chol (low-density lipoprotein cholesterol) levels were in the borderline-high risk levels, HDL-Chol (high-density lipoprotein cholesterol) level was on the borderline to low level and serum triglyceride level was within the desirable level. After receiving RBF, their serum triglyceride rose to the high risk level which was most likely due to their high sucrose intake of 37% of total calories. The study indicates the need for improvement of RBF in order to achieve adequate linoleate status and normal serum lipid levels.

33. Nutritional status in patient with laryngeal carcinoma receiving blenderised diet via nasogastric feeding tube

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The purpose of this study was to assess the nutritional status and lipid status in patients with laryngeal carcinoma receiving blenderised diet via nasogastric feeding tube. Nineteen subjects, (18 male, 1 female) participated in this study. The study was divided into 3 periods: pre-surgery (PSP), before receiving the blenderised diet (BRP), and the 7 day period of receiving the blenderised diet (PRP). The results of this study are summarised as follows: In PSP and BRP the subjects received inadequate energy for nutritional requirements. After the subjects received the blenderised diet, the protein and energy intake increased subsequently from 0.65 ± 0.57 to 1.65 ± 0.67 g/kg, and 1114.81 ± 712.01 to 1989.47 ± 867.24 kcal/d, on day 1 and day 7, respectively. Their cholesterol intake increased from 1053.98 ± 926.03 on day 1 to 2716.29 ± 1139.17 mg/d on day 7. The subjects had protein-calorie malnutrition before they had surgery. In the BRP group, blood cholesterol, LDL-Chol, HDL-Chol, triglyceride, protein, albumin, haemoglobin, and haematocrit levels were decreased significantly compared to the PSP. When the subjects received the blenderised diet for 7 days, their body weight, % weight for height, BMI, blood cholesterol, LDL-Chol, HDL-Chol, triglyceride, haemoglobin, and haematocrit levels were decreased significantly compared to the PSP, and also their blood cholesterol, LDL-Chol, haemoglobin, and haematocrit levels were decreased significantly compared to the BRP. Whereas HDL-Chol and protein levels were significantly increased. There was a tendency for the albumin level to be increased although this was not significant. The N-balance of these subjects in BRP was negative and in PRP was positive. There was no significant difference in the skinfold thicknesses (triceps, biceps, subscapular, and suprailiac) and blood glucose level in BRP and PRP. The blood urea-nitrogen and urinary creatinine were not significantly different in the three periods.

34. Total body nitrogen as a prognostic marker in maintenance dialysis

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In order to assess long term nutritional adequacy, 154 patients on maintenance dialysis (78 on haemodialysis (HD), 76 on continuous ambulatory peritoneal dialysis (PD)), underwent measurement of total body nitrogen (TBN) with concurrent recording of dietary history, anthropometrics and serum albumin. Seventy-one patients were assessed 23.3 (2.2) months later. In cross-sectional analyses, anthropometric measurements and dietary intake remained stable over time for all patients. However, a significant fall in TBN occurred in the HD population with increasing time on dialysis ($P < 0.05$). In the prospective analyses, PD ($N = 26$) had a significant increase in TBN ($P < 0.02$). In contrast, longitudinal measurements of TBN in HD patients ($N = 36$) tended to fall but did not reach significance ($P = 0.18$). TBN correlated with total caloric intake estimated from the dietary history ($P < 0.05$) but not with estimated protein intake.

During follow-up, 38 patients died. These patients were older ($P < 0.05$), and in the PD population had been on dialysis a longer time ($P < 0.05$). Those who died had a lower TBN expressed both as g/kg lean body mass ($P < 0.005$) and as nitrogen index ($P < 0.05$). The probability of death within 12 months in the patients with a NI less than 80% of the predicted normal value was 48%. The relative risk of death in this population was 4.1. A lower serum albumin was associated with increased mortality in PD patients ($P < 0.05$), but this relationship was not observed in the HD group. Anthropometric measurements and dietary history were similar in those who died compared with survivors.

We conclude that PD favours TBN and that anabolism is possible. No such effect was observed in the HD patients. In both populations, TBN is inversely associated with increased mortality, which is not predictable from anthropometric measurements or serum albumin.

35. Safety and efficacy of Nandrolone Decanoate for treatment of wasting in patients with HIV infection

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To study the safety and efficacy of the anabolic steroid, Nandrolone Decanoate, in male patients with HIV wasting, we conducted an open clinical trial. Twenty-subjects were enrolled who had middle to late stage HIV disease, who had lost between 5% and 15% of their usual body weight, and whose weight did not increase after intensive nutritional management. Subjects had detailed laboratory and body composition assessments including anthropometry, bioelectrical impedance and total body nitrogen assessment.

The treatment regimen was Nandrolone Decanoate 100mg second weekly for sixteen weeks. There were statistically significant improvements in weight (mean = 0.14kg/week, $P < 0.05$) and lean body mass (mean increase of 3.0kg by anthropometry, $P < 0.05$). Quality of life parameters, especially functionality, significantly improved during the trial. No subjects experienced toxicity in any clinical, biochemical, haematological or immunological measurements. These findings indicate that Nandrolone Decanoate has beneficial effects in selected patients who have mild to moderate HIV wasting.

36. A cross-sectional study on the nutritional status of haemodialysis patients attending a Malaysian clinic

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Undernutrition has been reported to contribute to the morbidity and mortality of dialysis patients. There is a paucity of information in Malaysia, regarding this aspect. This cross-sectional study reports on the nutritional status of 60 patients undergoing haemodialysis at a Kuala Lumpur clinic. Nutritional intake, anthropometric measurements and biochemical parameters formed the criteria for assessment. Measurements included were triceps skinfold thickness (TST), mid arm muscle circumference (MAMC), serum albumin and transferrin, total iron binding capacity (TIBC) and blood lipid levels. Dietary intake information using the 24-hour recall method was collected for 3 days representative of a weekend, dialysis and non-dialysis days. The rate of infection amongst the study group was recorded. Dietary intake and anthropometric data were then correlated with biochemical parameters and incidence of infection. This study is in progress and results will be reported at the 5th Clinical Nutrition Symposium in Bangkok.

37. Is measurement of total body nitrogen (TBN) a useful predictor of chemotherapy (C/T) toxicity in breast cancer?

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Controversy exists as to reliance on body surface area in determining C/T dose, particularly with obese patients. Measurement of TBN has been suggested as a more accurate predictor of clinical course and prognosis in serious illness. We tested the hypothesis that a depletion of TBN may also be associated with increased toxicity in patients receiving standard CMF (Cyclophosphamide, Methotrexate, 5-Fluorouracil) C/T for breast cancer. Absolute neutrophil count nadir (ANCN) was used as a measure of toxicity. 26 patients with breast adenocarcinoma had serial measurements of TBN, whilst receiving intravenous CMF. Their calculated Nitrogen Index (NI) was then compared with ANCN. Patient characteristics: median age: 48.5 (range: 26-78). C/T indication: adjuvant-18 (lymph node +ve 10, -ve 8), metastatic-6, neoadjuvant-1, local recurrence-1. The protocol was completed by 13 patients and continues for 3, while 10 patients had fewer than 5 measurements due to death, refusal or inconvenience. The confounding clinical events included 2 deaths due to progressive disease, 3 major infections in 2 patients and in 1 case G-CSF was started by the clinician.

There was no significant change in TBN, NI or % body fat during treatment. Following C/T: when NI<0.9, 9 of 15 (40%) courses led to neutropenia (ANCN<1.0), and for NI>0.9, 20 of 78 (26%) courses led to ANCN<1.0 (Fisher Exact Test: p<0.001). The 2 deaths, but none of the infections, occurred in patients with NI<0.89. We conclude that low NI is indicative of neutropenia.

38. Measurement of total body nitrogen levels in patients receiving adjuvant chemotherapy for breast cancer

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Malignant disease produces a reduction in total body nitrogen (TBN) levels. It has been proposed that chemotherapy itself inhibits protein

synthesis, and may therefore reduce TBN. We tested this hypothesis by measuring TBN levels, using In Vivo Neutron Capture Analysis, in 18 patients receiving adjuvant intravenous CMF (Cyclophosphamide, Methotrexate, 5-Fluorouracil) for adenocarcinoma of the breast.

Measurements were taken on the day of the CMF courses 2 to 6 in order to assess progressive changes in TBN, nitrogen index (NI), body weight and percentage body fat. Friedman two way ANOVA was used to statistically test changes. Patient characteristics: All female, median age 45.5 (range: 26-78). Surgical management had been mastectomy and axillary clearance in 13, and lumpectomy, axillary clearance + radiotherapy in 15. Nodal status was +ve in 10, and -ve in 8. The protocol was completed by 11 patients, and continues for 2, while 5 patients had fewer than 5 measurements, due to inconvenience or refusal. There were 2 confounding clinical events, an episode of radiation pneumonitis, and one of cellulitis arising from a tissue expander.

We conclude that in women without macroscopic residual breast carcinoma, adjuvant CMF chemotherapy does not significantly reduce total body nitrogen, an important measure of overall nutritional status. Further, we propose that the significant increase in body weight, in the setting of stable protein and fat measures, is due to an increase in body water, and we are currently testing this hypothesis.

39. Energy metabolism in patients with liver diseases

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The aim of this study is to evaluate energy metabolism in patients with liver diseases. Energy metabolism was analysed by indirect calorimetry in 11 patients with fulminant hepatitis (FH), 11 patients with severe type of acute hepatitis (AHS), 10 patients with acute hepatitis (AH), 14 patients with chronic hepatitis (CH), 3 patients with subacute hepatitis (SAH), 41 patients with liver cirrhosis (LC) and 18 patients as healthy controls (HC). We measured resting energy expenditure (REE), non protein respiratory quotient (npRQ) and oxidation rates for major substrates after an overnight fast. Predict basal energy expenditures (BEE) were calculated according to Harris-Benedict formula. REE/BEE was increased in FH, AHS, AH, SAH and LC as compared with HC (1.28±0.20, 1.14±0.13, 1.12±0.04, 1.15±0.16, 1.06±0.09 vs. 0.98±0.09; mean±SD; P<0.01). npRQ was decreased in AHS, AH and LC as compared with HC (0.80±0.10, 0.81±0.08, 0.83±0.06 vs. 0.90±0.05; P<0.01). Oxidation rate for glucose (%) was lower in AHS, AH, SAH and LC as compared with HC (26.9±18.5, 32.2±24.8, 40.4±26.1, 39.5±18.0 vs. 57.8±13.0; P<0.01, P<0.01, P<0.05, P<0.01). Oxidation rate for fat (%) was higher in AH, SAH and LC as compared with HC (57.2±25.2, 44.9±18.1, 48.6±18.3 vs. 26.7±15.4; P<0.01). Oxidation rate for protein (%) was lower in AHS, AH, SAH and LC as compared with HC (28.2±23.0, 10.6±5.3, 27.3±7.6, 11.9±5.0 vs. 15.5±5.3; P<0.05, P<0.01, P<0.01). In summary, it is likely that REE is increased and fat seemed to be utilised more preferably than glucose and protein in patients with liver diseases.

Section VII. Diagnosis and management of dyslipidaemia

40. Impact of insulin resistance on dyslipidaemia

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Insulin deficiency due to resistance inhibits LPL activity. Thus, there is both increased production and decreased clearance. The picture is obscured because hypertriglyceridaemia may cause insulin resistance. The hyperinsulinaemia seen in diabetes may also not be due to insulin but to proinsulins and insulin fragments

Insulin resistance is one of the mechanisms of pathogenesis of non-insulin dependent diabetes. This is associated with hyperinsulinaemia, hyperuricaemia and hypertension. The lipid abnormalities seen in NIDDM are hypertriglyceridaemia with increased very low density lipoprotein, remnant particles and reduced high density lipoproteins. Diabetes is also associated with increased total cholesterol and low density lipoprotein cholesterol. Insulin resistance in NIDDM results in both relative deficiency of insulin action and hyperinsulinaemia. Insulin promotes triglyceride and cholesterol synthesis and inhibits lipolysis in adipose tissues, partly by stimulating lipoprotein lipase.

41. Dietary intervention in dyslipidaemia

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Appropriate dietary intake plays an important role in regulating serum lipoprotein levels. High intakes of total energy, saturated fatty acids (SFAs), and dietary cholesterol can raise serum total cholesterol (TC) and low density lipoprotein-cholesterol (LDL-C) levels. Four principles have been recommended to lower serum TC and LDL-C levels for the general population and high risk individuals, ie, to control obesity by decreasing energy intake and increasing physical activity, to reduce total fat intake to $\leq 30\%$ of total calories with equal distribution of SFAs, monounsaturated fatty acids, and polyunsaturated fatty acids, to reduce daily cholesterol intake to $<300\text{mg}$, and to have protein and carbohydrate intakes of 10-20 and 50-60% of total calories, respectively. Our studies have shown that total fat and linoleate (18:2n-6) intakes of 30 and 10% of total calories can lower serum TC and LDL-C levels but this effect depends on the amount of cholesterol intake. The prevailing evidence suggests that the decrease in serum LDL-C level induced by 18:2n-6 is a result of modified secretion of cholesteryl ester and increased LDL receptor function. Consumption of fish oil rich in eicosapentaenoic (20:5n-3) and docosahexaenoic (22:6n-3) acids has been almost uniformly shown to lower serum triglyceride (TG) levels both in normal subjects and hypertriglyceridaemic patients with dose-dependent response. The plausible TG-lowering effects of fish oil include reducing TG synthesis and chylomicron secretion from intestinal cells, limiting VLDL secretion by suppressing hepatic fatty acid synthesis and TG production, and reducing apoprotein B synthesis and lipoprotein release. Moderate consumption of sugars and restricted intake of alcohol should be implemented in hypertriglyceridaemic patients.

42. Dietary management of hyperlipidaemia - a survey in Malaysian hospitals

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Coronary Heart Disease (CHD) is recognised as an important public health problem in Malaysia. Hyperlipidaemia is one of the main risk factors related to CHD. The mainstay of treatment is diet therapy which should be maintained even if drug treatment is indicated. In the absence of any national guidelines in Malaysia for dietary management of hyperlipidaemia, diet therapy has remained individualistic. Since dietitians are the primary providers of dietary treatment to hyperlipidaemic patients, this retrospective study attempts to report the dietary approaches and methodologies adopted by Malaysian dietitians in managing their patients. A postal questionnaire covering various aspects of dietary management of hyperlipidaemia were sent to all dietitians practising in private and government hospitals. Of interest to this study were dietary assessment techniques, dietary recommendations, dietary compliance, together with objective measures such as changes in body weight and blood parameters. The study is in progress and results will be presented at the 5th Clinical Symposium in Bangkok.

43. Pharmacological intervention and LDL-apheresis of familial hypercholesterolaemia

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Familial hypercholesterolaemia (FH) is a disease characterised by severe hypercholesterolaemia and premature coronary heart disease (CHD). One hundred patients of our 1,400 FH heterozygotes died; 68 patients (68%) died of CHD. Since the lower the plasma cholesterol level, the more likely it is that CHD can be prevented or retarded, aggressive cholesterol-lowering therapies may be indicated for FH patients with CHD. This study describes the long-term safety and efficacy of intensive cholesterol lowering therapies with drugs as well as LDL-apheresis for the management of heterozygous FH patients. One hundred and eighty-four (137 male, 47 female) heterozygous FH patients with CHD documented by coronary angiography had been treated by cholesterol-lowering drug therapy alone or in combination with coronary artery bypass grafting (CABG) surgery, percutaneous transluminal coronary angioplasty (PTCA) or low density lipoprotein (LDL)-apheresis. Serum lipid levels and outcomes in each treatment group were compared after 6.5 years. LDL-apheresis significantly reduced serum cholesterol and LDL-cholesterol levels as compared to the groups receiving other therapies. Four patients (10%) of 39 patients treated by CABG, one (3%) of 35 patients treated by LDL-apheresis, one (4%) of 25 patients treated by PTCA, 6 (10%) of 59 patients treated by drugs, and 7 (27%) of 26 patients receiving no cholesterol-lowering therapy died of CHD. The patients treated by LDL-apheresis ($p<0.01$) and drugs ($p<0.05$) had a better prognosis than those receiving no cholesterol-lowering therapy. Thus, for the treatment of CHD in FH heterozygotes, intensive LDL-cholesterol-lowering therapies are effective, and LDL-apheresis may become the therapy of choice.

44. Protein-energy status in athletic swimmers

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Protein-energy status was assessed in 13 athletic swimmers, consisting of 10 boys and 3 girls with the age ranging from 10 to 16 yrs, by anthropometric parameters and serum transport protein levels. Their height-for-age and weight-for-age were compared with those of international reference population derived from US National Center for Health Statistics.

All of them had height-for-age within median $\pm 2\text{SD}$ whereas 11 had weight-for-age within median $\pm 2\text{SD}$ and only 1 had weight-for-age above median $\pm 2\text{SD}$. These findings indicate that only 1 subject was obese. His height was 1.62m and body weight was 73.8kg constituting of 24.8kg body fat mass. The means $\pm\text{SEM}$ of their serum albumin, transferrin, and retinol-binding-protein levels were 45.14 $\pm 0.35\text{g/L}$, 3.02 $\pm 0.09\text{g/L}$, and 44.91 $\pm 1.55\text{mg/L}$, respectively. All of the individual values were also within the acceptable levels. The results indicate that these athletic swimmers had adequate visceral protein status.

45. Carnitine status in athletic swimmers

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Plasma and urinary carnitine levels were determined in 13 athletic swimmers consisting of 10 males and 3 females with the mean ($\pm\text{SEM}$) age of 13.2 ± 0.5 yrs. Means $\pm\text{SEM}$ of free, acyl, and total carnitine levels in plasma and urine are shown below. Plasma total carnitine consisted of 47.2% of free carnitine and 52.8% of acyl carnitine whereas the corresponding figures for urinary carnitine were 42.1% and 57.9%. There were no significant relationships between the corresponding forms of carnitine in plasma and urine. Based on urinary total carnitine excretions

of < 150, 150-500, and > 500 $\mu\text{mol/day}$ to indicate carnitine deficiency, adequate carnitine status, and increased catabolism, respectively, 8 swimmers (61.5%) had adequate carnitine status whereas 5 swimmers (38.5%) were in catabolic state. We also observed significant positive correlations between urinary acyl carnitine and fat-free mass ($r = 0.5639$, $p < 0.05$); urinary acyl carnitine and urinary creatinine excretion ($r = 0.6769$, $p < 0.0001$), as well as between urinary total carnitine and urinary creatinine excretion ($r = 0.4970$, $p < 0.01$). These findings are consistent with the fact that most of body carnitine resides in skeletal muscle.

Sample	Carnitine		
	Free	Acyl	Total
Plasma ($\mu\text{mol/L}$)	51.54 \pm 1.75	57.77 \pm 3.13	109.31 \pm 3.81
Urine ($\mu\text{mol/d}$)	174.53 \pm 23.21	240.22 \pm 18.77	414.74 \pm 39.85

46. Effects of dietary changes on serum lipoprotein levels in us peace corps volunteers working in Thailand

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Effects of dietary changes on serum lipoprotein levels were investigated in 20 US Peace Corps Volunteers (PCV) consisting of 4 men and 16 women with the age ranging from 21-35 years. Dietary, anthropometric, and biochemical assessments were performed within 3 days after their arrival (wk0) and during working in Thailand at wks 12 and 36. Though their mean serum total cholesterol (TC), low density lipoprotein-cholesterol (LDL-C), high density lipoprotein-cholesterol (HDL-C), and triglyceride (TG) levels were within the desirable levels their mean serum TC and LDL-C levels at wks 12 and 36 were significantly higher than those at wk 0 ($p < 0.05$). These changes could be due to (a) the increase in lipolysis of adipose tissue which may raise the supply of free fatty acids to the liver; this event may lead to the increased hepatic cholesterol content which down regulates the activity of hepatic LDL-receptors with the final development of increased serum LDL-C levels; this mechanism is supported by the decreases in their daily intakes of total energy, total fat, saturated fatty acids, and cholesterol at wks 12 and 36 with concomitant decrease in their body fat, and/or (b) significant decreases in their dietary fibre intakes at wks 12 and 36 which may increase cholesterol absorption evidenced by significantly negative correlations between dietary fibre intakes and serum TC levels ($r = -0.4651$, $p = 0.004$) as well as between dietary fibre intakes and serum LDL-C levels ($r = -0.3616$, $p = 0.028$).

Lipoprotein	Wk 0 mmol/L	Wk 12 mmol/L	Wk 36 mmol/L
TC	4.050.17	4.720.15*	4.640.1
LDL-C	2.280.18	2.870.14*	2.850.12*
HDL-C	1.330.07	1.250.06	1.230.07
TG	1.310.10	1.110.06	1.220.12

47. Serum lipids status of rats as affected by fed different fatty acid composition oils

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The serum lipids of rats fed different fatty acid composition oils were investigated. 40 adult female SD rats were randomly divided into four groups, all rats were exposed on a high lipidic diet and each rat of group A and B were given 1.0 and 0.5ml/d test oil, respectively, which consisted of various plant oils. Group C was given refined rape seed oil, and group D was a control. The experimental duration was 40 days. The results showed that the levels of serum total cholesterol (TC) and triglyceride (TG) in the rats of group A, B and C were lower than that of the control ($P < 0.05$). No significant difference of the high density lipoprotein cholesterol (HDL-C) in the serum was observed among each group. The ratio of TC to HDL-C in group A, B, and C were significantly lower than the control ($P < 0.05$ or

$P < 0.01$). The difference of the serum lipid levels among the test groups was not significant.

It could be concluded that the various plant oils including rape seed oil have significant effects on reducing serum TC and TG, but these oils did not affect the HDL-C level in the test rats.

48. Potential benefits of tempeh for lowering cholesterol: implications for future studies

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Tempeh is a non-salted fermented soybean food which was originally developed in Indonesia, where hypercholesterolaemia is now considered to be one of the health problems, especially among adult urban residents. Previous studies on the benefits of tempeh have focused on the nutrients, its contribution to infant formula, and on anti-bacterial components in diarrhoeal therapy. There is growing interest in the benefit of soybean products in coronary heart diseases prevention. This paper reviews potential benefits of tempeh in lowering cholesterol.

Studies on the health benefits of non-fermented soy products (NFS) suggest that NFS have a hypocholesterolaemic effect (HE) in humans. However, no studies assessed the HE of tempeh in humans. Limited animal studies have confirmed that tempeh has a HE in rats. Cholesterol lowering components, such as unsaturated fatty acids, soy protein and antioxidants (β -carotene + isoflavones), in NFS are also present in tempeh. Fermentation increases availability of oleic acid, and the bioavailability of protein and zinc in tempeh. The content of isoflavones, particularly genistein and daidzein, in tempeh is higher than in NFS (193 and 137 $\mu\text{g/g}$ in tempeh vs 52 and 46 $\mu\text{g/g}$ in soymilk); and 6,7,4-trihydroxy isoflavone (factor-2) have only been identified in tempeh. These data suggest that tempeh may also have a HE in humans, and this may be greater than for NFS.

If the HE of tempeh is confirmed in humans, further studies are required to investigate the mechanisms by the suspected components, the application of tempeh and tempeh products as a practical dietary approach, and appropriate promotion strategies for these products as part of healthy diet. Finally, studies would be needed to develop medical products from tempeh, as alternatives for those who would not accept tempeh. Such studies could make an important contribution to health status in Indonesia, where tempeh is consumed by over 45% of the population, as well as in developed countries, where tempeh and tempeh products are becoming more popular.

49. The effect of tempeh (soybean cake) and tempeh formula on lipid profile of hyperlipidaemic patients

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In this study 75 men age 40-65 years with total cholesterol (T-chol) > 220 mg/dL and triglyceride > 175 mg/dL were divided in three groups. The first group were treated for two weeks with Standard Diet (DS), the second group were given Standard Diet plus 150 gram tempeh (soybean cake) (DS+T) and the third group were given Standard Diet plus 67.50 tempeh-A5 (DS+T-A5) tempeh formula of tempeh, which contained tempeh powder, lecithin, fibre, aspartame and mixed vegetable oil.

Result: DS: T-chol decreased 4.36% (ns); triglyceride 7.59% (s); LDL-chol 4.43X (ns); HDL-chol increased 5.51% (ns); Ratio T-chol / HDL-chol decreased 7.18% (ns).

DS+T: T-chol decreased 8.38% (s); triglyceride = 9.19% (ns); LDL-chol decreased 8.29% (s); HDL-chol increased 8.47% (ns). Ratio T-chol/ HDL-chol decreased 13.38% (s).

DS+T-A5: T-chol decreased 18.59% (s); triglyceride 13.76% (ns); LDL-chol 16.76% (s); HDL-chol increased = 24.19% (s); decreased in Ratio T-chol/HDL-chol = 35.48% (s) $p < 0.05$.

Conclusion: Tempe and Tempe-A5 possess hypolipidaemic effect significantly by lowering T-chol and LDL-chol. Tempe-A5 also increased HDL-chol and has stronger hypolipidaemic effect than tempeh.

50. Variability of fat load response by aging and genetic factors

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Postprandial hyperlipidaemia is reported to be associated with an increased risk of atherosclerosis. There is considerable individual variability in the postprandial lipid response to a meal. To evaluate the factors which may account for the difference we studied the effects of aging and DNA polymorphism on postprandial lipid response to a fat load. Twenty-six young and seventeen older healthy female subjects were given a fat load consistent of 30g/m² body surface of milk fat. Blood was drawn at time 0 and every hour during a 6 hour period. We examined the relation between the gene polymorphism and postprandial levels of serum triglyceride. Fasting serum triglyceride levels were higher in older women, but there was no difference in postprandial responses of serum triglyceride between the two age groups.

We detected some difference of postprandial response in DNA polymorphism. Such as D/I polymorphism of signal peptide of apo B, apo E variant (E2, E3, E4) and D/I polymorphism of ACE gene. Elevations of serum triglyceride after fat load were observed in ID type of apo B gene, E2 variant of apo E gene and DD type of ACE gene.

In conclusion, analysis of DNA polymorphism is useful for the evaluation of genetic factors of postprandial response.

51. Lipoproteins and lipid peroxidation abnormalities in patients with chronic renal disease

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Increasing experimental and clinical evidence suggests that lipoproteins and lipid peroxidation can be important modulators in progressive kidney disease. A group of 54 patients with varying degree of kidney impairment was studied to find the abnormalities in lipoproteins and lipid peroxidation. Lipoproteins and lipid peroxidation products, malonaldehyde (MDA) were measured in the plasma of 54 chronic renal disease patients (CGN 33, nephrosclerosis 11, 7 CTIN, 1 PCKD, unknown 2) and compared with values obtained from 32 healthy controls. The patients were divided into 5 groups according to serum creatinine levels. All groups had significantly elevated plasma MDA VS controls ($p<0.0001$). Serum lipoproteins also correlate with plasma MDA ($r=0.52$). Results: Mean \pm SD; * $p<0.05$, ** $p<0.0001$ vs normal.

Patients with chronic renal disease showed lipoprotein abnormalities and accelerated lipid peroxidation. The evidence was more marked in patients with normal to mild renal insufficiency which suggested the role of oxidative stress early in the course of nephron injury.

	Normal	Group 1	Group 2	Group 3	Group 4	Group 5
Scr (mg/dL)	0-1.5	<2	2-4	>4-8	>8-12	>12
Pe chol (mg/dL)	208 \pm 32	273 \pm 127*	358 \pm 137**	242 \pm 90	234 \pm 65	218 \pm 52
LDL-cho	132 \pm 36.2	181 \pm 110*	273 \pm 162**	153 \pm 92	154 \pm 55	141 \pm 35
VLDL-cho	18 \pm 8.6	39 \pm 15.7**	75.9 \pm 52**	37 \pm 20.7*	30 \pm 10.9*	37.9 \pm 15*
HDL-cho	52.6 \pm 9.2	47.7 \pm 28	40 \pm 16.8*	39 \pm 9*	39 \pm 9.5*	27 \pm 10.6**
Pl trig (mg/dL)	95.3 \pm 42	199 \pm 78.8**	423 \pm 766**	214 \pm 124**	149 \pm 56*	181 \pm 63.4**
PI MDA (μ mol/L)	7 \pm 3.1	120 \pm 45.7**	165 \pm 95.8**	75 \pm 76.6**	72 \pm 37**	74 \pm 43**

52. Influence of overall obesity and abdominal obesity on health risk in obese women

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The influence of overall obesity based on body mass index (BMI) of ≥ 25.0 kg/m² and abdominal obesity based on waist-over-hip circumference ratio (WHR) of >0.8 on blood pressure (BP), serum lipoproteins, plasma fibrinogen, and blood glucose levels were evaluated in 22 obese women. Throughout the 16-wk study, they were instructed to decrease their energy intake with dietary energy distribution of 20% protein, 30% fat, and 50% carbohydrate calories. The subjects took 4g of sweet basil seed extract (SBSE) daily during wks 4-16. BMI, WHR, BP, serum lipoproteins, plasma fibrinogen, and blood glucose were measured at 4-wk intervals in all of them during the study. Prior to the SBSE treatment, all of the women had BMI of >25.0 kg/m² and WHR of >0.8 . Out of 22 obese women, 11 (50%) showed a decrease in their body weight >2 times during wks 8-16 from that at wk4. Linear regression analysis revealed that their BMI had significantly positive correlations with their systolic BP ($r=0.4043$, $p<0.00001$), diastolic BP ($r=0.4163$, $p<0.00001$), serum M-particle levels ($r=0.2772$, $p=0.0034$) and plasma fibrinogen levels ($r=0.2664$, $p=0.0055$), whereas their WHR showed significant positive correlations with their systolic BP ($r=0.5583$, $p<0.00001$), diastolic BP ($r=0.4476$, $p<0.00001$), serum total cholesterol ($r=0.3480$, $p=0.0002$), triglyceride ($r=0.4318$, $p<0.00001$), apo-B ($r=0.3153$, $p=0.0008$), M-particle ($r=0.4142$, $p<0.00001$), S-particle ($r=0.2476$, $p=0.0094$), plasma fibrinogen ($r=0.3736$, $p=0.0001$), and blood glucose ($r=0.3387$, $p<0.0058$) levels. The results imply that abdominal obesity coexisting with overall obesity aggravates adverse effects on BP, serum lipoprotein, plasma fibrinogen and blood glucose levels.

53. Plasma lipoprotein levels in athletic swimmers

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Plasma lipid levels were determined in 13 athletic swimmers consisting of 10 males and 3 females with the mean (\pm SEM) age of 13.2 \pm 5 yrs. Their means (\pm SEM) of serum total cholesterol (TC), low density lipoprotein-cholesterol (LDL-C), high density lipoprotein-cholesterol (HDL-C), and triglyceride (TG) levels were 5.61 \pm 0.17, 3.51 \pm 0.15, 1.71 \pm 0.07, and 0.85 \pm 0.06 mmol/L, respectively. Plasma lipoprotein analysis was performed by sequential ultracentrifugation technique followed by enzymatic determination of lipid in each lipoprotein fraction. The cholesterol contents in VLDL, LDL, and HDL were 0.82 \pm 0.07 (18.5%), 3.10 \pm 0.14 (57.0%), and 1.39 \pm 0.05 (24.5%) mmol/L, respectively, whereas the TG contents in these 3 lipoproteins were 0.28 \pm 0.03 (40.3%), 0.22 \pm 0.02 (30.7%), and 0.20 \pm 0.03 (29.0%) mmol/L. None of the swimmers had serum HDL-C levels <0.90 mmol/L, 10 (76.9%) had serum HDL-C levels of ≥ 1.55 mmol/L, and all of them had serum TG levels of <2.26 mmol/L. These findings are consistent with their high physical activity. However, 8 swimmers (61.5%) had serum LDL-C levels of 3.36-4.12 mmol/L and 5 (39.5%) had serum LDL-C levels <3.36 mmol/L. There were no significant differences in their energy distribution or cholesterol intake in these 2 groups. It should be noted that the mean (\pm SEM) energy distribution and cholesterol intakes in these 13 swimmers were 15.9% protein, 49.1% fat, 35.0% carbohydrate, and 668mg/d, respectively.

SECTION VIII. Application of stable isotope tracers in human nutrition

54. Stable isotope probes of body protein dynamics in vivo

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Classical nitrogen balance approaches to quantifying body protein status provide important and often crucial information on overall net gain or loss of body protein stores. Nonetheless, balance data alone are insufficient for assessing the mechanism(s) leading to the measured changes in nitrogen balance since many permutations of the relationships between body protein synthesis and body protein breakdown can produce the same net change in nitrogen balance. Thus, in order to provide a full picture of the pathophysiological events, it is necessary to quantify the dynamics of body protein synthesis and breakdown in vivo. Since these events occur intracellularly, that is within body compartments inaccessible to sampling by conventional means, it is necessary to trace the processes taking place within these compartments with probes that enter the cell, participate in the protein kinetic events of interest, and return to the accessible plasma compartment where the results of their journey are recorded by appropriately timed sampling algorithms. Stable isotopically, labelled amino acid tracers are absolutely safe probes of this kind and this lecture will focus on the expanded information one can gain during in vivo studies of protein metabolism using such tracers. Specifically, examples of both simple and comprehensive modeling approaches to body protein kinetics will be presented. The assumptions, advantages, and limitations of each level of approach will be discussed.

55. Use of stable isotopes to study mineral absorption in children

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In classical balance studies, the net absorption of a nutrient is calculated by measuring the difference between mineral input from the diet and total faecal mineral output. This methodology does not provide accurate information on absorption, as cumbersome faecal collections are subject to many errors, and the results are a combination of unabsorbed minerals and minerals secreted into the gut lumen. Stable, nonradioactive isotopes offer a safe alternative approach with accurate results. Ca and Zn studies utilise the dual-tracer technique: one isotope is administered intravenously and another one orally, followed by a urine collection. The relative fraction of the oral versus the intravenous tracer dose represents the fraction of the oral tracer dose that was absorbed. In Fe studies, the incorporation into red blood cells of an orally administered isotope of Fe is measured 2 weeks after ingestion. The methodology has been used to study Ca absorption in preterm and term infants and, patients with juvenile rheumatoid arthritis, as well as Ca and Fe absorption from weaning foods. Examples of our own and other investigators work will be presented.

SECTION IX. Age-related nutritional problems

56. Adolescent nutrition

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Adolescents are commonly thought to be a generally healthy population. In fact, a number of specific nutritional problems exist during this crucial period of human life. The World Health Organization

considers ages 10-19 years as adolescence; the term 'young people' refers in general to the age range 10-24 years. Early adolescence is defined as 10-14 years, middle adolescence as 14-17 years, and late adolescence as 17-20 years. It has been shown that of all age groups, adolescents had the highest prevalence of 'unsatisfactory' nutritional status. Adolescents tended to consume less than the RDA of calcium, iron, vitamin A & C. Food habits of adolescents are characterised by (1) a tendency to skip meals (especially breakfast & lunch); (2) snacking; (3) inappropriate consumption of fast foods; (4) dieting. Some adolescents are dissatisfied with their body image, search for self-identify, desire for peer acceptance, and adopting the adolescent lifestyle. In Australia, adolescent boys start drinking alcohol on average at 12.4 years (Thailand; 13.5 years) whereas girls started a little later (Thailand; 13.7 years). About 45% of Australian adolescents aged 14-15 years stated that they currently consumed alcohol; only 8% of Thai adolescents reported this. Approximately 20% of adolescents in Australia and from Thai well-to-do families are overweight or obese. Only 5% of Thai adolescents from low socioeconomic families are overweight or obese. In developed countries such as Australia, the prevalence of blood total cholesterol levels above 4.5mmol/L (170mg/dL) in adolescents aged 14-15 years are 23% for boys (Thailand: 21%) and 40% for girls (Thailand: 50%). In Thailand, adolescents aged 13-16 years from high socioeconomic families were taller (boys 7cm; girls 5cm) and heavier (boys 7kg; girls 5kg) than adolescents from low socioeconomic families.

57. Current issues in the elderly

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In this report two issues will be discussed. In the first place a short report is given about a large European nutritional health study in elderly called SENECA (Survey in Europe on Nutrition and the Elderly, a Concerted Action). In the second place we will discuss future research needs and opportunities with regard to nutrition and health in the elderly.

SENECA: The aim of this study was to explore nutritional health and performance of older adults age 70-75 years at baseline and changes over a period of 5 years. Both overnutrition and undernutrition was found in higher percentages than in adults. The nutrient supply and biochemical indices report low vitamin B6, B12 and D status. Socio-economic aspects were found to play an important role in providing an adequate nutrient supply. Some changes over a period of 5 years will be discussed.

Future research: Future research in elderly should not be limited towards interest in when and how people die, but also in the quality of their survival. It will be a great challenge to study in depth the role of food and nutrition contributing to the quality of this survival. We thereby have to be aware that elderly should not be studied as a homogeneous group and therefore different subgroups should be identified.

58. Dietary trace elements and nutritional status of the elderly people in Padang area, west Sumatra, Indonesia

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The aim of this study was to clarify the dietary food habits and nutritional status of elderly people (>60 years old), residents in Padang city and suburbs. The 24-hr food recall was used. Artificial food models were used for estimating the portion size. Most respondents (86%) were below 2000kcal in daily energy intake, and this low energy intake was reflected in their low body mass index (BMI). For daily intake of total protein, 87% of respondents were below 60g/day. The requirement of dietary protein is 60-80g/day, so protein intake of elderly people in Padang was very low. The main energy source was carbohydrate. Daily fat intake was also rather low, 33% of the respondents consumed more than 50g/day, and 47% below 30g/day. In case of carbohydrate, 87% of the respondents were more than 200g/day. Furthermore, daily intake of iron and calcium was very low: Sixty percent and 27% of the respondents were

below 200mg Ca/day and below 5mg Fe/day, respectively. In order to improve dietary habits and nutritional status, people in Padang need more dietary protein and trace elements such as calcium and iron.

59. Nutritional status of rural Malay elderly in Kelantan, Malaysia

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A study was carried out in rural Kelantan villages to assess the nutritional situation and health status of active, free living Malay elderly population (age 60-85 years old). A total of 135 respondents (N=135) participated in the study. Dietary intake, body mass index, disease prevalence (clinical examination) and haemoglobin levels were recorded. The results were as follows: 60.2% suffered from chronic energy deficiency, 50.4% were anaemic and 42.2% had chronic diseases. Dietary findings show that 97.0% had insufficient total energy intake, 91.9% low in protein intake, 91.8% low in vitamin intake and 94.9% had low iron intake. It can be concluded that the prevalence of chronic undernutrition or subclinical malnutrition among elderly people in Kelantan is significantly high. Thus in general their nutrition and health status is not satisfactory.

60. Breastfeeding initiatives after delivery

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A total of 100 mothers (N=100) were observed and interviewed after delivery in the Hospital Universiti Sains Malaysia wards to assess the initiation of breastfeeding. All respondents were interviewed between 2 and 29 hours after delivery, where more than half (54%) were interviewed in less than 12 hours after delivery. Of the mothers, 33% were primipara. The time taken from delivery till the first act of breastfeeding ranges from 1 to 7 hours for 92% of the mothers. 61% of the mothers breastfed their previous babies, where 80% said they did for more than 1 year. The frequency of feeding since delivery and the time of the interview show that more than 95% breastfed 1-5 times. The duration of feeding was between 5-20 minutes in 92% of the mothers. About 20% of the breastfeeding mothers discarded their colostrum during their first feeding; among the reasons given were that the colostrum is dirty and it is a form of traditional practice. The study also sought opinions of mothers on the benefits of breastfeeding and infant formula. The decision to breastfeed was based on the information the mothers received from various sources and encouragement from several parties.

61. Infant feeding practices in Kelantan, Malaysia

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A total of 65 mothers (N=65) were interviewed using a prepared questionnaire on the feeding practice of their children whose age 24 months and below. The respondents were selected by employing a systematic sampling method on those mothers who attended the Child Health Clinics in Hospital Universiti Sains Malaysia, Kota Bharu and Tumpat. Most of the interviews were conducted in the home of respondents. The results indicated that 41.5% of the respondents exclusively breastfed their children ranging from 2 to 12 months duration, while 55.4% practised mixed feeding, and 3.1% bottle fed their baby exclusively. Reasons for stopping of breastfeeding were also recorded. The age of weaning for babies varies from 2 to 8 months. The introduction of the adult diet was started between the age of 7 and 24

months. Most of the mother (86.2%) were aware of the complications that can arise due to improper weaning practices, where diarrhoea and vomiting were commonly cited. Among the foods believed to increase breast milk production during the lactation period are powdered milk, protein food, fruits and vegetables and drinks. A significant number of respondents believed in the concept of "cold" food (41.5%), "hot" food (20%) and "windy" food (46.2%)

SECTION X. Perspective of nutrients, non-nutrients, and health

62. Vitamin A: from gene expression to clinical studies

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In the last decade methods of molecular biology have facilitated exploration of molecular mechanisms involved in action of retinol (vitamin A) and its derivatives, retinoids, with an unprecedented interest. A wealth of evidence points to the cell nucleus as a target for their action in influencing expression of quite a few genes. In addition, the family of natural retinoids originally composed from retinol, retinal, all-trans- and 13-cis-retinoic acid was enlarged by discoveries of other metabolites of retinol including 14-hydroxy-retro-retinol, 9-cis-, 9,13-dicis-, 4-hydroxy-, 4-oxo-, 18-hydroxy- and 3,4-didehydroretinoic acid. Major efforts have been directed toward elucidation of how retinoids (in most instances retinoic acid appears to be the most potent retinoid) are involved in the time dependent activation and repression of specific gene products linked to their role in cellular differentiation, organogenesis, perinatal development, organ maturation and even morphogenesis. Interaction of retinoic acid with the genome involves two families of nuclear retinoic acid receptors (RAR and RXR). These proteins act as homo- or heterodimers with respective response elements on DNA.

Parallel to this research, retinoids were successfully used in the therapy of skin hyperkeratoses, measles and bronchopulmonary dysplasia of prematurely born human neonates. Safety aspects of administration of retinoids have been defined. Most dramatic beneficial effects were seen when high doses of all-trans-retinoic acid were introduced as treatment of promyelocytic leukemia, which is characterised by chromosomal translocation of one position of a nuclear retinoic acid receptor [supported in part by USPHS grant HL 14214].

63. Carnitine-choline interactions: a perspective on human health

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Nutrient-nutrient interactions, without a deficiency of one, are poorly characterised for most conditionally essential nutrients such as choline and carnitine. We have discovered an interaction between these two nutrients that has the potential to profoundly affect human nutritional requirements for both nutrients. We have demonstrated a conservation (65%) of carnitine as a result of moderate increase (20mg/kg/day) in dietary choline in otherwise choline sufficient humans. This effect of choline was consistently present regardless of ethnicity and food habits of free-living individuals. We have established an animal model (guinea pig) which responds to choline-induced carnitine conservation akin to humans and allows further understanding of the interaction at organ and cellular level which is too invasive to be practical in humans. Choline supplemented diet increased concentrations of carnitine in all organs especially in skeletal muscle where it is proposed to increase fat utilisation for energy. Choline-mediated altered tissue partitioning of carnitine has significant implications for nutrient requirement in normal healthy individuals.

64. Zinc and copper status in thalassemic children

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Plasma zinc, erythrocyte zinc, urinary zinc, plasma copper, and erythrocyte superoxide dismutase (SOD) were measured in 10 healthy children and 47 thalassemic children consisting of 11 children with HbH disease, 26 children with β -thalassemia /HbE disease, and 10 children with β -thalassemia major. Their age ranged from 4 to 15 yrs. All of the results shown below are presented as means \pm SD. The significantly lower plasma and erythrocyte zinc levels but significantly higher urinary zinc level in thalassemic children than those in healthy children indicate their inadequate zinc status caused by hyperzincuria which is most likely due to the release of zinc from haemolysed red blood cells (RBC) evidenced by the significantly negative correlation between their urinary and erythrocyte zinc levels ($r=-0.70$, $p<0.001$). The significant increases in plasma copper level and plasma Cu:Zn ratio are consistent with zinc deficiency whereas their significantly high erythrocyte SOD activity is at least in part due to increased plasma copper level supported by the significantly positive correlation between plasma copper level and erythrocyte SOD activity ($r=0.46$, $p<0.001$). Our findings of significantly positive correlations between plasma zinc levels and height-for-age ($r=0.26$, $p<0.05$), mid upper arm circumference ($r=0.41$, $p<0.005$), and upper arm muscle circumference ($r=0.41$, $p<0.005$) also indicate that zinc deficiency is another factor affecting growth of thalassemic children.

Children	Plasma Zn	RBC Zn	Urine Zn	Plasma Cu	Plasma Cu:Zn	RBC SOD
	mg/dL	mg/g/Hb	mg/d	mg/dL		mg/g/Hb
Healthy	118 \pm 12	91 \pm 9	322 \pm 59	104 \pm 16	0.89 \pm 0.14	3577 \pm 329
Thalassemia	102 \pm 16 ^b	71 \pm 14 ^a	611 \pm 170 ^a	126 \pm 32 ^a	1.25 \pm 0.42 ^a	5750 \pm 1350 ^a

Significant difference from healthy children: ^a $p<0.001$, ^b $p<0.005$

SECTION XI. Functional foods and health: Time for scientific evidence

65. Functional foods and health

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Functional foods may be traditional or novel, but positioned in the food supply to subserve particular physiological or pathophysiological purposes beyond those ordinarily expected of a biologically varied food intake, and of energy intake matching the energy needs of an apparently healthy, physically active individual. The stimuli to their development includes new understandings of food-health relationships, newer (and rediscovery of old) food technologies, pressures (including ecological) on traditional food supplies, the quest for health and disease prevention by consumers, and changing demography, especially that of an ageing population. Perhaps the most active areas of functional food development are in the fields of athletic performance, antioxidants and disease prevention; use of vitamin and mineral fortification of foods for disease prevention; for multifunction phytochemical compounds from food; and foods with pre- and probiotics. Thus, preventive and therapeutic opportunities are emerging for specific food component manipulations. Slower in appreciation and development are the valuable aggregate and interactive effects of food components where "the sum is greater than the parts", as evidenced in the Mediterranean diet and mortality study published by Trichopoulos et al in 1995.

66. Chicken extract stimulates haemoglobin restoration in iron deficiency

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Chicken essence is widely used as a traditional remedy for several ailments including anaemia. To test this claim for objective evidence, a series of experiments was carried out in anaemic rats by supplementing iron deficient diets with either liquid or lyophilised essence, which contains mainly protein and peptides (83mg/ml) and free amino acids (3.1mg/ml), very little iron (1mg/ml), and no fat. Haemoglobin returned to normal significantly more rapidly in rats supplemented with ad libitum liquid Brand's Essence of Chicken (BEC) over a period of up to 27 days compared with controls fed only water in addition to the ad libitum iron deficient diet. Haemoglobin was also significantly increased after 1 week in animals fed ad libitum diets supplemented with lyophilised chicken essence than with controls fed the unsupplemented diet. The effect was greater with supplementation at the level of 0.2% than at 1% lyophilised essences. The results indicate that the effects were mediated by increased appetite and by enhanced availability of food iron. These studies provide objective evidence for the traditional belief that chicken essence remedies anaemia.

67. Effects of chicken extract (I): the recovery from mental fatigue

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Folk wisdom suggests that chicken extract is useful for recovery from physical and mental fatigue. To explore this question, the physiological effect of Brand's Essence of Chicken (BEC), a popular chicken extract used as a traditional remedy, was assessed during recovery from mental stress. We quantitated the blood levels of stress-related substances, and examined the task performance and subjects' mood states during mental workloads. Subjects were 20 healthy male students who had never tasted BEC. They took two bottles of BEC or a placebo (70ml/bottle) daily in the morning for 7 days. On the final experimental day, two mental workload tests were performed: (1) a mental arithmetic test (MAT; 1600 trials of two or three figure-addition or subtraction for 40 minutes) (2) a short-term memory test (SMT; 20 trials of memorising 9 digit numbers). Blood was collected before and after each workload task. After the mental workload, the recovery of mean cortisol level of subjects who consumed BEC was significantly faster than that of the placebo group. The task performance of subjects performing the MAT and SMT was also improved with BEC consumption compared with placebo. According to the profile of mood state questionnaire, subjects felt more active but less fatigued during the workload when they took BEC regularly. We conclude that chicken extract has the potential to metabolise stress-related substances in blood and to promote recovery from mental fatigue.

68. Effect of L-anserine existing in chicken extract on the suppressed haematopoiesis in cancer radiotherapy and chemotherapy

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Purpose: L-Anserine (ANS) is a natural histidine-containing dipeptide abundantly occurring in animal organisation, especially in chicken meat, as well as L-Carnosine (CAR). These dipeptides have recently been studied and known as water-soluble antioxidants in muscle and brain. There are some work in relation to the protective effects of CAR against irradiation and chemotherapy, however such effects of ANS have not been investigated. The purpose of this study is to examine the effect of ANS on the haematopoietic functions in mice treated with X-ray irradiation and anti-cancer agent, Cyclophosphamide (CY).

Method: [Exp-1] 6 Gy X-ray was irradiated once to C57/BL6 mice on day 0, followed by transplantation of bone marrow progenitor cells derived from normal mice. On day 8 after administration of ANS (100mg/kg/day, s.c.) in the treatment group and of 0.9% NaCl solution (10ug/g/day, s.c.) in the control group, the colonies formed in spleen was counted as CFU-s of the transplanted haematopoietic stem cells.

[Exp-2] CY (300mg/kg, i.v.) was administered to ICR mice on day 0. ANS or 0.9% NaCl solution was administered for 9 days as in Exp-1. The changes of peripheral blood cell numbers, colony stimulating activity (CSA) in serum, IL-3 productivity in spleen, bone marrow cell proliferation rate (BMPR) after CY treatment were compared.

Results & Discussion: [Exp-1] X-ray irradiation and the subsequent transplantation effectively caused colony formation in spleen. ANS stimulated the CFU-s significantly ($p < 0.05$) compared with the control group. [Exp-2] CSA in serum, IL-3 productivity in spleen, and BMPR were significantly suppressed 24h after CY treatment and peripheral leukocyte and erythrocyte numbers were decreased. However ANS treatment markedly enhanced these reduced haematopoietic functions and promoted the recovery from the decreased numbers of blood cells. These results indicate that ANS has a potential to protect against the suppressed haematopoiesis in cancer radiotherapy and chemotherapy.

69. Effect of chicken extract on the disorder of metabolic functions in mice caused by restraint-stress

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Restraint-stress caused remarkable changes of metabolic functions such as glucose tolerance, serum ketone bodies, serum insulin, serum GOT, and also organ weights. The half-life period of administered glucose in blood was significantly prolonged and serum ketone bodies were elevated after loading of the stress. These results suggested that glucose metabolism was definitely disordered by the stress and glucose was poorly utilised as an energy source. Significantly elevated levels of serum GOT and reduced level of serum insulin indicated that liver and pancreas suffered from the acute damage by the stress. The half-life of administered glucose in blood which should have been prolonged by the stress was markedly shortened by administration of chicken extract. The improved glucose metabolism was well explained by the grounds that serum insulin level was significantly elevated and glycogen synthesis in liver was remarkably activated by chicken extract. There was a trend that serum GOT and ketone body level which should have been elevated by the stress were halted at lower level by chicken extract. This study demonstrates that chicken extract improves the disorder of metabolic functions possibly by the protective effect on the organ damages caused by restraint-stress.

70. Clinical and biochemical studies of black meat chicken

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The objective of this study is to investigate the clinical and nutritional significance of black meat chicken (BMC) kadaknath (KN) over routine table chicken (RTC) white leghorn. BMC (KN) possesses a distinctive taste and has special medicinal value in haemopoietic and nervous disorders in addition to its claim as aphrodisiac. BMC (KN) is similar to BMC in Guingdong in China are in great demand. The AOAC (1975) methods and of NIN (1971) India, were followed. In this study, linoleic acid, in BMC observed as 24% as against 21% of RTC, claiming its nutritional superiority clinically. The EFA of dietary fats participate in vascular homeostasis through the synthesis of prostaglandins. BMC protein content 91.94% on DM basis is of interest comprising of EAA. It is enigmatic that the concentration of cholesterol 184.75mg/100g in BMC meat was significantly lower ($P < 0.01$) than that of RTC meat 218.12mg/100g, in spite of significantly ($P < 0.01$) higher blood cholesterol 352.37mg/dL in BMC than RTC 253.12 mg/dL. The rate of synthesis of cholesterol in the liver is inversely related to the supply of dietary cholesterol which may be regarded as homeostasis mechanism. Blood cholesterol has its role as predisposing agent in human cardio-vascular disorder. Thus it is of immense interest to choose foods which are richer in adequate proteins, low in cholesterol and their fat possesses higher degree of unsaturation in terms of linoleic acid, which possibly postpone the hazards of atherosclerosis.

71. The health effects of tea polyphenols in China

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Tea polyphenols (TP) isolated from green tea has been produced industrially and its health effects have been demonstrated:

(1) Antioxidative-TP is able to scavenge $O_2^{\cdot-}$, $\cdot OH$, 1O_2 and protect bio-macromolecules against free radicals and to inhibit membrane lipid damage induced by gas-phase cigarette smoke and maintain membrane fluidity, to guard conformation of protein evoked by Cr^{6+} , and to protect DNA damage induced by γ irradiation. They are also able to protect myocardium or brain from reperfusion damage by inhibiting lipid peroxidation, increasing SOD activities and accelerating repair of mitochondria.

(2) Anticarcinogenic-TP can inhibit growth of human cervical and lung cancer cell line in vitro, inhibit tumour growth and increase cellular immune function in mice bearing Ehrlich ascitic carcinoma or Sarcoma 180. They can also block synthesis of nitroso compounds in vitro and decrease NPRO excretion in men. TP is effective in inhibiting mutagenesis induced by MMC, and EGCG reduces TPA- induced skin mouse oncogene expression. When TP are given to patients, serum immunoglobulins are increased, and WBC also increased during the first course of chemotherapy.

(3) Antiaging-TP can increase SOD and GSH- Px activities in mice and decrease LPO and LF amount. The span and L50 Of houseflies fed on TP are prolonged. In hyperlipidaemic rats fed on TP, serum TC and TG decreased while HDL-C increased. The TC - lowering effect is also observed in patients. TP also improve RBC deformability, decrease plasma fibrinogen and reduce in vitro thrombosis formation.

(4) Bacteriostatic - TP have a wide antimicrobial spectrum, dose-effect relation, good selection and no drug tolerance. TP can inhibit activities of human rotavirus and cloned HIV-1 RT in vitro. TP can lower extracellular glucan synthesis and decrease caries-inducing ability of bacteria.

72. Functional foods and health: time for scientific evidence - red wine

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Many epidemiological studies suggest that red wine consumption results in low incidence of coronary heart disease. Red wine contains high concentrations of polyphenolic substances and these have been implicated as the source of the increased serum antioxidant capacity of red wine drinkers. Considerable evidence suggests that oxidatively modified low density lipoproteins (LDL) have an important role in the development of atherosclerosis. We established the assay method for detecting susceptibility of LDL oxidation by measuring conjugated diens formed with 2,2-azobis (4-methoxy- 2,4 dimethylvaleronitrile: V-70).

Changes of susceptibility of LDL oxidation by drinking red wine were measured in healthy males. After 14 days drinking of red wine showed to prolong the lag phase of LDL oxidation in vitro. The functional substances in red wine may be oligomer of polyphenols.

73. Health benefits of the mushroom *Ganoderma lucidum*

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The fruit body of *Ganoderma lucidum* (Leys. ex. Fr.) Karst has a history of more than 2000 years and has also been regarded as a panacea for all types of diseases. This is due to the demonstrated efficacy as a remedy to treat hepatopathy, chronic hepatitis, leucopenia, diabetes, anorexia and cancer. As the yield of wild *Ganoderma* is very low, today, it is being produced on a large scale for pharmacological and clinical studies by artificial cultivation and submerged fermentation.

The fruit body of *G. lucidum* contains sterols, fungal lysozyme, acid protease, soluble proteins, amino acids, polypeptides, saccharides, lactones, alkaloids and polysaccharide.

Research and Development Institute, Government Pharmaceutical Organization, has conducted extensive research on various aspects of *G. lucidum* since 1989 in order to explore further and possibly exploit the claimed therapeutic effects of this mushroom. The research activities involve the extraction of Ganoderic acid B, one of the chemicals found in the fruit body and known to have hypocholesterolaemic activity. The effective components in *G. lucidum* are extracted and standardised. Parallel to this, pharmaceutical technologists develop precise methods for quality analysis and suitable modes of administering which best conform to the demand for stability, tolerance and simplicity of dosage. Mycelia cultures grown in pilot-scale fermentations were also investigated.

The results of the pharmacological and toxicological tests provide us with important indications about the effects, dosage and therapeutic scope of our products. It is then a matter of testing results on patients in a broad spectrum of trials.

74. Garlic in health promotion and disease prevention

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Scientific evidence strongly supports the beneficial effects of garlic in the following three areas: cardiovascular protection, anticancer, and antifungal, in addition to some lesser important benefits. On the cardiovascular front, garlic preparations, particularly aged garlic extract (AGE), have been shown to suppress cholesterol and fatty acid synthesis in the liver (and probably in other tissues) and eicosanoid synthesis in the platelet, to inhibit platelet aggregation and adhesion, to attenuate smooth muscle activation, to retard intimal cellular proliferation, and to enhance fibrinolysis. Platelet adhesion initiates a chain of events that eventually lead to atherosclerotic development and/or thrombosis. Excessive liver cholesterol and triglyceride synthesis leads to increased serum cholesterol and triglyceride levels, which in turn enhance lipid deposition in the atherosclerotic plaques and expedite atherosclerotic development.

Enhanced platelet's aggregative activity is associated with the consumption of certain modern diets and can directly increase the risk of an occlusion. Cellular proliferation is a key factor in the development and growth of the atherosclerotic mass. Smooth muscle activation is an important pathological mechanism of ischaemia, and myocardial infarction. Enhanced fibrinolytic activity can reduce the severity of an occlusion. Thus, these properties of garlic can provide synergistic and substantial protection against occlusive cardiovascular diseases; even though most of the protective attributes of garlic are minor or subtle, except the anti-platelet attributes.

On the cancer front, garlic can inhibit the formation of nitrosamines in the stomach, enhance liver detoxification of chemical carcinogens, protect the DNA against carcinogen-DNA adducts formation. Through these mechanisms garlic exerts its anticancer effect. Aged garlic extract has also been shown to have a moderate suppressive effect on the proliferation of cultured neoplastic cells. Thus, it might have a value as an adjuvant in the treatment of certain type of cancer, if the active principles can be delivered to the cancer mass to reach the effective concentrations. These anticancer attributes are consistent with the epidemiological observations that populations with high garlic consumption have lower cancer mortality rate than their low garlic consumption counterparts.

Laboratory studies and clinical applications have also demonstrated that garlic has a moderate, albeit short lived, antifungal effect. However, clinical application of garlic to fungal infection is presently limited to topical and/or contact applications. Application of garlic to systemic fungal infections is, in general, less effective, mainly due to the rapid inactivation/excretion of the active principles.

75. Anti-HIV activity of acid polysaccharides from Rooibos tea in vitro

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Acquired immunodeficiency syndrome (AIDS) is a life threatening and debilitating disease caused by human immunodeficiency virus (HIV) infection. The extract of Rooibos tea (*Aspalathus linearis*) suppressed the HIV-induced cytopathic effect using HIV (HTLV-IIIb) infected MT-4 cells, and cytotoxicity was extremely low. The active substances, acid polysaccharides, were extracted with 1% sodium hydroxide from Rooibos tea leaves, but not Japanese tea leaves (*Camellia sinensis* var. *sinensis*). The acid polysaccharides from Rooibos tea suppressed the HIV-infected cytopathicity. Its 50% effective concentration (EC₅₀) was 12-67 µg/mL, while 50% cytotoxic concentration (CC₅₀) was higher than 1.0mg/mL. The acid polysaccharides were composed of 27% of reducing sugar, 42% of neutral sugars and 21% of uronic acid. The acid polysaccharides from Rooibos tea were treated and degraded with 1 N HCl at 75°C for 3-5 hours. The degraded substances, which were oligosaccharides composed of two to three residues containing uronic acid, also suppressed the HIV-induced cytopathic effect. LD₅₀ of the crude alkaline extracts from Rooibos tea was higher than 1.2g/kg body weight, which is the maximal concentration of the solubility. Rooibos tea is a healthy beverage in Japan. From these results, HIV infection may be suppressed by daily intake of Rooibos tea extracts.

76. N-nitrosamine-lowering effect of a Chinese beverage in rubber workers

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The incidence of cancer is high in rubber workers. N-nitrosamines compounds (NNC) are carcinogens and come from rubber vapour. The purposes of this study was to determine the NNC concentration in blood and urine of rubber worker and to decrease the NNC concentration. The method of determination of NNC was a gas chromatography-thermal energy analyser (GC-TEA). The results showed that: the concentrations of NDMA and NMOR in rubber vapour were 5.9-58.6µg/M³ and 2.1-5.7µg/M³ respectively; the concentrations of NDMA, NMOR and NDEA in urine (x±SD µg/8h) were 3.71±2.82, 0.94±0.71, 0.32±0.44,

respectively; the level of NDMA in blood was highly correlated with the level of NDMA in urine ($r=0.686$). After drinking a Chinese beverage which was composed of Chinese traditional herbs, antioxidants, and a Chinese fruit juice, the concentration of NDMA, NMOR and NDEA in urine of rubber workers was decreased by 44.5%-67.6%, 58.0%-73.6% and 44.6%-89.7%, respectively. Thus it is possible to lower the levels of NNC in rubber workers.

77. The anti-free radical and T-cell enhancement effects of longan pulp extract in mice

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The longan pulp is one of Chinese traditional herbs and foods. The purpose of this study is to determine the anti-free radical and immunoenhancement effects of longan pulp extract in vitro and in vivo in mice. The results showed that the LPO products in 36 samples of mouse nonogenous liver which were added with different concentration extract of longan pulp have been inhibited by 44.5%-49.6%. The 38 mice were fed the different concentration extract of longan pulp by stomach -feed for 21 days, the LPO (nmol/g liver) Were decreased by 15.7%-22.9%, the SOD (u/g Hb) were increased by 6.3%-6.5%. The GSH-Px (enzyme activity unit) in whole blood were increased by 17.2%-49.3%. The T-cell in thymus were increased by 52.9%-105.0%, the T-cell in inguinal node were increased by 51.4%-62.8%, While the weights of thymus and spleen were no obvious change. This results show that the longan pulp extract has anti-free radical and T-cell enhancement effects.

SECTION XII. Body Composition

78. Predicting body composition from anthropometry in healthy Thais

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Body composition changes in various physiological and pathological processes. Simple anthropometry may be as useful as more sophisticated measures for predicting fat and lean body mass. A few prediction equations have been developed but they may be population-specific and needed to be validated. The objectives of the present study were to construct prediction equations for assessing fat mass and lean body mass from anthropometry in Thais and compare their accuracies to results obtained by dual energy X-ray absorptiometry (DEXA) and those of the commonly used equations.

Subjects consisted of 102 men and 165 women aged 20-80 years. Fat mass and lean body mass were determined by DEXA (Lunar DPX-L). Anthropometric measurements were performed by standard methods and included triceps skinfold (TSF), biceps skinfold (BSF), subscapular skinfold (SSF), suprailiac skinfold (SISF), height (HT), weight (WT), waist circumference (WC), hip circumference (HC). Prediction equations

for fat mass and lean body mass were derived by stepwise multiple regression analyses and tested in a separated validation group consisted of 51 men and 78 women.

The regression equations for the prediction of body composition were as follow

In men: fat mass = $0.51TSF + 0.24WC + 0.32HC - 41.54$

lean mass = $-0.44BSF - 0.49SSF + 0.8WT - 0.21WC + 21.42$

In women: fat mass = $0.18TSF - 0.16HT + 0.39WT + 0.1WC + 0.27HC - 14.6$

lean mass = $-0.18TSF - 0.13BSF + 0.14HT + 0.57WT - 0.08WC - 0.25HC + 13.82$

When tested in the validation group, our prediction rules were highly correlated to those measured from DEXA in both men (fat mass, $r = 0.94$, $P < 0.001$; lean body mass, $r = 0.94$, $P < 0.001$) and women (fat mass, $r=0.95$, $P < 0.001$; lean body mass, $r = 0.85$, $P < 0.001$). Although the commonly used prediction rules for body composition using anthropometric data were able to predict fat mass reasonably well in both men ($r=0.87$, $P < 0.001$) and women ($r = 0.92$, $P < 0.001$), the prediction of lean body mass was not as accurate (men, $r = 0.73$, $P < 0.001$; women, $r=0.54$, $P < 0.001$). Comparing the squares of error of prediction, the predictions using our population-specific equations were significantly better than those of the commonly used equations in terms of fat mass in women (6.1 ± 10.9 vs 11.6 ± 26.8 kg², $P < 0.05$) and lean body mass in both men and women (men, 6.2 ± 10.8 vs 599.1 ± 185.3 kg², $P < 0.001$; women, 4.4 ± 7.1 vs 246.9 ± 96.7 kg², $P < 0.001$).

Conclusions: Predictions of body composition from anthropometric data in our study are highly correlated to the measurements by DEXA. Previously reported prediction equations for body composition are population-specific and needed to be validated when used in different populations.

79. Bone mineral density of healthy Thai adolescents

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The purposes of this study are to determine bone mineral density (BMD) of healthy Thai adolescents living in Bangkok and to evaluate its relating factors. BMD at AP L2-L4 vertebra, femoral neck, midshaft and distal forearm were measured by dual-energy X-ray absorptiometry in 110 healthy Thai adolescents (66 males, 44 females), aged 15.0-18.2 years, whose weight and height were normal. Most (98%) of them were in puberty stage IV-V. Females had no significant change of BMD at all sites over age. In males, distal forearm BMD increased while vertebral BMD Z-score decreased with advancing age. Female weight for age Z-score and body mass index (BMI) had positive correlation with BMD at all sites except distal forearm which did not correlate with the former. Male weight for age Z-score and BMI positively correlated with BMD at midshaft forearm and femoral neck. Height for age Z-score did not correlate with BMD. At the ages of 16 and 17 years, males had greater BMD than females with the same puberty stages. Milk consumption was positively related to BMD at forearm and femoral neck.

Conclusion: BMD values of a group of healthy Thai adolescents in puberty stage IV-V were measured. Determinants were sex, age, weight for age, BMI and milk consumption.

TRAINING COURSE IN CLINICAL NUTRITION

SESSION I. Diagnostic skills in clinical nutrition

80. Approaches to nutritional diagnosis

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Despite tremendous knowledge of nutrition, humans are still facing 3 major nutritional problems, ie, nutrient deficiency diseases, diet-related chronic diseases, and food hazards. Thus nutritional diagnosis is crucial to detect nutritional disorders in high risk individuals who require appropriate nutritional management. The 3 diagnostic tools consisting of the patient's history, physical examination, and laboratory tests should be employed to assess the patient's nutritional status. Careful review of the patient's history including medical, psychosocial, and dietary history provides valuable information on the patient's nutritional status. Inspection for physical signs of nutritional disorders and practical anthropometric measurements should be incorporated into routine physical examination. Laboratory tests employed must not be overly invasive and should be sensitive enough to identify impaired nutritional status before the appearance of clinical manifestations. Whenever nutritional disorders are found their causes should be identified in order to provide appropriate management.

81. Nutritional support in paediatric AIDS: a case study

Prasong Tienboon

A 1.5 years-old-Thai boy was admitted to hospital with a 3 week history of diarrhoea. Two weeks prior to admission, it was noticed that the child had a fluctuating fever. An upper respiratory tract infection was diagnosed by a general practitioner. As the father had a chronic cough the child's mother thought that the child had a similar problem. The child had diarrhoea with frequent mucoid loose yellowish-green stools, 5-6 times a day. The parents gave him some boiled rice to help treat the diarrhoea. However, the child's condition deteriorated and he was taken to hospital. He was a first child, born at 39 weeks gestation. His birthweight was 2500g, length 48cm, occipito-frontal circumference (OFC) 33cm. The Apgar score at birth was 8. The child was breastfed from birth and also fed with commercial infant formula, boiled rice, mashed banana twice a day. Routine BCG and Hepatitis B vaccination had been given at birth. Both parents were 23 years old and were diagnosed HIV positive when the mother was 3 months pregnant. They were both currently asymptomatic. The father was a labourer.

On admission, the child was febrile with a temperature of 38°C, pulse rate 120/min, respiratory rate 40/min and blood pressure 90/60mmHg. The weight was 6.5kg, (% weight for age 56%, % weight for height 59% and % height for age 96%). The percent OFC for age was 99%. He appeared moderately dehydrated with sunken anterior fontanelle and was drowsy. He was mildly icteric and with a slight pallor. Bitot's spots were found on both eyes. Both angles of eyes were inflamed. There was generalised non-tender lymphadenopathy. Four umbilicated infected ulcers were present on his face. He had oral thrush and inflamed both angles of mouth. Fine crepitation was found on the right upper chest wall. The heart was regular and no murmur. Hepatomegaly (2cm below costal margin) was present. The spleen was not palpable. Further examination revealed dry and scaly dermatitis on chest wall and lower legs. There were also some rashes around the perineum and anal orifice.

Laboratory investigations:

1. Full blood count: haemoglobin 8.0g/dL, haematocrit 32%, white blood cell count 5000/mm³ with neutrophil 46%, lymphocyte 54%. The platelet count was 237,000 mm³ and normal appearance of red blood cell on the smear.
2. Urine examination: yellow, clear, pH 6, specific gravity 1.003, no casts, no white blood cell nor red blood cell. Protein and sugar were negative.
3. Stool examination: mucus, yellowish and green loose stools with numerous fat droplets. Occult blood was negative and no parasite ova were detected.
4. Chest X-ray: infiltration at right upper lung field.
5. Enzyme-linked immunosorbent assay (ELISA) test for HIV was positive.
6. Direct smear from face ulcer was positive for mycelium and on culture *Penicillium marneffeii* was identified.
7. Electrolytes: sodium 133meq/L, potassium 2.5meq/L, chloride 100meq/L, bicarbonate 17meq/L.
8. Liver function tests: GOT 180mg/dL, GPT 150mg/dL, direct bilirubin 1.2mg/dL, total bilirubin 2.9mg/dL, albumin 3.0g/dL, globulin 5.0g/dL.
9. Blood urea nitrogen 8mg/dL.
10. Fasting blood glucose: 83mg/dL.
11. Lipid profile: cholesterol 80mg/dL, triglyceride 92 mg/dL, high density lipoprotein cholesterol 40mg/dL.
12. Calcium (7-11mg/dL) 8.5, Magnesium (1.5-2.2meq/L) 2.1, Phosphorous (3.5-5.3mmol/L) 4.9.
13. Zinc (92-112ug/dL) 60, Copper (78-131ug/dL) 72.
14. Lumbar puncture: no cells, protein 50mg/dL, sugar 50mg/dL.

Answer:

Problem list:

1. Marasmus with AIDS
2. Diarrhoea due to fat malabsorption and possibly infection
3. Pneumonia
4. *Penicillium marneffeii* skin infection
5. Oral thrush
6. Anaemia
7. Vitamins A, B2 deficiency
8. Trace elements deficiency: zinc & copper
9. Essential fatty acid deficiency

82. A case of renal failure

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A 57 year-old female was transferred from a suburban hospital because of dyspnoea and deterioration of consciousness. Following skin-grafting at the left breast, the patient went into sepsis and her urine flow dropped. She became dyspnoeic and stuporous. BUN and creatinine rose from 30 and 1.3mg/dL to 85 and 3.2mg/dL, respectively.

On admission, the patient was afebrile with normal vital signs. She was moderately obese, drowsy, slight pale with no jaundice. A big pressure-sore was present at the sacrum. Rhonchi and fine crepitation were audible over both lungs. The heart sounds were normal. Bowel sound was hypoactive. The liver was 4cm below the costal margin. Moderate pretibial edema was recognised. The chest X-rays was compatible with pulmonary edema. The urine was turbid with a specific gravity of 1.020, the urinalysis revealed protein +3 and negative for blood, glucose and ketones. The blood chemistries revealed Na 130, K 2.4, Cl 91, HCO₃⁻ 13 mEq/L; SGOT 17, SGPT 15 unit/ml, total bilirubin 0.7 mg/dL, albumin 1.52 g/dL; BUN 115, creatinine 5.1 and glucose 105 mg/dL.

The patient was clinically stable after fluid-electrolyte resuscitation. Infections were under controlled. The patient had received nothing per oral. In spite of large doses of diuretic her urine output was less than 700 ml/d. Nutrition service was consulted on the sixth hospital-day. The nutritional management will be discussed.

83. Methods in designing investigations in critically ill patients

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The aim of this study is to design a method able to investigate the variations of metabolism during substrate infusion in the acute injury phase. Such a phase is characterised by an high degree of variability that can impair the demonstration of the metabolic variation due to the substrate infusion. Many are the problems, such as the time necessary to detect the effect of the treatment and the meaning of an eventual metabolic effect (treatment or physiological vanishing of the acute phase?). The first step is to check if the treatment is done during acute phase and/or is overlapping with the weaning phase of the trauma reaction. Obviously, short term study periods should be mandatory. Nevertheless, to safely reduce the study length we had to consider: the lag time in the appearance of the effect; the lag time in full blown effect; the effect resetting phenomenon during treatment. On the contrary, at the end of the study, we had to consider: the lag in the weaning of the effect and always to check: the stability of trauma reaction. We will present our experience in assessing appearance and disappearance of the treatment effect on N output and balance, 3MH output, leg AA efflux, plasma AA variations and gas exchange in severely injured or septic stressed patients in acute injury phase. For the full appearance of the metabolic effect, 24/48 h for N output, 24 h for 3MH, 24 h for plasma AA level variations, 24/48 h for leg AA efflux and 8/24 h for gas exchange are mandatory. The disappearance of the effect is completed in 12 h for N output, 5h, at least, for plasma AA level variations, 6/24 h for leg AA effl. and 8 h for gas ex. As a result, the minimal study length in an injured critically ill patient in the early phase of trauma reaction should be 24 h.

84. Dietary assessment in clinical practice

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Clinical practice can be facilitated in a number of situations by a knowledge of what is eaten. These situations include the evaluation of growth and development in the child; disease prevention; management of energy imbalance, whenever there is a deficit or excess; food component deficiency, not just nutrient and food component excess.

There are several methods which may be used to obtain relevant food intake information: a targeted enquiry with key questions about protective or detrimental foods; an evaluation of food variety; an assessment of energy expenditure and inappropriate nutrient loss. More systematically, a usual 24 hour food intake history may be taken, or a week-long food record obtained.

Aside from the foods themselves, the food culture, food knowledge and skills, food patterns across the day and seasons, genetic background, physical activity, past and present illness and non-nutritionally related health priorities must be established.

A knowledge of community food supply and its nutritionally-related epidemiology make the clinical process more informed. In the course of the evaluation, opportunities for change can be established. Dietary assessment leads on to nutritional therapy and to monitoring the outcome.

85. Roles of dietitians in patient-care service and metabolic studies

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The roles and responsibilities of dietitians in teaching hospitals include patient-care service, teaching and training, and research. Such activities at Faculty of Medicine, Ramathibodi Hospital are illustrated here. The patient-care service consists of nutritional care for hospitalised patients and outpatients attending the Nutrition Clinic. Dietitians are involved in meal planning, supervising food preparation and service

including enteral formula, assessing patient food acceptance and recommending an appropriate diet, dietary counselling and educating patients on modified diets. The activities for teaching and training in dietetics cover education for dietetic students, candidates for master degree in nutrition, dietetic personnel, and other health care professionals. A postgraduate dietetic diploma program is offered by Ramathibodi Hospital for dietitians who are working in hospitals. Graduates of the program are assigned to perform the expected functions of the dietetic practitioner. In addition, dietitians also participate in nutrition and metabolic studies to improve the quality of nutrition care. The activities include: (a) formulation and provision of menus according to the study design; (b) reviewing the dietary history of the subjects and giving the orientation of the assigned diets to them; (c) calculation of their dietary intake; (d) collecting, analysing, and reporting the data; and (e) motivating and educating subjects to consume proper diets at home. In the future, as the advances in nutrition and medical science and the demand for high quality nutrition care services, dietitians in the health care setting should consider to expand their traditional roles with a greater participation in direct patient-care functions and as a member of the hospital nutrition support team to improve the health status of the patient. Specialisation in clinical dietetic practice in various areas, eg, renal disease, diabetes mellitus, and cardiovascular disease may also be considered. These concepts offer the clinical dietitian a mode of increasing the effectiveness of dietetic services. However, to achieve these concepts the dietitians must acquire and keep up with the advance knowledge in nutrition and dietetics and implement it into their clinical practice.

86. Measuring body composition

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The measurement of human body composition has mostly been possible only over the past half century. Although cadaver chemical assay has been attempted in a limited way, in vivo methods allow for research and clinical decision-making. A number of models of body composition exist, of which the five level model, from atomic through molecular, cellular, tissue/organ to whole body levels makes biological sense. However, the decision to use a particular technique also requires consideration of precision, cost, side-effects, portability, availability and applicability. At the atomic level, potassium and nitrogen are most often measured, but in vivo neutron activation analysis allows other elements to be measured. Water, protein, and lipid are the most common molecules measured, using direct and indirect techniques. At the cellular level, cell mass, extra and intracellular water can be measured. Both these levels allow for integration of data with biochemical and physiological control mechanisms. CT and MRI can assess adipose tissue and skeletal muscle volume; at the whole body level. The traditional anthropometric techniques allow assessment in individuals and populations. Knowledge of changes in body composition with age, between males and females is necessary to choose the appropriate technique for measuring body composition components in disease.

87. Health risks of body composition disorders

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An important assumption of nutritional assessment is that body composition is an indirect measure of cellular function. Body composition estimates are usually highly correlated with specific functional tests. Body composition changes throughout the adult life span, and this must be considered when evaluating the body composition assessment. Height declines and, assuming body weight remains unchanged, there is more fat and less fat-free mass in an elderly subject than in a younger individual of the same sex. Body composition is in a dynamic state throughout the day. Both total body protein mass and energy content decline between meals as a result of obligatory amino acid oxidation and metabolism of other fuels. The result is negative protein and energy balance. With food intake, balance becomes positive, and total body protein and energy content increase. Over a typical day, net protein and energy balances are zero and

body weight remains constant. Many diseases and disorders are accompanied by changes or abnormalities in body composition. The most common problem may be obesity, in which the excessive amount of body fat probably causes the cardiovascular diseases, several chronic diseases, and different forms of cancer. Abdominal obesity is associated with metabolic aberrations, morbidity, and mortality in both genders. Gluteal-femoral obesity could be considered a cosmetic problem rather than a morbid condition, whereas abdominal obesity markedly increases the risk for cardiovascular disease and breast cancer. Depletion of body nutrient stores and loss of specific cellular functions are common to many acute and chronic diseases. Progressive loss of fat-free body mass is associated with the evolution of various complications, including loss of cell-mediated immunity, infections, bedsores, and ultimately, death. Protein-energy malnutrition causes a decrease in the amount of fat and protein stores in the body and many diseases are related to abnormalities in total body water or to its distribution among intra- and extracellular space.

88. Assessment of immune function

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Immunocompetence is known to be a functional index of nutritional status. Immunoincompetence in protein-energy malnutrition (PEM) and micronutrient deficiencies can be reversed with nutritional repletion. With other nutritional indices, such as serum albumin and serum transferrin, immunocompetence (assessed by delayed type hypersensitivity) can be used to determine Prognostic Nutritional Index (PNI). PNI is useful for predicting morbidity and mortality of nonemergency surgical patients.

Several methods have been used to assess immune function. Measurement of total lymphocytes in the peripheral circulation is usually performed routinely on almost all hospital patients. Peripheral whole blood immunophenotyping using a flow cytometry has been widely used to enumerate lymphocyte subpopulations. Delayed type hypersensitivity (DTH) is considered to be a useful in vivo assessment of immunocompetence. The ability of mononuclear phagocytes and polymorphonuclear cells to kill pathogens can be assessed using reactive oxygen species (ROS) generation test. Lymphoproliferative assays are used to measure lymphocyte function. The level of specific antibodies and complements can also be measured.

Immunological tests should be interpreted with caution, considering many other factors affect the immunocompetence. Technical variation and difficulties in the assays can influence the results. Correct interpretation of the results would require the overall clinical and nutritional indices.

89. Lipoprotein analysis

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Lipids are transported in the plasma as lipoproteins which can be categorised into 4 main classes: chylomicron, very low density lipoprotein (VLDL), low density lipoprotein (LDL), and high density lipoprotein (HDL). These lipoproteins are water soluble complex composed of cholesterol, triglycerides, phospholipids, and apoproteins. There are three general ways of isolating lipoproteins in practicable quantities: ultracentrifugation, precipitation and chromatography. After separation, the different lipid component including total cholesterol, free cholesterol, triglycerides, and phospholipids are determined in each lipoprotein fraction by using enzymatic techniques. Ultracentrifugation technique separates the lipoproteins according to differences in their hydrated density and the most widely used procedure is the sequential centrifugation at different solvent densities. Although this technique is comparatively time-consuming and is therefore not well adapted to the routine characterisation of lipoprotein preparations, it offers the best combination of capacity and resolution that is available. Precipitation method is based on the interaction of lipoproteins with macromolecular polyanions and allows the plasma lipoproteins to be divided into two fractions that approximate to the high density and the low density classes. However, the fractions obtained by precipitation differ somewhat from those isolated by ultracentrifugation. Chromatography has been used for

the fractionation of lipoproteins that have been isolated by other methods and does not permit the complete separation of the lipoproteins from plasma. Moreover, chromatography usually produces a diluted product rather than a concentrated one. The other two techniques developed for quantitative measurement of serum lipoproteins such as electrophoresis or nephelometer can be used for the separation of particles that have the same density but differ markedly in electrical charge or differ in a light scattered by particles in suspension. Sequential ultracentrifugation technique and lipid composition in each lipoprotein fraction in hyperlipoproteinaemic patients is described in detail in this session.

SESSION II. Nutritional therapy and support

90. Criteria of an adequate diet

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Historically, an adequate diet has been evaluated in terms of recommended dietary intakes (RDIs), along with consideration of certain macronutrient components like water, essential amino acids and fatty acids which protein and fat provide, and dietary fibre. To address problems of national food shortage, preferred food intakes to avoid nutrient deficiency were formulated in terms of food group usage. More recently, the World Health Organization has developed a Food Based Dietary Guidelines (FBDGs) approach to ensure both adequacy and nutritionally-related disease prevention. This takes account of the sum total of all food components and their effects on human biology, along with the properties of food other than those prescribed by chemistry, such as its physical properties and its organoleptic properties, to ensure interest in it and consumption.

Nutritional adequacy must be considered in relation to energy expenditure and, therefore, an individual's energy balance is pivotal. With greater or lesser energy throughput, food intake needs to be less or more nutrient dense, respectively. Some prediction of energy requirements can be made on the basis of basal energy expenditure (BEE), knowledge of particular physical activities and their duration, and state of health. But because of poorly defined contributors to energy expenditure, like variations in efficiency of energy utilisation, and spontaneous movement, it is often necessary to document current food intake, level of physical activity, and degree of steady state in body weight or, better, body composition as a basis for any effort to change energy balance.

There has been much debate over the years about the level of protein intake required in healthy individuals to maintain health and be in nitrogen balance and most evidence now points to a level of about 0.8 kg body weight/day to achieve these, perhaps rising in the elderly and in certain elite sports. In the nutritionally compromised, body nitrogen may be spared by increasing protein intakes to the region of 1.0-1.5g protein kg body weight/day. To provide non-protein energy, carbohydrate and fat can be added. The adequacy of intake of dietary fibre, resistant starch and oligosaccharides resistant to digestion is poorly defined, but for dietary fibre itself this is probably between 20-30g/day for adults. However, even for dietary fibre, the particular function in question may determine whether or not these preferred intakes should be expressed in terms of anthropometric measures or some other dietary reference point like energy intake or absorbable carbohydrate. That dietary fibre should be obtained from a variety of plant food is quite certain.

The preferred level of intakes of phytochemicals, like flavonoids, monoterpenes, isothiocyanates, salicylates, and non-provitamin A carotenoids, remain to be determined, but will be forefront areas of nutrition research in the next decade. These compounds are often multifunctional.

Some food components are "conditionally essential", including some amino acids and peptides.

The nutrient requirements in transitional nutritional states, as in refeeding may also be quite complicated and conditional, as with increased phosphate requirements during refeeding.

A detailed knowledge of food chemistry, and a dynamic view of human biology in health and disease is required to ensure nutritional adequacy.

91. The use of routine assessment for nutritional diagnosis

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Early nutritional diagnosis is the important mode to reduce the morbidity and mortality rates of malnutrition. Physicians must be aware of nutritional problems encountered by the population in their community as well as capable to make early nutritional diagnosis and provide appropriate management to the affected persons. This can be achieved by their willingness to incorporate nutritional assessment into their clinical practice through the triad of diagnostic approaches in clinical medicine, ie, the subject's history, physical examination, and laboratory tests. Appropriate and accurate dietary assessment provides the information on the adequacy of dietary intake of the subjects quantitatively and qualitatively. Physical examination should include the measurements of body mass index, waist-over-hip circumference ratio, and inspection of common suggestive signs of malnutrition. Several routine laboratory tests are useful to make provisional diagnosis of nutritional disorders, ie, haemoglobin, mean corpuscular volume, total lymphocyte count, serum albumin, urea nitrogen, creatinine, total cholesterol, triglyceride, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, uric acid, and blood glucose. However, under certain circumstances, special laboratory tests are needed for the definite diagnosis of nutritional disorders and for detecting subclinical malnutrition.

SESSION III. Nutritional epidemiology and publication

92. Biostatistics and epidemiology in nutrition intervention

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Biostatistics and epidemiology are two important branches of medical science. They are often taught concurrently in medical and research courses. Epidemiologists employ biostatistical methods to work out design issues (including sample size requirements and statistical power calculations), data analyses (including various statistical tests and controlling of confounding effects) and data presentation (including

understanding of types of variables and descriptive statistics). On the other hand, medical and health researchers engage epidemiological methods to consider occurrence of human disease patterns, to measure disease frequency, distribution and determinants, and to assess a cause-effect relationship between exposure and disease. Biostatistics and epidemiology provide the basis for medical and health research. It's potential cannot be fully utilised without a sound research plan (including how to conduct a study, a time-table and budgetary items). This paper will consider biostatistical and epidemiological methods in the conduct of a nutrition intervention at a clinical and community setting.

93. Preparation for nutritional publication

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Several sequential requisites are needed for a successful publication. The order in which the steps in developing a paper is taken can be invaluable. Firstly, one must be well motivated about one's ideas and research work. Capture the main idea or finding of your work in an illustration or table somewhere in the paper so that it can be progressed into other literature. Anticipate this finding in the introduction and develop it in a persuasive and critical way in the discussion. Reflect it in the "key words". Choose a journal which best fits the focus of the paper and where you believe the editors will understand and be sympathetic to your purpose. Prepare yourself for the exercise of writing the paper by systematically gathering references in full detail and compiling them in a database; and by being systematic about documenting methodological detail and findings. Spend time tabulating and illustrating your findings in various ways and then organise the data in logical sequence, with the hypotheses in mind, whether fulfilled or not. Display the data in such a way that newly generated hypotheses or constructs become evident. Then produce a written description of the results as best you can on the basis of the tables and illustrations. Before going any further, write an abstract so that the paper is focussed. It will be easy now to write an introduction which states the background to the present work, what you plan to do and what you expected to find. Set out the discussion in point form so that you do not miss key issues which will come up in the minds of referees and the ultimate readership. Argue your way through the hypotheses. Return to the methods. Include an appropriate statement of ethics. Include the study design or experimental protocol, investigatory, analytic and statistical methods. Draft a letter to the editor of the journal you have chosen in which you state the principal purpose of the paper, its main idea and what benefit there will be to the readership. Welcome the referees comments when you have the journal's decision and use them for revision for the present journal or for submission to another journal. Be perseverant.