

## **4E: DO THE CURRENT AUSTRALIAN RECOMMENDATIONS ON HEALTHY EATING NEED A RETHINK?**

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### **The Nutrition Australia Healthy Food Pyramid**

The National Health and Medical Research Council (NHMRC) developed Dietary Guidelines for Australians in 1992 that provided advice about healthy food choices. These guidelines were embodied in the Nutrition Australia Inc “healthy food pyramid” which is Australia's best-recognised nutrition icon, placing the most recommended foods at the base of the pyramid and foods which should be eaten sparingly, if at all, at the apex. This eating regime was suggested to minimise the risk of diet-related diseases and establish the foundation for a healthy life-style<sup>1</sup>.

In this short article I will examine the Nutrition Australia pyramid and its underlying philosophy to determine if it supports these aims. I will discuss the idea that the recommendation of a high intake of starch-based foods may be in conflict with the aim of minimising the risk of diet-related diseases. Finally, I will suggest improvements that I think better support the intended aim of the food pyramid.

### **An examination of the current Nutrition Food Pyramid**

The Nutrition Australia food pyramid recommends that the majority of calories (70%) should come from low-fat carbohydrates. The remaining 30% of calories should comprise two servings each of lean protein (meats) and low-fat dairy products to boost protein, vitamin, iron and calcium intake. Junk and indulgence foods are placed at the top of the pyramid with the recommendation that they be eaten sparingly.

Carbohydrates occur in the Nutrition Australia food pyramid in four locations: the recommended three bottom tiers that include the starchy staples, vegetables and fruits and the non-recommended top tier that includes biscuits, cakes, sugars, cereal snack foods and sweets. The base tier consists of many processed starchy foods mostly derived from wheat including bread, pasta, noodles and breakfast cereals and other grain products such as rice. The prominence of the base tier has been recognised by manufacturers of these foods who readily display this pyramid on their products. The next tier that contains vegetables and fruits is generally not starch-based although there are some notable exceptions such as potatoes, pumpkin, bananas and corn.

It is relatively easy to comply with the recommendation of eating 5 or more servings of starchy products from the lower tier. A person who regularly has cereals and toast for breakfast, sandwiches for lunch and a generous helping of either rice, pasta, bread or potatoes (a starchy vegetable) as a main feature of or accompaniment to dinner would easily account for 5-6 servings of starchy foods. However, it is well recognised in Australia that the intake of vegetables and fruits is less enthusiastic<sup>4</sup>. I believe that some of the reasons for the preference for starchy cereal foods over vegetables and fruits are the following:

- (a) the extra-prominent positioning of starchy foods on the bottom tier of the pyramid,
- (b) the notion that cereal starches are "free" foods that can be eaten in plentiful amounts (5 plus servings per day),

- (c) the ease of preparation of starchy foods,
- (d) the ready availability of starchy foods in the take-away industry and
- (e) the active recommendation of starchy foods by many nutritionists in preference to other forms of carbohydrate. For example, type II diabetics continue to be recommended starchy foods in preference to vegetables and fruits.

### The problem with starch

I consider that the recommendation of starch-based foods in the bottom tier is the most serious flaw of the current food pyramid. The major problem with starch is that it is too dense (ie it contains a high proportion of digestible starch content per gram of total weight) and many starches also have a high glycaemic index<sup>2</sup>. The glycaemic index (GI) is a reproducible method of ranking foods based on their glycaemic impact—the rate at which carbohydrate based food is digested to simple sugars and absorbed into the body to become circulating sugar (glucose) in the blood.

### How is the GI assessed?

The GI of foods is assessed using the simple sugar glucose as a control and comparing it to equal calorie amounts of other test foods. The ability of a test food to raise blood sugar is compared to glucose. In a sense, GI measures "how similar is a particular test food to the simple sugar glucose"

As glucose does not need to be digested by the body, it "sprints" to the blood stream unchecked resulting in a very rapid rise of blood sugar levels. Because of this, glucose has a GI of 100. It may come as a surprise but the GI of many starchy foods is also close to 100 including many popular breakfast cereals, potatoes, breads and rices (see Table 1)<sup>2</sup>. Therefore, the notion that starchy foods are broken down and absorbed by the body slowly is false. To place the high GI of starchy foods into another perspective, consider that table sugar has a GI of 70, a level lower than many starchy foods. A food with a GI of 70 or above is regarded as being high<sup>2</sup>. In contrast to starchy foods, the GI of most vegetables, fruits and legumes is much lower, even negligible (see Table 1). Therefore, many starchy foods are biochemically-speaking not too dissimilar to a glass of glucose or a pack of jelly beans that would be positioned in the top tier of the pyramid.

Food	GI	Density (gm sugar/100gm fresh weight)	Glycaemic load (GI + Density)
Corn flakes	84	87	171
Wheat Bix	69	63	132
White bread	70	50	120
Rice Bubbles	83	87	170
Potatoes (Desiree)	101	11	112
Burgen bread (Soy-Lin)	19	45	64
Low-Fat Muesli	43	55	98
Lentils	28	19	47
Apples	38	12	50
Orange	44	8	52
Watermelon	72	5	77
Carrot	49	4	53
Pear	38	14	52

Table 1. Summary of the GI, density and glycaemic load of selected foods.

The second problem with many starchy foods is that they are very dense (they have a high amount of available sugar as a proportion of their weight, see Table 1). In contrast, although some fruits (e.g. watermelon GI 72) and vegetables (e.g. carrots GI 49) have a high or moderate GI, their density is low. This means that one would need to eat 1 kg of watermelon to equal the amount of sugar in 100 gm (2.5 slices) of white bread. To accentuate the difference, I have calculated the glycaemic load (GL) for each food (Table 1). Note that food with a high GI and density (GL > 100) would have the greatest effects upon blood sugar levels.

By systematically measuring GI, the following conclusions have been drawn by scientists:

1. Traditional and unprocessed foods have lower GIs<sup>2</sup>. For example, the staple carbohydrate foods of Nauruans, Australian Aborigines and Pima Indians are primarily low in GI.
2. Legumes, whole cereal grains and millets possess low GIs<sup>2</sup>. Note the difference in GI between Bûrger breads compared to white bread.
3. Factory processing and milling markedly increase the GI of foods<sup>2</sup>
4. Simple sugars gave a wide range of GIs: sucrose has a GI of 70, glucose 100 and fructose (the main sugar of fruit) has a GI of 22<sup>2</sup>. The low GI of fructose explains partially why fruits are sweet but have much lower GIs than starches. The high water, low density and fibre content of fruits also influences their low GI and GL.

### **What is the effect of high GI foods upon physiology?**

The excessive and rapid production of sugar from eating high GI foods has both direct and indirect effects upon health. First, the production of sugar in the mouth can promote dental caries. Second, it is well known that excessive sugar in the blood can lead to the spontaneous addition of glucose to blood proteins—a process that can be readily seen in diabetics. In addition, the excessive raising of blood sugar levels often leads to the excessive production of the hormone insulin by the body. Insulin is a primary regulator of blood sugar levels however, excessive production of insulin is well known to have the following effects:

1. Insulin is both a potent inhibitor of fat "burning" and promotes the production of fat by the body<sup>2,3</sup> especially in the liver.
2. Insulin made in excess may lead to inter-meal drowsiness as it may drive blood sugar too low too fast and at the same time inhibit the breakdown of an emergency sugar supply in the liver (glycogen)<sup>3,5</sup>. Inter-meal drowsiness may lead to snacking in-between meals and impose another barrier to fat loss.
3. Excess insulin promotes cholesterol synthesis (by overstimulating the activity of HmG CoA reductase—a key body enzyme involved in cholesterol making)<sup>3,5</sup>.
4. Excessive insulin production is associated with type II diabetes<sup>5</sup> and diabetes predisposes people to heart disease. Note that although the mortality from heart disease has dropped dramatically, the incidence of heart disease and type II diabetes has increased markedly (by 400%) in Australia in the past few decades.

### **Recommendation**

Given the points that I have raised above, I do not believe the active promotion of starchy cereal foods at the bottom of the Nutrition Australia food pyramid minimises the risk of diet-related diseases nor establishes the foundation for a healthy lifestyle. These foods play havoc with blood sugar levels, are over processed and relatively nutrient poor. One solution would be to reverse the order of the carbohydrates in the healthy food pyramid by placing vegetables at the bottom (six plus serves), followed by fruits (3 serves) and then

starchy foods of low GI (3 serves). The drop in total calories due to the increased low-density carbohydrate intake could be offset by modest increases in lean protein and unsaturated fats (such as olive oil and nuts) which, in turn, would make food much more varied, healthy, satiating and enjoyable.

## Discussion notes

- Although the food pyramid recommends cereal products for their high fibre content, this may be less essential than we have been led to believe. Michael Eades' book *Protein Power* quotes a study in 1929 and 1930, using the explorers Vilhjalmur Stefansson and Karsteen Anderson. These men returned from the Arctic reporting that Eskimos were able to live on nothing but caribou meat all winter, performing arduous work, expending great amounts of energy without adverse consequence. To prove that not only Eskimos had this capability, both explorers volunteered to be studied while in Bellevue Hospital, New York city for one year. During this time they ate a meat diet of more than 2,500 calories a day which was 75% fat. At the end of the year, both had lost about 3 kilos of weight, their cholesterol levels and other blood chemistry values were normal, and neither experienced adverse effects. On the other hand, we should look at the long term effects, such as the high incidence of intestinal cancer on high meat and fat diets.
- Many people think of dietary fibre as a single, simple food component. Fibre is a complex and varied macronutrient composed of plant polysaccharides and lignin that are resistant to hydrolysis (breakdown) by our digestive enzymes. Many studies have shown that fibre can have a profound effect on digestive events in the small intestine and is fermented in the large intestine. There is a huge amount of information to suggest that high fibre content in the diet is important for maintaining a healthy digestive system and aiding elimination. An adequate water intake is also essential, since fibre draws water from the body into the intestine. The classical work of Dennis Burkitt attributes many of the so-called 'diseases of civilisation' to lack of dietary fibre. These ailments include constipation, varicose veins, haemorrhoids, gall bladder disease and bowel cancer.
- A diet which is high in fruit and vegetables not only provides a high fibre content and fluid (water), but also many vitamins, minerals and beneficial plant-derived micronutrients and antioxidants that can't be found in multivitamin bottles. Allan Bourshek's *Pocket Calorie and Fat Counter plus Cholesterol Counter & Fats Diet Guide plus Diabetes Diet Guide & Carbohydrate Counter* gives a good summary of the types of fibre, the foods they are found in and their functions in our bodies. This book also has a fibre counter if people would like to calculate if they are getting the healthy 25-35 grams/day of fibre. The book is available from newsagents and some pharmacies.
- The Commonwealth department of Health and Aged Care has published *The Australian Guide to Healthy eating*. The booklet gives suggested serves from the following food groups for different age groups and for males and females:  
Breads, cereals, rice, pasta, noodles, e.g. for active females 19-60 years 4-9 serves  
Vegetables, legumes 5 serves  
Fruit 2 serves  
Milk, yoghurt, cheese  
Meat, fish, poultry, nuts  
Extra foods fibre
- Mannatech has introduced a fat-loss, weight management system based on low glycaemic eating, adequate levels of activity and supplements, including fibre. The

food pyramid they recommend is similar to the one stated in this paper, and the results for weight management and health improvements have been impressive.

- Nutrients can either be enhanced by cooking (e.g. potatoes, legumes), or destroyed by excessive cooking. In general, the following guidelines apply:
  - 1) Light steaming is generally good to preserve the nutrients of foods
  - 2) Boiling (especially in excess) can deplete and destroy some nutrient content of vegetables
  - 3) Stir frying is generally acceptable (provided that excessive heat is not applied, and oil content is kept low)
  - 4) Grilling is OK, but not as good as 1-3
  - 5) Baking – surprisingly the food temperature tends to be a lot lower than the oven temperature, and this method is not too bad
  - 6) Deep frying has many drawbacks. Apart from infiltrating the food with large amounts of fat, the food's nutritional content is severely compromised by the excessive heat applied.
- High carbohydrate cereal foods are easy to prepare, store and eat, and there are huge vested interests in keeping us on the high-carb path. Yet, as other papers in the conference make clear, a diet which is dominated by carbohydrates is a very recent aberration, contrary to our evolutionary inheritance. There are a number of books on the shelves which promote a diet similar to that advocated in the paper. The “Dr Atkins” books are pretty basic – based primarily on what “works” in terms of weight loss. The “Zone” books by Dr Barry Sears are more scientific in approach and look at broader health issues such as longevity and overall wellbeing as well as fat loss. “Protein power” by Michael and Mary Eades is as good as the other two and as broad in scope as the Sears books but with fewer pages of biochemistry. Another book which is due to be published shortly in the USA, and which is in keeping with the theme of the conference is “The Paleo Diet – Lose Weight and Get Healthy by Eating the Food you were Designed to Eat” by Loren Cordain (Amazon.com.) Jennie Brand Miller has written a book “The GI factor”
- The glycaemic index (GI) measures the rates at which different carbohydrates make their way from the mouth through the digestive tract and into the blood, raising the sugar level. Raised blood sugar stimulates insulin release. The first problem with the GI for practical purposes is that it is based on individual foods. Being an index and not an absolute value, combining foods gives a different index value, and therefore a different blood sugar and insulin effect. We rarely eat single foods, we eat meals that combine foods. It is not possible to work out (other than by experiment) the glycaemic index of a meal, even though it is possible for an informed person to be able to estimate if a particular meal has a high, medium or low glycaemic index. A second problem is that the GI is not the only indicator of nutritional value. For example, the simple sugar fructose has a low GI of 32 (on the white bread = 100 scale). On this basis it would seem to make sense to eat foods that are predominantly fructose rather than glucose (GI = 137) or starchy foods such as potatoes (GI = 121) that the body breaks down rapidly into glucose.
- Sadly, diabetics are often advised to consume fructose because of its low GI. Yet fructose (table sugar – sucrose – is half fructose and half glucose) carries with it such perils that New Scientist magazine gave it cover story status on September 1 2001, indicating the direct links between fructose and heart disease, diabetes, obesity – basically, “Syndrome X”. Fructose is preferentially used to fill liver glycogen stores, whereas glucose is used to fill muscle glycogen stores. The amount of fructose in fruit is relatively low, so the overall GL is low (Table 1). The general message is to encourage diabetics to eat liberal quantities of leafy vegetables and fruit, lean meat, fish and nuts, with some unrefined starches, avoiding refined starches and sugars.

## Further reading

- 1 <http://www.nutritionaustralia.org/>
- 2 Brand-Miller JC, Foster-Powell K, Colagiuri S, Leeds A. The GI Factor (Revised Edition). Hodder & Stoughton: Sydney, 1998. Brand-Miller JC, Foster-Powell K. GI Plus-The Glucose Revolution. Hodder: Sydney, 2000
- 3 Moran LA, Scrimgeour KG, Horton HR, Ochs RS, Rawn JD. Biochemistry (Second Edition). Neil Patterson NJ, USA 1994. Sears B, Lawren W. The Zone. Harper Collins, 1995
- 4 Miller M, Stafford H An Intervention Portfolio to Promote Fruit and Vegetable Consumption. National Public Health Partnerships 2000 ([www.nphp.gov.au](http://www.nphp.gov.au)).
- 5 [http://arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/pancreas/insulin\\_phys.html](http://arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/pancreas/insulin_phys.html)