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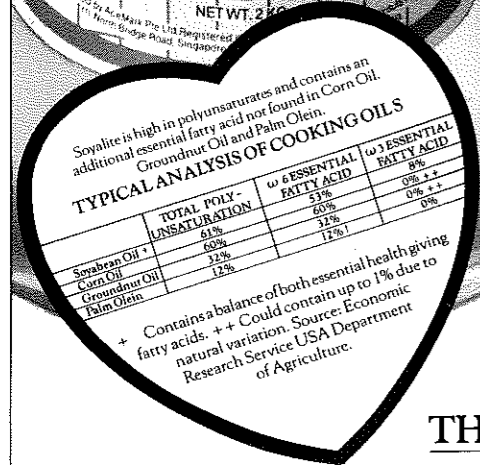
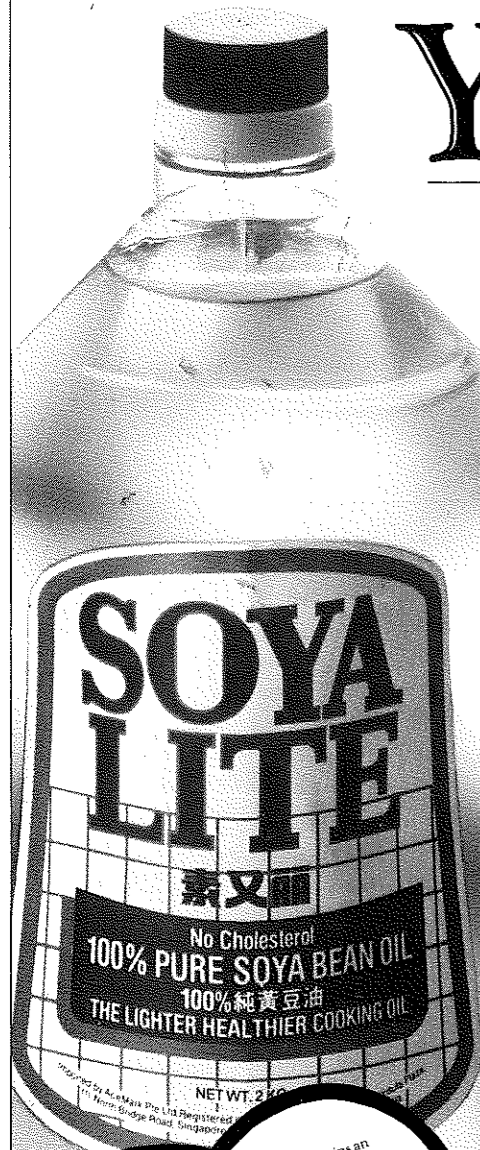


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Editorial.

Dietitians and nutritionists are increasingly called upon to render assistance in public education and community service programmes. One new area where nutritional expertise is required is in the hospice movement which has recently begun in Singapore. In this issue, one member who has been involved in the local hospice movement summarises the role of the dietitian in this concept of care, and outlines the guiding principles of nutritional management of the terminally ill.

Many people will be interested to read the findings reported from a London study on the popular tonic chicken essence. The study represents a very preliminary attempt to measure objectively what is usually a subjective response to an ingested food.

While it is tempting to share the author's speculation that "unidentified extractives" may be responsible for the effects noted, information is needed on the complete nutritional composition of these products before ruling out the effect of their nutrient content. Even "negligible" quantities of

calories and nutrients may assume significance depending on the volume of extract consumed. It will be necessary to demonstrate that the products have a unique effect compared not only to water but to other foods. Documentation of their effect on appetite is also essential.

Meanwhile SDA continues striving towards enhanced professional recognition, and in this respect the Association has formed a working committee to consolidate the Association's approach on certain issues of therapeutic dietetics and nutrition as they pertain to the local context.

The first position paper will be completed shortly, and will be published in a coming issue of The Singapore Dietitian. The subject of this paper is one on which there is currently much debate and a need for consensus, namely "Dietary Recommendations for Individuals with Diabetes Mellitus."

Finally, the Editorial Committee takes this opportunity to wish all SDA members and journal readers a Happy and Prosperous Chinese New Year!

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Nutritional management of the terminally ill cancer patient

Lynn Alexander, B. Sc. (Hons)

With the beginning of the hospice movement in Singapore, there is a need to be aware of the ways in which dietetic services can contribute to palliative health care. Cancer is the major illness requiring hospice care. The majority of terminally ill cancer patients have nutritional problems to some degree. Due to a combination of inadequate food intake and increased requirements the result is weight loss as well as other physiological and psychological symptoms. It is therefore desirable to attempt to maintain adequate nutrition in the terminally ill.

Over 70% of terminal cancer patients are anorexic and show signs of undernourishment (1). This paper outlines the benefits to patients of overcoming nutrition symptoms and discusses how this can be achieved in various circumstances. The importance of recognising when the burdens of continued nutrition outweigh the benefits is also discussed.

The hospice movement in Singapore

The modern hospice movement brings pain relief, symptom control, emotional support and material help to the person dying at home, in the hospice or in hospital. In Singapore, hospice care at home has now been available to about 50 patients referred to a research project on pain control (2). In addition, one hospice has been set up since 1985, providing beds and medical care for those who have no-one to care for them at home, or who need symptom relief or a brief admission to support the family through a prolonged illness.

Coordinating the hospice movement in Singapore is the Hospice Care Group, which functions under the auspices of the Singapore Cancer Society's Helping Hands Committee. This group has set up a support structure to continue hospice care at home. It relies heavily on volunteer nurses, doctors and social workers, as well as other health professionals from time to time, including dieti-

tians. Lectures by a dietitian, on practical aspects of nutrition in palliative care, are included in a training programme organised by the Hospice Care Group for nursing and lay volunteers.

The dietitian's role on the palliative care team

Nutrition is a major concern of the great majority of cancer patients and their families. The dietitian, therefore, has a particularly important role on the hospice care team. She is equipped to help both physician and patient weigh the potential benefits against the burdens of the various nutrition alternatives. Furthermore, she can facilitate implementation of the agreed-upon nutrition plan by translating the scientific principles of nutrition into practical food preparation for catering staff or the patient and his family at home (3).

Inadequate food intake has several undesirable consequences for the terminally ill patient:

- **Weight loss** – due to muscle wasting and breakdown of fat stores
- **Weakness** – a result of lack of energy from food, as well as anaemia
- **Breakdown of skin at pressure points** – due to loss of subcutaneous fat
- **Impaired immune function**
- **Poor wound healing**
- **Constipation**
- **Low morale and depression**
- **Loss of food as a source of comfort and pleasure**
- **Family anxiety and tension**

Ultimately, undernourishment hastens death. While a quick death may be a blessing to those who are suffering very badly, many have a strong will to live on, just long enough perhaps to see a first grandchild born, or to travel back to their hometown again. These patients appreciate all efforts to help them eat for the strength to fulfil their ambitions.

Causes of nutrition problems in terminal cancer

The various factors contributing to poor nutritional status in the cancer patient are listed in Table 1. Some of these causes have to be accepted as part of the cancer process. Others, however, can be reversed.

Two vicious cycles operate in anorexic patients. Firstly, decreased food intake leads to further loss of appetite (4). Secondly, malabsorption occurs not only as a result of the causes mentioned in the table, but is seen to an extent in all malnourished people, being due to atrophy of the

Table 1. Effect of cancer on nutrition

Effect	Causes
Decreased food intake	Pain Anxiety Loss of taste Nausea Difficulty in swallowing Early satiety
Decreased nutrient absorption	Deficiency of pancreatic enzymes or bile salts Diarrhoea and vomiting Fistula losses Massive bowel resection
Increased requirements	Increased metabolic rate Preferential uptake of nutrients by tumour Tumour necrosis factor

villi in the small intestine (5). The only way, therefore, to break these two vicious cycle is to improve food intake. Fortunately, there are ways in which this can be achieved.

Food service considerations in overcoming anorexia

1. Be aware of food likes and dislikes, which in a cancer patient can change from day. As far as possible cater to individual preferences.
2. Ensure attractive presentation of food through the use of pleasing colour combinations, garnishes and cheerful accessories such as tray cloth, napkin or even flowers.
3. Keep portion sizes small – patients feel defeated when they cannot finish a normal-sized meal. The plate size should be smaller too.
4. Be flexible with mealtimes, in order to make the most of the times when the patient feels like eating.
5. Keep drinks and biscuits handy at the patient's bedside, so he can help himself when he likes.
6. Give assistance in feeding if required, but maintain the patient's independence in feeding as long as possible – this can be accomplished with the help of straws, weighted-bottom glasses which do not tip over easily, serving soup in a cup instead of a bowl, providing special easy-to-handle cutlery and cutting up food before serving if necessary.

Psychological and other considerations in overcoming anorexia

Explaining the value of food to the patient will make eating seem more worthwhile. To this end, many cancer centres have developed patient education booklets (for example, 6 and 7).

Mealtimes are meant to be social occasions, and a little company and conversation during meals can make patients feel more cheerful and relaxed. On the other hand, some patients who can only eat with great difficulty or require to be fed, will prefer privacy. Soft, soothing music played at mealtimes is a very subtle way of inducing relaxation.

Treatment of pain and depression is often half the battle in overcoming anorexia. The timing of pain medication

must be coordinated with mealtimes – say half an hour before the meal – to ensure that the patient gets maximum enjoyment from his meal.

To work up an appetite, a short stroll before meals is a good idea for mobile patients. Alcohol is a well-known appetite stimulant, and may help relax the patient too.

Glucocorticosteroid appetite stimulants are even more effective and are used by many hospices.

Physical comfort during the meal can be ensured by helping the patient to the toilet or bringing a bedpan prior to the mealtime. Bedpans and any other unpleasant stimuli should be removed before the meal arrives. It is customary as well as hygienic to wash before meals, so at the very least a hot or cold towel should be offered for face and hands.

Nutritional supplements

The use of a daily high protein and calorie supplement is a good way of ensuring a minimum intake in a patient, as well as stimulating the appetite. The aim of supplementation is to provide a substantial amount of nutrients in a small volume. It should also be easily taken, hence it is usually in liquid form.

Good homemade supplements include fortified milk, milkshakes and traditional egg-nog. Milk-based supplements, however, pose a problem for some Asian patients, who either do not like the taste of milk or suffer indigestion or diarrhoea after drinking it due to lactose-intolerance. If the problem is taste, it may help to drink it very cold, through a straw. It can also be flavoured. For lactose-intolerance it is possible to buy hydrolysed milk or commercial supplements which are low in lactose.

For those on an all-liquid diet, **isotonic supplements** are available, which present a low osmotic load to the GI tract, thereby reducing the risk of diarrhoea. Patients with severe malabsorption will benefit from **elemental supplements** composed of pre-digested nutrients – these, however, are quite expensive.

Modular supplements may be useful at times, particularly glucose polymer powder. This is not sweet, and can be dissolved in water and then added to drinks or soups. Being a polymer of glucose it does not cause a sudden osmotic load to the GI tract. Another modular supplement, medium chain triglyceride (MCT) oil, is a source of fat which does not require pancreatic lipase or bile for digestion and absorption to the extent that long chain fat does (8). It is therefore useful for those with pancreatic cancer. A good natural source of MCT is coconut oil, so simply cooking in coconut oil and adding coconut milk to desserts is useful for these patients. MCT is also used as the main fat source in some commercial "complete diet" supplements.

Vitamin and mineral supplements are not necessary if the patient is taking a "complete" supplement regularly, as these are usually fortified with all the essential vitamins and minerals. Otherwise it is advisable to give a daily multivitamin/mineral to avoid inviting any further problems of nutritional deficiency. These can be given in liquid form if swallowing tablets is difficult.

Overcoming specific symptoms

Dry mouth. This is a common complaint in terminal cancer. It can be a side effect of low food intake or caused by certain drugs, including anti-depressants. Radiation of the head and neck can also cause dry mouth by damaging the salivary glands. It is very difficult to swallow food

when the mouth is dry, and this aggravates anorexia. The following measures can help bring relief:

- Keep plenty of fluid on hand for sipping
- Moisten food with soups and sauces
- Take a sip of liquid with each bite
- Dip bread/biscuits in a hot drink
- Icecream is ideal and very refreshing
- Chewing gum or sucking hard candy can stimulate salivary flow
- Suck shaved ice
- Avoid breathing through the mouth
- Artificial saliva may help

Dysphagia. Dysphagia in terminal cancer can be due to chewing difficulties or a tumour blocking the oesophagus. The following measures must be considered in dealing with this problem:

- Food should be soft and moist, and pureed or liquidised if necessary
- If dentures do not fit well, a bedside refitting may bring relief
- If there is a Celestin tube *in situ*:
 - avoid sticky, pithy food like glutinous rice and oranges
 - avoid fish unless liquidised
 - chew food well
 - sip carbonated drinks with and between meals
- For severe dysphagia, consider nasogastric tube-feeding if patient is independent and active.

Sore mouth or throat. This can be relieved through a few simple measures:

- Food should be soft and non-acidic
- Dry food such as toast, raw vegetables and biscuits should be avoided
- Liquids can be taken through a straw
- Serve food at room temperature

Nausea and vomiting. Nausea and vomiting occur in approximately one-third of all terminal cancer patients (9). There are many causes, including mechanical obstruction, electrolyte imbalance, raised intracranial pressure and chemo- or radio-therapy. To help avoid nausea:

- Do not serve oily or fried food
- Keep kitchen smells away from patient
- Avoid precipitating nausea by suggesting it is expected
- Patient should rest after a meal, but not lie completely flat
- Make sure clothing is not tight

Treatment of vomiting:

Besides the use of anti-emetics, vomiting must be treated by resting the GI tract. Only clear fluids should be taken. These include:

- clear soup
- beef or chicken extracts

diluted fruit cordials
jelly
barley water
apple, pear or grape juice

When vomiting subsides, the patient can be gradually weaned back on to a full diet.

Early satiety. Patients with anorexia, and particularly those who have had stomach surgery, often complain that after a few mouthfuls of food they feel full. The answer here is to give more frequent, small meals. All the mouthfuls will add up! Avoiding drinking with or just before meals also helps.

Food aversions. When patients go off particular foods, an attempt must be made to provide alternatives. If meat is the offender, substitute with eggs, fish, beancurd or lentils.

Constipation. This is rife among the terminally ill, due mainly to inactivity, low intake of food and as a side effect of opiates. Dietary measures for the relief of constipation include:

- A glass of warm water or coffee first thing in the morning
- At least six glasses of fluid a day
- Prune juice helps as it contains a natural laxative
- Other fruit juices should be taken often
- If possible increase the volume of food eaten
- Increase the patient's mobility if possible

Diarrhoea. Diarrhoea can occur with bowel tumours or after radio- and chemo-therapy. It rapidly causes electrolyte imbalance and dehydration if not treated. The following measures should be taken:

- Plenty of fluid must be given for replacement
- Cut down on concentrated sugary drinks
- Avoid lactose
- Avoid fruit juice
- Low residue diet
- Natural yogurt may be useful as it helps re-establish normal bacterial colonization of the bowel.

Bowel obstruction. Unfortunately, this is common towards the last stages of bowel cancer. The vomiting which occurs is very distressing and patients may get relief by passage of a nasogastric tube to aspirate stomach contents. In this situation food can still be eaten and some absorption will occur, so if the patient fancies a little food it should be encouraged. It is best to confine eating to the earlier half of the day as it seems to be better tolerated at this time (10).

Fat malabsorption. When there is bile or pancreatic insufficiency, or stomach resection, fat malabsorption is a problem, and the resulting steatorrhoea is unpleasant. Avoiding excessive fat in the diet will give some relief, and, as discussed, MCT or coconut oil will be better absorbed than other types of fat.

Ascites. This symptom can usually be treated very effectively with diuretics. If resistant, however, a low salt diet may be indicated. It should be stressed that if a patient is eating very little then there is no need to restrict salt. He should merely be cautioned against taking very salty foods or drinks such as beef or chicken extracts.

Other metabolic problems. Diabetes, renal or hepatic failure in the terminally ill may suggest special diet therapy, but in practice patients are often eating so little anyway that this is unnecessary. With diabetes particularly, we have to ask ourselves whether or not the effects of dietary indiscretions would make the patient any more uncomfortable. The American Dietetic Association (ADA), in a recent position paper (11), endorses this view, stating that:

"For the patient able to accept and perhaps enjoy oral intake, previous dietary restrictions should be minimised, depending on the potential consequences."

Nasogastric tube-feeding

Nasogastric tube feeding can be considered to overcome severe dysphagia and even to treat anorexia, but only if patients agree and are still independent and active — usually at an earlier stage in their illness. It should be instigated only with the assistance of a dietitian, who can advise on method of delivery and write an appropriate formula or recommend a suitable commercial product for the patient's needs.

In order to avoid the common complication of diarrhoea, utmost hygiene is necessary and the formula should be introduced gradually, starting at ¼ strength and building up to full strength only on the third day. Attention to the caloric and osmolar load of the formula is necessary in order to avoid osmotic diarrhoea. A fine-bore tube is preferable and continuous drip feeding rather than bolus feeding will help reduce the incidence of diarrhoea.

Many patients find tube-feeding uncomfortable, and it may not be practical, depending on their circumstances. Moreover, it is not without the complication of aspiration pneumonia.

When the end is near

The time comes when the terminally ill patient can no longer take even sufficient fluid to maintain hydration, and death is probably a few days or hours away. At this point feeding is generally considered a futile task that exacerbates the distress of dying and detracts from the patient's dignity. Views differ, however, on whether or not there is an obligation to keep the dying patient hydrated.

In hospital settings, hydration is usually maintained right to the end by IV fluids. Indeed, in a recent survey of 96 doctors in US, 70% of them said they would feel compelled to continue providing hydration to a comatose, dying patient (12). The necessity of this is now being questioned, however, the main objections being that it is inhumane to prolong the dying process and upsetting for relatives to see the IV tubes and needles in place.

Furthermore, some hospice workers have observed that there may be beneficial effects of dehydration for the dying patient. They report that:

"Dehydration can reduce the patient's secretions and excretions, thus decreasing breathing problems, vomiting and incontinence. Dehydration usually leads to

death through haemoconcentration and hyperosmolality with subsequent azotaemia, hypernatraemia and hypercalcaemia. All of these produce a sedative effect on the brain just before death." (13)

In the hospice or home, where minimal medical intervention is usually preferred, simple measures to relieve the dying patients's symptoms of thirst and dry mouth are appropriate. These include:

- frequent sips of water
- sucking icechips or boiled sweets
- glycerine swabs
- regular mouthrinses

Conclusion

The ADA has summed up the approach to nutrition of the terminally ill in this way:

"Food and drink have both psychological and physical functions that may play very special and sometimes central roles in the care of the terminally ill person. Food has strong emotional overtones that include maternal nurturing, as well as religious, cultural and social values. The actual or illusory source of strength, comfort and caring provided by food should (therefore) be encouraged." (11)

Fear of abandonment, physical or emotional, is among the most frequently cited apprehensions of dying people (14). Providing regular nourishment, therefore, is a very concrete way of demonstrating our continued love and care, and can contribute greatly to the quality of life.

The primary consideration must be the wishes of the patient. When a patient no longer wishes to eat he must continue to be supported by acknowledging that he has the right not to eat and by explaining gently to his relatives that they should not feel compelled to go on cooking for him.

Options must be kept open — patients who have refused food for a time should always have the opportunity to change their minds. The ultimate goal of palliative nutritional care is to contribute to the patient's comfort by providing whatever level of nutrition is desirable in whatever form is acceptable.

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OCCUPATION:

Effect of chicken essence on metabolic rate and blood restoration

Catherine Geissler, BDS, MS, PhD

Introduction

Chicken essence is widely used, particularly in Chinese communities, as a traditional remedy for several ailments. It is believed to help recovery from physical and mental fatigue and from blood loss during childbirth and menstruation. To test such claims for objective evidence several experiments were carried out in human subjects and in animals. Essence of chicken is made by extracting water soluble substances by steaming for several hours. A similar process is used commercially and one of these products, Brands Essence of Chicken (BEC), was used for these experiments.

The first set of experiments was designed to test whether or not the essence had any stimulatory effect on metabolic rate in human subjects. Several previous unpublished reports and one published report (1) on small numbers of subjects in our and other laboratories have shown a positive stimulation of metabolism over a period of several hours by meat extracts, mainly chicken. Of these 7 previous tests only one had no effect, the other six showed a stimulation varying between 3-14%. This variability was likely to be due to different methods of preparation. It was therefore decided to carry out a more definitive test on a larger number of subjects using the type of essence currently available.

As a preliminary investigation into the effects of chicken essence on blood restoration, experiments were carried out on anaemic rats to test whether those provided with chicken essence recovered at the same rate as those without essence. No previous work appears to have been done on this topic.

1 STIMULATION OF ENERGY METABOLISM

Methods

Twenty healthy Chinese male and female volunteer subjects were recruited for the tests from students attending King's College, University of London, and their friends.

Each subject attended the laboratory in the morning after an overnight fast for two sessions in which metabolic rate was measured before, and every 15 minutes for 2 hours after, consuming 70 mls of BEC or 70 mls water. The order of treatment was random.

All precautions were taken to eliminate other factors that might affect metabolic rate: prior to the experiment each subject was made accustomed to the use of the res-

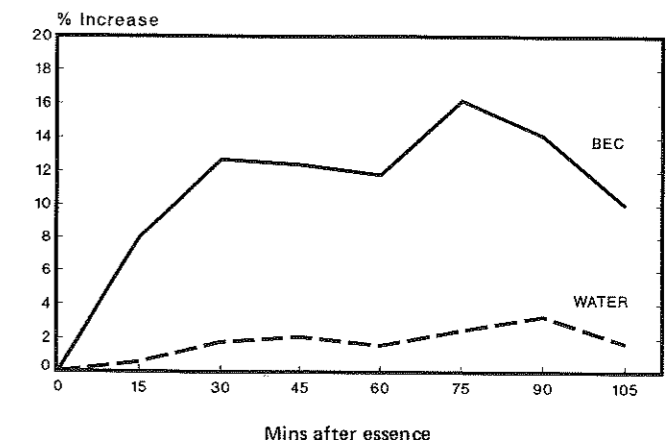
Dr Geissler is attached to the Department of Food and Nutritional Sciences, King's College, University of London, Campden Hill Road, London W8 7AH.

piratory apparatus; they kept to the same activity and food consumption on each day prior to measurement and to the same means of transport to the laboratory on the morning of the measurement.

The subjects arrived at the laboratory in the early morning in a fasted state. They rested for half an hour in a comfortable arm chair. Resting metabolic rate was measured 4 times until a stable baseline was assured. The subject was then given 70 mls of either NEW TASTE BEC or water. These liquids were administered in a mug with a dark brown interior so that there were no visual differences between the two to minimize psychological factors. They were not told the contents of the liquids, only that they were two forms of essence. Metabolic rate was measured for approximately 5 minutes every 15 minutes for two hours. During the experimental session the subject was seated comfortably in a quiet room with no disturbance, asked not to fidget, and was provided with a radio to counteract boredom.

To measure metabolic rate all expired air was collected via a mouth-piece and tube into a Douglas bag over an exactly timed period, enough to give an expired air volume of approximately 50 litres. The oxygen content of this air was subsequently measured with a Sybron-Taylor oxygen analyser. The energy expenditure per minute was then calculated by the Weir (2) formula, the mean values for each 15 minute measurement and the overall mean per treatment were calculated, and response to the essence expressed as % increase in metabolic rate above baseline. Significance of difference between treatments was tested by analysis of variance.

Fig. 1 Metabolic rate: effect of chicken essence



Results

Figure 1 shows the mean response of 20 subjects to the BEC at 15 minute intervals after consuming the essence, expressed as percentage increase over baseline. Over the period of 105 minutes the overall mean thermic response was 12% compared to 2% with water. The stimulation was statistically significant ($p=0.001$). The maximum effect of BEC was 16% after 75 mins.

Discussion

Essence of chicken stimulates metabolic rate by 12% on average over a period of approximately two hours. In other experiments a similar level of response was obtained from a mixed meal of 250-300 kcals, several hundred times the negligible number of calories supplied by BEC. The level of stimulation can therefore not be accounted for by metabolic processes required for the assimilation of energy from food. Unpublished experiments in our laboratory (3) indicate that this level of stimulation could also not be accounted for by the quantity of protein, of individual amino acids or vitamins in the extract. The effect must therefore be due to other unidentified extractives or to an interaction between the components.

2 BLOOD RESTORATION

The experiment reported here was designed to test the effect of BEC on haemoglobin levels in the blood of anaemic animals.

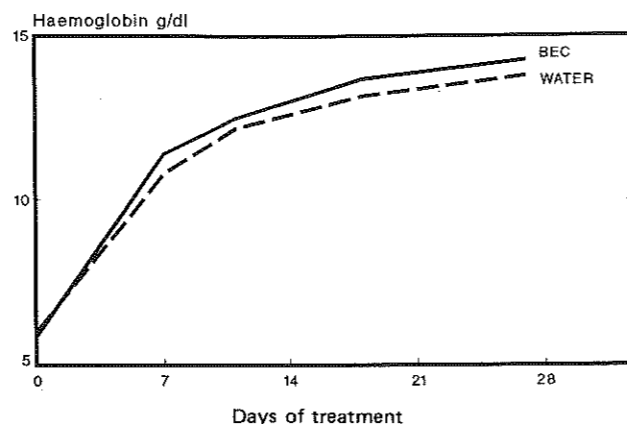
Methods

A group of 20 male Sprague Dawley rats was made anaemic by tail bleeding and a milk diet, low in iron, until haemoglobin levels reached the low level of 6g/dl. They were then ranked in order of haemoglobin level and alternately assigned to a treatment or control group so that the mean haemoglobin level was the same in each group. The treatment group was given BEC to drink ad libitum and the control group water. The experimental diet was designed to be minimally adequate in all nutrients by the dilution of the stock diet which contained approximately twice the requirements of most nutrients except protein. To retain the same protein level and reduce that of other nutrients the stock diet was blended with corn starch and casein. The animals were housed in individual cages at a room temperature of 20°C. The treatment group was provided with BEC and the controls with water in the drinking bottles as the sole source of liquid.

Before bleeding each rat was put in a hot box (40-46°C) for 3-5 minutes to dilate the blood vessels to facilitate bleeding and the blood was collected in EDTA tubes for the measurements of haemoglobin and other parameters. To induce anaemia 4-6 mls were taken at intervals of several days until an adequately low haemoglobin level was reached. During treatment smaller blood samples were taken for the purpose of analysis to monitor the restoration of the measured parameters. This was done at intervals of approximately one week. Haemoglobin was measured by the cyanmethemoglobin method (4).

Mean and standard deviation were calculated for each treatment group at several time periods throughout the treatment. Analysis of variance was used to test the statistical significance of differences between groups.

Fig. 2 Haemoglobin level: effect of chicken essence



Results

The mean haemoglobin values by day of treatment are shown in Figure 2. There was a significant difference between the groups in the levels of haemoglobin, the BEC group being consistently higher in all measurements after the start of treatment ($p=0.01$).

Discussion

The definition of anaemia is based on a low level of haemoglobin in the blood. The normal level in rats is similar to that in humans and 6g/dl as the starting value for treatment could be considered severe anaemia. Haemoglobin was restored more rapidly towards normal levels with BEC than with water. Other blood parameters, haematocrit, serum iron and iron binding capacity as well as growth were also measured in this and prior experiments. In each case the values for the BEC group were higher than for the control group, although the difference did not reach statistical significance. The improved performance in the restoration of all these parameters on BEC would not likely be due to any of the major solid components of the essence, gelatin and peptides, as the protein content of the diet fully met nutritional requirements. Nor could it be due to any energy supplement as the diet was not restricted and the energy content of the essence is negligible. It is unlikely to be due to the replacement of a vitamin or mineral as all were minimally adequate in the diet and their content in BEC small. It is therefore possibly due to a component that either affects nutrient absorption or intake. One possible explanation is that the essence stimulated appetite and therefore the animals may have eaten more of the diet, secondarily affecting the measured parameters. Another possible explanation is the stimulation of gastric secretions, promoting the absorption of iron from the diet. Stimulation of growth could possibly be mediated via hormonal stimulation. Meat extracts have been used as a stimulatory test for growth hormone, for example. Further studies would be required to verify the effect under different dietary conditions and to determine the mechanisms of action of BEC in recovery from anaemia.

CONCLUSIONS

Essence of chicken significantly increased metabolic

rate in human subjects and the rate of restoration to normal blood haemoglobin levels in rats when compared with water. These experiments provide some objective support to the traditional belief in the efficacy of chicken essence to relieve mental and physical fatigue and to restore blood loss after childbirth and menstruation.

This is a summary of work carried out at King's College, University of London, which was presented to a meeting on 27 February 1988, organised by the Singapore Dietitians' Association.

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CAFFEINE — IS THERE CAUSE FOR CONCERN?

Today there is substantial public concern over contradictory reports on caffeine's safety and possible negative effects it may exert in various human illnesses. How has this concern arisen? How solid is the evidence? What are the alternatives?

Pharmacologists classify caffeine as a mild stimulant of the central nervous system and consider it one of the world's most widely used drugs.

The United States *Code of Federal Regulations* lists caffeine as a multipurpose, Generally Recognized As Safe (GRAS) substance.

Caffeine Content of Beverages, Foods, and Drugs

In general, coffee contains the most caffeine. A typical cup of tea of the same size provides only one-half to one-fifth as much, while cocoa and hot chocolate contain very small amounts.

The amount of caffeine in any given cup of coffee or tea depends on the variety of coffee bean or tea leaf; where it was grown; the particle size used (the particular coffee "grind" or tea leaf cut) and the method and length of brewing or steeping.

Manufacturers add caffeine to cola and non-cola soft drinks. Their amounts found in colas are shown in Table 1.

Table 1

Caffeine Content of Various Soft Drinks	
Soft drinks containing caffeine ^a	Caffeine content ^b (mg/12-oz serving)
TAB	46.8
Coca-Cola	45.6
Diet Coke	45.6
Pepsi-Cola	38.4
Diet Pepsi	36.0
Pepsi Light	36.0

^aThere are at least 200 flavours, varieties and types of soft drinks, manufactured by the leading bottlers, that contain no caffeine.

^bData obtained from the National Soft Drink Association, US.

This is an abstract of a Scientific Status Summary of the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition (US), first published in Food Technology, pp 105-113, June 1987.

The amount of caffeine in cocoa or chocolate is considerably less variable, but still depends on the origin of the beans and other factors. Table 2 shows a range of values for the caffeine content of coffee, tea, and chocolate products.

Caffeine serves a variety of pharmacologic functions and is found in combination with drugs used as stimulants, pain relievers, diuretics, cold remedies, and weight-control products.

Table 2

Caffeine Content of Popular Beverages and Foods	
Item	Caffeine content ^a (mg)
Coffee (5-oz cup)	
Drip method	110-150
Percolated	64-124
Instant	40-108
Decaffeinated	2-5
Instant decaffeinated	2
Tea, loose or bags (5-oz cup)	
1-min brew	9-33
3-min brew	20-46
5-min brew	20-50
Tea products	
Instant (5-oz cup)	12-28
Iced tea (12-oz can)	22-36
Chocolate products	
Hot cocoa (6 oz)	2-8
Dry cocoa (1 oz)	6
Milk chocolate (1 oz)	1-15
Baking chocolate (1 oz)	35
Sweet dark chocolate (1 oz)	5-35
Chocolate milk (8 oz)	2-7
Chocolate-flavored syrup (2 tbs)	4

^aData obtained from Consumers Union, Food and Drug Administration, National Coffee Association of the U.S.A. and National Confectioners Association of the United States

Physiological Effects

Depending on the dose, caffeine can increase heartbeat and basal metabolic rate, promote secretion of stomach acid, and step up the production of urine. It acts to dilate some blood vessels, to constrict others, and to increase the capacity for muscular work (1). Caffeine has been shown

to be an effective bronchodilator in young patients with asthma (2).

Caffeine in the blood plasma rises to peak levels within 30 minutes of consumption by mouth. While it is present in the blood, caffeine also penetrates all the body's tissues in amounts approximately proportional to their water content. This distribution throughout the body extends to the reproductive system, since caffeine freely crosses the blood/testicular and fetal/placental barriers. Caffeine is also secreted in human milk.

The time required for the body to eliminate one-half of any substance introduced into it is called the "half-life". The half-life of caffeine varies from several hours to several days, depending on age, sex, hormonal status, medication being taken, and whether or not an individual smokes. Newborns do not have the enzyme(s) needed to metabolize caffeine until several days after birth, so half-life in newborns is about 3-4 days (3). The half-life in children and smokers is less than 3 hr; in the average non-smoking adult about 5-7 hr (4) and in women taking oral contraceptive agents, up to 13 hr (5). Pregnant women, particularly in the last trimester, require 18-20 hr to metabolize half the caffeine, but the metabolic rate returns to normal within a month after delivery (6, 7).

Toxicity

Excessive consumption (more than 600 mg/day, the equivalent of about 5-6 5-oz cups of strong brewed coffee) may lead to caffeinism, sometimes referred to as "coffee nerves," in some individuals, especially if consumed in a short time period. Symptoms of caffeinism include anxiety, restlessness, delayed onset of sleep or frequent awakenings when asleep, diarrhoea, headache and heart palpitations (8).

Individuals who drink little or no coffee show a greater sensitivity to its effects than do heavy coffee drinkers, who are relatively insensitive to it (9).

In humans, the fatal oral dose is estimated to be about 10g, equal to the amount contained in about 80-100 cups of strong brewed coffee or 200 cans of cola beverage consumed within a half-hour period.

Only eight fatalities from caffeine poisoning have been reported in the English-language literature (10).

Questions of Safety

The Select Committee on GRAS Substances reviewed the data on caffeine in 1978 (11); the majority opinion reaffirmed the safety of caffeine, but did require that additional research be conducted. The Committee concluded that "while no evidence in the available information on caffeine demonstrates a hazard to the public when it is used in cola-type beverages at levels that are now current and in the manner now practiced, uncertainties exist requiring that additional studies be conducted."

Foods and beverages containing caffeine have been associated publicly with a wide variety of conditions and diseases, including peptic ulcers, heartburn, cardiovascular disease, cancer, fibrocystic breast disease, birth defects, anxiety disorders, and central nervous system abnormalities.

Data from animal tests on caffeine clearly show that in very large doses, it can have deleterious effects. In humans, there are few data on the effects of comparably large doses, but all of the available data on moderate intake of caffeine indicate that the hazard to humans, if any, is minimal.

Ulcers and Heartburn

Coffee, both "regular" and decaffeinated, has been shown to stimulate the gastric mucosa and increase secretions of stomach acid, exacerbating *existing* ulcers (12). Since regular and decaffeinated coffee both increase the flow of stomach acid, it appears that caffeine is not the component of the brew responsible.

In the case of heartburn, caffeine alone is clearly not a causative factor. Heartburn occurs when the ring of muscles (the sphincter) at the lower end of the oesophagus relaxes, allowing the contents of the stomach to "back up" into the oesophagus. Anything that makes these muscles relax can cause heartburn. Caffeine alone has virtually no effect on this sphincter. Coffee, on the other hand, has been shown to relax the muscle ring in some people, while having the exact opposite effect in others.

Cardiovascular Disease

"The risks of infarction among those drinking one to five and six or more cups of coffee per day are estimated to be increased by 50% and 120% respectively," the researchers report (13, 14), and the greater the amount of coffee consumed, the greater the risk.

However, no evidence has been found in the long-term Framingham Study of a relationship between coffee consumption and coronary heart disease, angina pectoris, or myocardial infarction (15).

Coffee and tea consumption were correlated to the total serum cholesterol level of 42,627 white men and women who underwent health examinations at the Kaiser-Permanente medical centre from 1978 to 1981. While a significant association between coffee intake and higher cholesterol levels was found, there was no relationship in the case of tea drinkers. This suggests that caffeine per se is not the causative factor.

A long-term study of 1,130 white male physicians, graduates of Johns Hopkins medical school from 1948 to 1964, showed that heavy coffee drinkers (5 or more cups a day) had a risk of heart failure, heart attack, or severe heart pain, 2.8 times greater than their non-coffee-consuming peers (16). However, the researchers noted that their study did not control for diet, sedentary lifestyle, or job stress, and that only 47 of the subjects had developed heart disease.

While common sense dictates that *excessive* consumption of stimulants such as caffeine is not particularly wise, there continues to be no evidence to suggest that moderate caffeine intake is a causative factor in cardiovascular disease.

Cancer

Studies between bladder cancer and coffee (17, 18, 19, 20, 21) have confirmed that cigarettes and some occupational exposures are definitely a risk for bladder cancer. Many people who drink caffeinated beverages also smoke cigarettes. However, no cause-and-effect relationship has been demonstrated.

Studies between pancreatic cancer and coffee (22-26) support the view that there is no link between regular or decaffeinated coffee consumption and pancreatic cancer. Other studies (27, 28) have found no link between coffee intake and any form of cancer.

Fibrocystic Breast Disease

A link was reported between consumption of methylxanthines and benign fibrocystic breast disease (29, 30).

However, Ernster *et al* (31) concluded that there was no relation between clinically palpable breast finding scores and caffeine consumption levels. Levinson and Dunn (32) reviewed the 1980-86 literature and reported that there is "little evidence to support the association between methylxanthine consumption and fibrocystic breast disease." They added, "Some women may continue to limit their caffeine ingestion in an attempt to decrease symptoms of FBD. However, on the basis of this review, we do not recommend that physicians routinely counsel otherwise healthy women with FBD to avoid caffeine."

Effects on Birth, Development and Growth.

Largely on the basis of animal tests (33), FDA in 1980 advised pregnant women to reduce their intake of caffeine. In these tests, birth defects were seen in pregnant rats that were force-fed large quantities of caffeine by stomach tube — the human equivalents of 56 and 87 cups of strong brewed coffee at one time.

The force-feeding method used in the FDA experiments was much criticized, since it gave the animals their entire daily dose of caffeine at once. Subsequently, FDA sponsored "sipping studies," conducted by the same researchers who did the force-feeding studies. In these studies, rats received caffeine at similar daily dose levels but in their drinking water, a method more comparable to the way humans normally consume caffeine. Offspring of pregnant rats that "sipped" high doses of caffeine solution did not show any of the birth defects seen in the off-spring of pregnant rats that were force-fed (34).

Caffeine can indeed cause birth defects in animals, but only when given at very high doses. What do human studies show?

During the past decade, at least eight studies have dealt with the incidence of birth defects in children and caffeine consumption by their mothers. The findings were negative (35, 36).

Thus, there is no human evidence at this time to suggest that moderate caffeine consumption by pregnant women causes birth defects. Moderation in the consumption of caffeine-containing foods, beverages, and drugs, however, should be emphasized.

Central Nervous System Effects

Weiss and Laties (37) have pointed out that administration of 200-250 mg caffeine to adults "is known to increase alertness, stimulate attention and restore performance degraded by factors such as fatigue and boredom."

While the consumption of moderate amounts of caffeine does little or no harm to psychologically normal people, hospitalized psychiatric patients (38) and individuals with anxiety disabilities (39) showed some benefit from the withdrawal of caffeine from their diets and medications.

Rapoport *et al* (40) reported that caffeine consumption by children at levels equivalent to about 72 oz of cola drinks (6 cans) per day resulted in behavioural changes.

A subsequent study, in which high-caffeine-consuming children were tested against low-caffeine consumers in a double-blind, placebo-controlled challenge study, showed that the low-caffeine consumers were affected by caffeine while the other group was not (41).

The authors pointed out that the study illustrated the importance of challenge studies, because the initial correlational data would have indicated that caffeine "caused" hyperactivity. "Instead," they noted, "the

challenge data indicates that hyperactive children might selectively ingest caffeine, quite the contrary finding."

Alternatives to Caffeine-Containing Beverages

In addition to water, milk, and fruit juices — which do not contain caffeine — caffeine-free colas, decaffeinated coffees and teas, and caffeine-free herbal teas are available.

Herbal teas however, may not necessarily be risk-free, because less is known about the ingredients of herbal teas than about regular teas.

Decaffeination of Coffee and Tea

Decaffeination has recently received public attention as a result of FDA's proposed ban (42) of methylene chloride in aerosol cosmetic products. Methylene chloride has a variety of uses, including extraction of caffeine in decaffeination processes.

When inhaled for lifetimes in excessive quantities, methylene chloride produced tumours in rats and mice. However, residues of this solvent in decaffeinated coffees are extremely low and do not pose a cancer risk to humans. FDA has determined that methylene chloride is safe for decaffeinated coffee use (42), and therefore the substance is still permitted for use in coffee decaffeination.

There are two basic coffee decaffeination processes — water extraction and direct solvent extraction (43). The processes differ slightly in their effect on the flavour of the resultant coffee and in process operation costs. Decaffeinated coffee and tea suffer a small loss in aroma and taste during the decaffeination process. However, decaffeination affects coffee less than tea.

Tea may be decaffeinated with either the solvent ethyl acetate or carbon dioxide. Methylene chloride is currently not permitted for tea decaffeination in the U.S.

Safety of Methylene Chloride Decaffeinated Coffee

FDA continues to permit the use of methylene chloride to decaffeinate coffee because it has determined that any potential risk from using methylene chloride for this purpose is so low "as to be essentially non-existent" (42).

In two long-term studies sponsored by the National Coffee Association of the U.S.A., methylene chloride was administered to rats and mice in their drinking water at doses of 5-250mg/kg/day throughout their lifetime (44). Methylene chloride did not induce a carcinogenic response at doses which could be considered equivalent to human consumption of up to 6 million cups of decaffeinated coffee/day for a lifetime.

The mortality rates of 1,000 male employees exposed to methylene chloride in an Eastman Kodak plant were followed for 21 years and were compared to the mortality rates of more than 40,000 men in control groups (45). Diseases such as respiratory and hepatic cancer and ischemic heart disease, which had been hypothesized to be related to methylene chloride exposure, did not occur more frequently among the exposed employees than among those in the control groups.

More than 2,000 employees of two Dow Chemical plants were also studied (46). The health status of the employees of one plant which used methylene chloride in its manufacturing process was compared to that of the employees of the other plant which did not use methylene chloride. The results of this study also indicated that the solvent had no adverse impact on the health of exposed employees. No significant increase in overall mortality or cancer was observed.

Conclusion

Caffeine has had a long history of safe use by humans. While questions about the ultimate safety of caffeine remain, there is a solid body of evidence supporting the view that moderate amounts are not harmful to the average healthy adult. The processes used for decaffeination of coffee and tea do not impart a health hazard to the final products as consumed.

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BOOK REVIEW:

The Food Revolution

"The Food Revolution", Verner Wheelock. Chalcombe Publications: Marlow, 1986. 119 pages, soft bound.

This book is written for those with an interest in food: consumers, health professionals, and those involved in the food and agricultural industries.

Dr. Wheelock, currently head of the food policy research unit at the University of Bradford, UK, has presented this very comprehensive overview of the ongoing changes in consumer attitudes towards food and the resulting implications for the food manufacturing and related industries.

The book begins with an analysis of the shift in disease patterns in the West within the last 100 years, from deficiencies and infections to the diseases of plenty and degenerative diseases such as obesity, coronary heart disease, diabetes and cancer. The central role and influence of diet on these diseases forms the core of the first few chapters. Emphasis is given to citing of scientific data from health authorities and studies done in various countries. The concluding message is that dietary modification and reduction of other risk factors (example - smoking and lack of exercise) are the most effective measures in the prevention and control of these modern diseases.

The ensuing chapters dwell on the history and development of food policies and dietary guidelines in the west. These are traced from the initial recommendations of the American Heart Association some 25 years ago, calling for a reduced intake of salt, fat and cholesterol and avoidance of excess weight, to the more refined and detailed guidelines of today such as the COMA¹ report of 1984. The author also highlights the complications and

difficulties authorities are likely to encounter in implementing food policies largely through resistance and pressure from related industries which may feel threatened.

Since the fundamental objective of any dietary policy is to promote eating patterns conducive to health, its success ultimately depends on the action of consumers. With greater awareness of the various health issues through media education, there now arises a marked change in consumer attitudes towards food, maintains Dr. Wheelock. The many different factors that contribute to this change and its implications on the retailing, manufacturing and production sectors of the food industry are outlined and examined in the latter part of the book.

One such factor that may strike a familiar note to readers in Singapore concerns the detection of excess pesticide residues in some vegetables, which recently caused much alarm among the local populace. It remains to be seen whether the growing sophistication of consumers here will eventually lead to a demand for so-called "organically grown" food as it has done in the west. Government responsibility aside, far-sighted food producers must take the lead in providing safe and nutritious food. In the long run their success will rest on the ability to produce healthy food which the consumer will enjoy, Dr. Wheelock concludes.

Although primarily geared to the British rather than the international reader, this is nonetheless a unique book providing an interesting revelation of the current trends in food consumption and how farmers and the food industry can best adapt to changing demands.

¹Committee on Medical Aspects of Food Policy. *Diet and Cardiovascular Disease*. HMSO: London, 1984.

The Fifth Asian Congress of Nutrition Osaka, Japan, October 26-29, 1987

The Congress was attended by 750 nutritionists/scientists from all over the world, the greater portion coming from the Asian region. Organised every four years, the last Congress was held in Bangkok and the Sixth Asian Congress will be held in South Korea. Papers were presented on many topics and symposia titles included "Nutrition and Cancer", "Prevention of Cardiovascular Disease" and "Parenteral Nutrition".

Participants from Singapore included Mrs. Tan Wei Ling and Dr Tay Lie Ping of the Ministry of Health and Susani K. Karta of the American Soybean Association. Ms Karta presented a paper entitled "Soybean Utilisation: Functional and Nutritional Properties".

The Congress provided an opportunity for the participants to meet other professionals from the neighbouring countries and update their knowledge of the current nutritional trends in the region.

Following are some abstracts of talks presented at the Congress.

NUTRITION AND HEALTH – NEW KNOWLEDGE, NEW CHALLENGES

Dr. Nevin S. Scrimshaw

Institute Professor, Massachusetts Institute of Technology and Director, United Nations University Food, Nutrition, Biotechnology, and Poverty Programme

Nutrition is nearly unique among sciences in its dependence on comparative research in a variety of human populations and environmental circumstances. Research on experimental animals has contributed importantly to advances in nutrition, but many human nutrition problems cannot be adequately studied in experimental animals.

International research has a role in understanding and conquering the classical nutritional deficiency diseases, unraveling the synergistic interactions of nutrition and infection, and determining the role of diet in the aetiology of coronary heart disease, cancer, and other chronic non-infectious diseases. Comparisons among populations of different genetic backgrounds and environmental circumstances are also essential for learning the range of nutritional requirements.

There is still an acute lack of nutrition knowledge and nutrition services in many Asian countries and an urgent need for increased education and training as well as institution building in food and nutrition. Nutritionists should also be concerned with the briefing of policy makers and the nutrition education of the public through the press, radio, and television.

The science of nutrition involves a broad range of disciplines, including not only experimental and human nutrition, biochemistry, and physiology, but also those of public health, agriculture, and the social sciences. Public health nutritionists must be trained to view nutritional improvement as an integral part of health improvement, and to consider such primary health-care activities as immunization, improved sanitation, and oral rehydration as contributing importantly to nutritional improvement.

Human dignity is a right that requires adequate food. Nutritionists should see themselves as the defenders and promoters of this vital human right.

HYPERTENSION AND SALT

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There is much evidence linking salt intake and blood pressure (BP). It is derived from physiological knowledge about sodium (Na) and Na-regulating hormones, from animal studies, from the use of very low Na diets and from epidemiological studies. In the latter, *intra*-population studies show a significant relationship between Na intake and BP but *inter*-population studies have given inconsistent results: a positive relationship has been found in Chinese, Japanese, Koreans and Kenyans but not in whites.

Short-term trials of moderate salt restriction also have given inconsistent results and the concept of "salt sensitivity" and "salt resistance" has emerged, i.e. in some people BP responds to changes in Na intake while in others it does not. This does not entirely fit the epidemiological data which suggest that a whole population's mean BP is high when salt intake is high. Possibly there are different degrees of salt sensitivity; there appear also to be racial differences in this respect.

It is possible that short-term trials of salt-restriction fail to give the whole picture, i.e. there may be some long-term adaptation to low or high salt intake which is reflected in the blood pressure. This is at present speculative. It seems possible also that other dietary factors may interact with salt to affect the BP. For instance, there is much interest currently in the effect of calcium intake on the BP, a high intake apparently being beneficial. An adequate intake of potassium and magnesium is thought also to be beneficial. Finally there is the likelihood that the amount and type of fat we eat affects the fatty acid composition (and thus the function) of our cell membranes. In this connection it is interesting that a link between salt intake and BP is easier to find in populations (e.g. Chinese, Japanese, Koreans, Kenyans) who have a low fat intake than in white populations who have a high intake of saturated fat.

While more work is required on the effect of changes in diet on BP levels, it is likely that a reduction in Na intake to about 100-120 mmol/day would be beneficial and would not lead to problems except where iodine intake is dependent on iodised salt.

(Note: dietary data should be in mmol of sodium. Sodium is present not only as NaCl, but also as other salts. 1g NaCl contains 17 mmol Na but 17 mmol Na does not necessarily equal 1g NaCl.)

The author's work is supported by the Medical Research Council of New Zealand and the National Heart Foundation of New Zealand.

HOW TO MANAGE DIETARY, DRUG, AND SPECIAL TREATMENTS IN PATIENTS WITH HYPERLIPIDAEMIAS

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Most of the cases of hyperlipidaemias in Japan are mainly based on hereditary predisposition, being mildly affected by nutritional conditions. A high consumption of vegetable oil and dietary fibre with a relatively small intake of animal fat seems to have been contributing to the prevention of atherosclerotic vascular diseases among Japanese. A highly significant relationship between hypertension and hyperlipidaemia is seen among obese people, and such a relation is significant even among non-obese people. These facts tell us that the dietary treatment is primarily important in the management of the patients at high risk of coronary heart diseases.

Lowering the total energy intake was shown to be the most appropriate dietary treatment of Japanese. Even with a low calorie diet, an increase in animal fat intake in the form of butter resulted in an insufficient decrease in serum cholesterol levels. However, the difference in the serum cholesterol levels between low- and high-animal fat diets with low-energy supply was much less than the difference observed under high energy supply.

Administration of eicosapentaenoic acid (EPA, 1.8g/day) did not cause a remarkable reduction in cholesterol in the patients who had already been under dietary treatment. There was no increase in docosahexaenoic acid (DHA) in serum lipids by giving a purified EPA preparation. Administration of a crude preparation including EPA and DHA at the ratio of 2:1 caused an increase in DHA. The significance of DHA was estimated by comparing the effect of EPA and DHA on platelet aggregation.

Among the various types of primary hyperlipidaemias, familial hypercholesterolaemia (FH) is resistant to dietary treatment. Obesity and glucose intolerance are not frequent among those with FH. Therefore, direct use of anticholesterolaemic drugs seems to be preferable for FH patients, especially those already having ischaemic heart diseases.

Strict dietary restriction often led the patients to drop out from the long-term trials. A combined drug therapy using three drugs, cholestyramine, probucol, and a hydroxymethylglutaryl CoA reductase inhibitor, resulted

in a 50% decrease in serum cholesterol levels. Another combination therapy using cholestyramine and clofibrate (or one of its analogues) is recommended for the patients with combined hyperlipidaemia. Physical exercise was synergic with the drug therapy especially in the latter cases. Effect of clofibrate or its derivatives is reportedly more remarkable among Western populations than Japanese. In contrast, probucol gave greater reduction in serum cholesterol among Japanese than in Western countries. We found that the restriction of total energy and fat intake enhanced the efficiency of probucol.

NUTRITIONAL ASPECTS OF TRANS FATTY ACIDS

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Hydrogenated fat products such as margarine and shortening commonly contain varying amounts of *trans* fatty acids. The prototype is *trans* octadecenoate composed of a number of the positional isomers. The hardened products also usually contain a small amount of the isomers of linoleic acid. The content of *trans* fatty acid varies depending on the products, and home-use margarines from various Asian countries contain as geometrical isomers practically zero to 35% of total fatty acids with an average value of 15%. In general, the linoleic acid content was higher in margarines produced in Japan than in those from other countries.

From the analysis of diets, Japanese students were estimated to be consuming not more than 2g of *trans* fatty acids per capita per day. Human adipose tissues contained detectable amounts of *trans* fatty acids in response to the amount ingested; the range observed was 0.5 to 4.5% of total fatty acids (average 2.5%). Although studies with rats showed that the proportion of *trans* fatty acids deposited paralleled to the amounts ingested, the long chain *trans* fatty acids (t-20:1, t-22:1) occurring in hardened fish oil were not detected to a measurable amount.

Carefully controlled animal studies indicated that *trans* monoene fat is, as compared to the *cis* monoene, in no way hypercholesterolemic and atherogenic. The same seems true for humans. Feeding hydrogenated fats containing 25% *trans* octadecenoate to rats at a level above 10% of the diet resulted in the stimulation of cholesterol metabolism primarily due to an increased faecal elimination of both neutral and acidic steroids. The cholesterol dynamics were directed to compensate the increased faecal loss.

Interference of *trans* fat with the metabolism of linoleic acid and hence the production of eicosanoids could be practically ignored insofar as the intake of linoleic acid is adequate. Although *trans* monoene increased faecal excretion of steroids, its effect on the incidence of carcinogen-induced colon tumours in rats was comparable to that of *cis* fat. Also, geometrical difference did not significantly influence the mammary tumorigenesis induced by chemical carcinogens or the growth of transplantable tumours. All of the currently available information therefore indicates that *trans* fat may not be hazardous to the public at dietary levels that are now current. Thus, *trans* fatty acid in commercial products is not a plague and should not be unfairly prejudiced.

In Brief...

The safety of very low calorie diets

Lingering social prejudice against people who are overweight means that the quest for slimness is a common one, particularly among women.

The orthodox reducing diet, however, yields discouragingly slow results, which depend on long-term willpower. The slimming industry has spent years searching for a preparation that assures rapid weight loss.

The very low calorie diets (VLCDs) appeared to be their golden egg. And the recent popularity of several products, particularly the Cambridge Diet (which provides 330 kcal/day), has caused some members of the profession to fear that the profit-motive exploiting an eager and vulnerable market overshadows legitimate concern about the safety of the VLCDs. Anxiety is rooted in the fact that a number of people on early versions of the VLCDs, the so-called liquid-protein diets, died in the United States in the early '70s. These diets were subsequently removed from the market.

The Committee on Medical Aspects of Food Policy (COMA)¹ published a long awaited report on the use of VLCDs in obesity. The difficult subject of whether or not VLCDs cause hazardous loss of lean body

tissue is circled and never satisfactorily answered. COMA defines VLCDs as diets that provide less than 600 kcal/day for several days or weeks. COMA warns that there is comparatively little information on the effect on health of prolonged use of VLCDs. The report justifies claims for their safety on the absence of serious complaints from consumers, but this situation does not take into account possible damage caused by long-term use, on-off use, or the yo-yo syndrome of losing and gaining weight rapidly. COMA advises that VLCDs should provide a minimum of 400 kcal/day for women and 500 kcal/day for men and tall women, and 40 and 50g respectively of suitable protein per day. The report does not specifically limit the time spent on a VLCD and does not recommend a satisfactory interval between dieting or the adoption of long-term healthy eating habits.

¹Committee on Medical Aspects of Food Policy. *The Use of Very Low Calorie Diets in Obesity*. HMSO: London, 1987.

Source: *The Lancet*, January 2/9, pg 70-71, 1988.

Vitamin preparations as supplements/therapeutic agents

Statement by American Medical Associations Council on Scientific Affairs

The group states that healthy adult men and healthy adult non-pregnant, non-lactating women consuming a usual, varied diet do not need vitamin supplements. Infants may need dietary supplements at given times, as may pregnant and lactating women. Occasionally, vitamin supplements may be useful for individuals with unusual life-styles or modified diets, including certain weight reduction regimens and strict vegetarian diets.

Vitamins in therapeutic amounts may be indicated for the treatment

of deficiency states, for pathological conditions in which absorption and utilization of vitamins are reduced or requirements increased, and for certain non-nutritional disease processes. The decision to employ vitamin preparations in therapeutic amounts rests with the physician. The importance of medical supervision when such amounts are administered is emphasized. Therapeutic vitamin mixtures should be so labeled and should not be used as dietary supplements.

Source: *The Journal of the American Medical Association*, vol 257, April 10, 1987 pg 1929

Abstracts

NUTRITIONAL THERAPY FOR HIGH BLOOD PRESSURE' FINAL REPORT OF A FOUR-YEAR RANDOMIZED CONTROLLED TRIAL - THE HYPERTENSION CONTROL PROGRAM.

Stamler, R., Stamler, J., Grimm, R., Gosch, F.C., Elmer, P., Dyer, A., Berman, R., Fishman, J., Van Heel, N., Civinelli, J., and McDonald, A. *The Journal of The American Medical Association* Vol. 257, March 20, 1987, p. 1484.

A 4-year trial assessed whether less severe hypertensives could discontinue antihypertensive drug therapy, using nutritional means to control blood pressure. Randomization was to three groups: group 1 - discontinue drug therapy and reduce overweight, excess salt, and alcohol; group 2 - discontinue drug therapy with no nutrition program; or group 3 - continue drug therapy, with no nutrition program. In groups 1 and 2, patients resumed drug therapy if pressure rose to hypertensive levels. Loss of at least 4.5 kg (10 + 1b) was maintained by 30% of group 1, with a group mean loss of 1.8 kg (4 lb); sodium intake fell 36%; and modest alcohol intake reduction was reported. At 4 years, 39% in group 1 remained normotensive without drug therapy, compared with 5% in group 2. Study findings demonstrated that nutrition therapy may substitute for drugs in a sizeable proportion of hypertensives or, if drugs are still needed, can lessen some unwanted biochemical effects of drug treatment.

VITAMINS - HOW MUCH IS FOR KEEPS?

Sauberlich, H.E., *Nutrition Today* Vol 22, January/February 1987 - p. 20.

An evaluation of the adequacy of dietary intakes of nutrients requires knowledge of not only the nutrient content of the foods ingested but also the extent to which the nutrient present in the diet is available for absorption and utilization (that is, its bioavailability).

These vitamins are discussed in terms of absorption and utilization: vitamin C, thiamin, riboflavin, vitamin B-6 (pyridoxine, niacin, folate, vitamin B-12, biotin, pantothenic acid, vitamin A (retinol, B-carotene), vitamin D, vitamin E, and vitamin K.

In Brief...

Monosodium glutamate: scientific status summary by the International Food Technology Expert Panel on Food Safety and Nutrition.

Use of MSG in food dates to antiquity when Oriental cooks used a seaweed (sea tangle) to make stock. Today, this flavor enhancer is produced around the world, usually by a fermentation process. Recent research by sensory physiologists has suggested that glutamates in foods may provide a fifth basic taste (in addition to sweet, sour, salty, and bitter). The flavor is referred to in Japanese as "umami." Flavor enhancement studies show that use of MSG in foods is self-limiting; taste panel studies indicate that a level of about 1/2 tsp per pound of meat or per 4 to 6 servings of vegetables, casseroles, and soups gives the best enhancement.

A recent study refutes the claim that MSG should not be used in baby foods. Term and premature human infants can metabolize glutamate as effectively as adults. A review of studies of the safety of glutamate suggests that the primate appears to be particularly resistant to glutamate; no evidence of central nervous system damage was found following MSG force-feeding or dietary administration of MSG at doses up to 4 gm/kg.

In terms of intake of MSG, two aspects of use have received wide attention: the sodium contribution to the diet and the possible idiosyncratic reactions. It should be noted that MSG contains only 12% sodium compared with 40% in table salt. Persons measuring sodium intake are advised to consider it on a portion or individual meal basis, not as a set measurement.

The unpleasant reactions to MSG experienced by some individuals have led to use of the phrase "Chinese Restaurant Syndrome." Studies show that its symptoms can be provoked in a limited number of individuals; to achieve a response, concentrations greater than 3% MSG are required. Use of MSG is specifically authorized in the Standards of Identity for many foods. Glutamic acid and its salts are regulated by the Food and Drug Administration as Generally Recognized As Safe (GRAS) substances. It appears that MSG is a safe, efficacious flavor enhancer for most of the population; it has a role in paediatric and geriatric feeding.

Source: *Food Technology* Vol 41, May 1987, Pg 143

Introducing carbonated milk - a nutritious soft drink

Carbonated milk is simply skim milk with carbon dioxide added - along with flavorings and sweeteners, such as strawberry, chocolate, peach, banana, root beer, or rum. Researchers at the US United Dairy Industry Association project that it will take at least 1 to 1 1/2 years before carbonated milk reaches consumer

markets.

It is estimated that if carbonated milk could capture 6% to 8% of the soft-drink market, it could soak up the milk surplus of the United States of America.

Source: *Food Engineering* Vol 59, May 1987, Pg 70

Abstracts

ULTRASONIC ASSESSMENT OF BODY COMPOSITION IN OBESE ADULTS: OVERCOMING THE LIMITATIONS OF THE SKINFOLD CALIPER.

Kuczmarski, R.J. Fanelli, M.T., and Koch, G.G. *The American Journal of Clinical Nutrition* Vol. 45, April 1987, p. 717.

Previous research in this laboratory, using relatively lean men, indicated that the skinfold caliper and ultrasound techniques gave similar predictions of body density. The present study compared caliper with ultrasound measurements in predicting body density of 44 white, obese, free-living adult volunteers of both sexes. Subcutaneous-fat thickness was measured at six body sites with a Lange caliper and an ADR 2130 ultra-sound scanner. By hydrostatic weighing, mean body density was 1.01 gm/ml and percentage body fat, 41.7%. The best predictors of body density were the thigh and biceps sites with ultrasound and the triceps site with calipers. Furthermore, ultrasound proved to be superior to the caliper technique in measuring subcutaneous fat of obese persons.

MICRONUTRIENT STATUS IN DIABETES MELLITUS

Mooradian, A.D., and Morley, J.E. *The American Journal of Clinical Nutrition*, Vol. 45, May 1987 p. 877.

This chronic metabolic disorder can alter the nutritional status of the individual. Some micronutrients, in particular zinc and chromium, have been implicated in the pathogenesis of carbohydrate intolerance. This review of the available published data concludes that both Type I and Type II diabetes mellitus can result in changes in certain micronutrients.

There are indications that trace-mineral urinary losses are accentuated during uncontrolled hyperglycemia and glycosuria. Patients who are on a high-fiber diet or those who are acidotic or glycosuric are at particular risk of developing profound deficiency of certain minerals such as zinc and magnesium. Adequacy of mineral and vitamin intake should be established when severely restricted diets are prescribed to patients with diabetes.

In Brief...

European policy statements on prevention of coronary heart disease

A comparison is made between recent publications of the European Atherosclerosis Society and the British Cardiac Society Working Group on Coronary Heart Disease Prevention. There is considerable agreement between the two reports — this is important because it reflects a medical consensus across the whole of Europe that coronary disease rates are unacceptably high and should be reduced by action directed at reducing dietary fat and smoking and increasing exercise in the population. There is little new in the reports, except for presentation of further evidence for a protective effect of essential fatty acids.

Both reports give advice on patient management at specific levels of serum cholesterol; above 6.4 mmol/L, the advice is consistent. Dietary advice is of primary importance at levels up to 7.8 mmol/L (300 mg/dl)

serum cholesterol; above this level, referral to a lipid clinic or a physician in regard to drug therapy is indicated.

Both reports make specific recommendations on reduction of dietary fat. The British group endorses the dietary recommendations of COMA (its Committee on Medical Aspects of Food Policy) — 35% of food energy from fat, including 15% saturated fat. The European report endorses the WHO recommendations — 30% food energy from fat, including 10% saturated fat. The British report highlights the need for good dietary habits in childhood, but the recommendation of reducing dietary fat to 35% of total energy intake is not intended for children below the age of 5 years.

Source: *The Lancet*, vol 1 March 14, 1987 Pg 601

Meetings

April 28-29, 1988
Washington, DC
American Society for Clinical Nutrition

Contact: ASCN
9650 Rockville Pike
Bethesda
MD 20814.

May 22-26, 1988
Yulara-Ayers Rock
International Congress on Diet, Lipids and Cancer.

Contact: Dr. J.R. Sabine
Dept of Animal Science
Waite Agr. Res. Inst.
Glen Osmond
South Australia 5064
Australia.

Sept 26-30, 1988
Arnhem, Holland
International Symposium on Nutrition, Bone Metabolism and Muscle Function.

Contact: E.C.H. van Berestyn
Dept of Nutrition
Netherlands Inst. for Dairy research
P.O. Box 20
6710 BA Ede Gld
The Netherlands.

Erratum

In the article entitled "Eating Out" in the September 1987 issue of *The Singapore Dietitian*, unpublished data was incorrectly reported as being from a survey conducted by the Singapore Cancer Registry. The correct source of this data is Gourley, L. (unpublished), 1985.

Abstracts

METABOLIZABLE ENERGY IN HUMANS IN TWO DIETS CONTAINING DIFFERENT SOURCES OF DIETARY FIBER CALCULATIONS AND ANALYSIS

Goranzon, H. and Forsum, E., *The Journal of Nutrition* Vol. 117, February 1987 p. 267.

Two diets providing between 33 and 74 gm dietary fiber per day were consumed by healthy young adults in balance experiments. Metabolizable energy was calculated by application of Atwater's general factors (4, 9, and 4 kcal/gm protein, fat, and carbohydrate, respectively), Merrill and Watt's specific factors, and the British approach, in which metabolizable energy from carbohydrates is calculated by multiplication of the monosaccharide equivalent by 3.75 kcal/gm. These factors were applied to the intakes of fat, protein, and carbohydrate.

It was calculated that the dietary fiber in diet A, derived mainly from cereals, contributed 2.5 ± 1.4 kcal/gm to metabolizable energy of the diet. The corresponding figure for dietary fiber in diet B, derived mainly from beans, vegetables, and fruits, was 3.1 ± 1.2 kcal/gm. It was concluded that Merrill and Watt's factors represent the best system in current use for calculation of metabolizable energy in dietary fiber-rich diets.

AN INSULINOGENIC EFFECT OF ORAL FRUCTOSE IN HUMANS DURING POSTPRANDIAL HYPERGLYCEMIA.

Reiser, S., Powell, A.S., Yang, C.Y., and Canary, J.J., *The American Journal of Clinical Nutrition*, Vol. 45, March 1987, p. 580.

It has been shown consistently that a fructose load given after an overnight fast produces only small increases in blood glucose and insulin levels. Fructose is rarely consumed alone, however; it is usually combined with other dietary components that would be expected to elevate blood glucose levels.

Results indicate that oral fructose can be insulinogenic when blood glucose levels are elevated. Implications of these findings are considerable in view of the positive association between elevated levels of blood insulin and atherosclerosis.



Singapore Dietitians' Association

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3. Transcripts
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Name: (Mr/Mrs/Miss/Dr) NRIC No.

Address: (Home) (Office)

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THE SINGAPORE DIETITIAN

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The following policies are implemented in an attempt to attain a reasonable standard and format for the *Journal* and at the same time encourage submission of manuscripts from professionals in fields allied to nutrition and dietetics.

The *Journal* will publish original research papers, review articles, short clinical communications and correspondence. Original research papers and short communications should be presented in the following format:

Title

The title should summarise the main idea of the paper in a concise statement. Its principle function is to inform readers about the nature of the paper, thus it should be self-explanatory when standing alone.

Abstract

The abstract should briefly summarise the content and purpose of the article. It should allow the reader to survey the contents of an article quickly.

An abstract of a research paper should contain statements of the problem, method, results and conclusion. The subject population should also be specified.

The abstract should be typed immediately below the title and should not be labelled.

Method

This should clearly describe how the study was conducted. It should be detailed enough to allow an investigator to replicate the study. This will also allow the reader to assess the appropriateness of the methods and the probable reliability of the results.

Results

The results should summarise the collected data and any statistical treatment of them. The use of graphs or tables will clarify information.

Discussion and conclusion

These should present an evaluation of the implications of the results. They should examine, interpret and qualify the results and draw inferences from them. Similarities and differences between these results and the work of others should be cited.

References

In text cite references in arabic numerals in parentheses. All references cited and other relevant works should be listed on a separate page. The following convention should be followed:

In the case of books: author's surname and initials; title of book; name of publisher; place of publication; year of publication.

In the case of a chapter of a book: author's surname and initials; title of chapter; name of editor; book title; publisher's name; place of publication; year of publication. See example 1 below.

In the case of a paper from a journal: author's surname and initials; title of paper; name of journal; volume, number, page numbers, year of publication. See example 2.

Example 1

Smith, A.B. Chapter title. In *Tropical Medicine*, 2nd edn., ed. Doe, J. Blackwell: Oxford, 1981.

Example 2

Brown, C.D. and Green A.T. Influences on eating habits of Asians in London. *Hum. Nutr: Appl. Nutr.* 40:107-15, 1985.

References should be numbered in the order in which they appear in the text.

Tables, photographs and illustrations

Each table and illustration must appear on a separate page. They should be numbered and labelled.

Reproduction tends to soften contrast and detail in photographs. It is therefore necessary to ensure that all photographs have sharp contrasts.

Preparing the manuscript

Typing should be double spaced with a margin of 4cm at the top, bottom and sides of the page to allow for editorial markings.

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Two copies, including the original, should be submitted to the Editor (address on page 3).

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Important Notice: The World Health Organisation (WHO)* has recommended that pregnant women and new mothers be informed of the benefits and superiority of breastfeeding - in particular the fact that it provides the best nutrition and protection from illness for babies. Mothers should be given guidance on the preparation for, and maintenance of, lactation, with special emphasis on the importance of a well-balanced diet both during pregnancy and after delivery. Unnecessary introduction of partial bottlefeeding or other foods and drinks should be discouraged since it will have a negative effect on breastfeeding. Similarly, mothers should be warned of the difficulty of reversing a decision not to breastfeed. Before advising a mother to use an infant formula she should be advised of the social and financial implications of her decision: for example, if a baby is exclusively bottlefed, more than one can (450 g) per week will be needed, so the family circumstances and costs should be kept in mind. Mothers should be reminded that breastmilk is not only the best, but also the most economical food for babies. If a decision to use an infant formula is taken, it is important to give instruction on correct preparation methods, emphasizing that unboiled water, unboiled bottles or incorrect dilution can all lead to illness. (* See - International Code of Marketing of Breast Milk Substitutes, adopted by the World Health Assembly in resolution WHA 34, 22, May 1981. Information for the medical profession only.