Nutrition problems in an obesogenic environment

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ABSTRACT

- Many claims about nutrition and weight loss stem from small, short-term studies, incorrect interpretations or distortions of evidence.
- Our knowledge of what people eat is poor; difficulties include accurate assessment of consumption, the complex composition of foods and individual variations in nutrient bioavailability.
- When advice appears to be ineffective, poor compliance is a likely explanation.
- There is no simple solution to obesity, and no fast way to create the energy deficit required for sustainable loss of fat — weight loss requires long-term commitment to permanently change eating and exercise habits.
- Valid advice is to reduce overall energy intake, include more vegetables, fruits and wholegrain products and fewer foods high in saturated fat, sugar and salt.
- While mindful of the need to encourage individuals to make changes, the medical profession needs to lead the charge to advocate for changes to our obesogenic environment.

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The community has a strong interest in food and nutrition, and the merest suggestion that something in our diet may help or hinder health receives widespread media publicity. Publicity which is given prematurely to results of small or preliminary studies may present a distorted picture, often implying a simple quick-fix solution for complex problems. This is particularly true for weight loss, and with overweight or obesity affecting 67% of Australian men, 52% of women[1] and 20%–25% of children,[2] the constant stream of diet stories is unlikely to abate.

Our knowledge of the complexity of foods and the interrelationships between many components of foods is far from complete. Further, our skills in encouraging patients to eat according to the recommendations of our well documented dietary guidelines[3] are poor. If we understood what people eat and why they eat that way, and developed greater skills in encouraging compliance with healthier food choices, we may be more effective agents for change. Even more important, however, may be the need for the medical profession to advocate more prominently for changes to our increasingly obesogenic environment.

What do we eat?

The first problem in nutrition research is finding out what people eat. No survey instrument includes more than a fraction of the 30 000 foods now available (Roberts DK, Scientific Director, Australian Food and Grocery Council, personal communication, October 2004), and while some products vary only slightly, there are enough differences in the expanding food supply to reduce accuracy.

In the classic late-1950s Seven Countries study, a dietitian went into people's homes, weighed and recorded foods for 7 days and took a replica of each meal for chemical analysis.[4] The costs associated with such methods are considered prohibitive today, and current dietary assessment involves asking clients to do one or more of the following:

- recall what they have eaten over the previous 24 hours;
- list what they usually eat (a diet history);
- fill in a food frequency questionnaire on how often they consume the selection of products included; or
- weigh or measure what they consume and record it.

No method is perfect. Sampling errors are inevitable, as not everyone is prepared to participate, and there are inaccuracies in reporting quantities and types of food, as well as errors in entering data. Keeping a record of everything consumed also changes consumption — indeed, this is a useful way to encourage a reduction in food intake.[5] Studies with doubly-labelled water show that obese people have a higher resting metabolic rate and consume more energy, and that most people under-report their food consumption. The degree of under-reporting may be substantial.[6] Lean women under-report their kilojoule intake by 23%; obese people under-report by 39%.[7] Specific under-reporting occurs with fat[8,9] and sugar, mainly from snack foods.[10] A lack of awareness of what we consume could be a prime factor in obesity.

Our changing food intake

A third of the Australian food dollar is now spent on foods purchased and consumed away from home. These foods usually have more fat than foods prepared at home or those sold in the past. A fast-food burger has 24–42 g of fat — about twice the level in burgers from independent shops 20 years ago[11] — while a home-made burger made with lean meat can have as little as 7 g of fat. Reporting eating a burger can thus give a 3–7-fold variation in fat content. Similar problems occur with restaurant meals and take-away foods.

Portion sizes also vary by a factor of 2–3, with "standard" portions uniformly smaller than those typically consumed by the public.[12] Many people also have more difficulty estimating portion sizes as the size of the portion increases,[13] and this could distort data for those who are large eaters.

In Box 1, I have compared the fat content of a few foods calculated from typical servings in popular recipes, cafes or restaurants with figures from the NUTTAB database (nutrient composition database compiled mainly from information originally published in the *Composition of foods, Australia*[14] and used in dietary surveys).

The discrepancies occur because of different serving sizes and the quantity of high-fat ingredients used. Other examples where the

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1 Fat content calculated from typical recipes compared with figures provided in the NUTTAB* database

	Fat content (g)	
Food	Recipe	NUTTAB database
Chocolate cake (1 slice)	82	10
Lasagne (average portion)	55	14
Chicken curry (average serving)	80	22
Quiche (1 slice)	44	25
Ice cream, premium (2 scoops)	20	5
Hot chips (medium serving)	22	13
Mashed potato (average serving)	24	2
Cheesecake (1 slice)	55	22
Fruit cake (1 slice)	10	6

* NUTrient data TABle compiled mainly from information originally published in the *Composition of foods, Australia*[14] and containing nutrient data for some 1800 foods. ◆

2 Dietitians' estimates of the fat content of selected foods versus results of analysis

	Fat content (g)	
Food	Estimated	Analysed
Milk (1 cup)	10	8
Tuna salad sandwich	18	43
Chicken caesar salad	24	46
Lasagne	35	53
Hamburger with onion rings	44	101
Porterhouse steak dinner	64	125

serving size may often vary from the usual database standard include:

- grilled lean sirloin steak — 104 g (restaurants/clubs serve much more);
- chocolate — 4 squares (not applicable to "individual" chocolate bars);
- spread for bread or toast — 6 g/slice (individual portion packs are 10 g and margarines claiming phytosterol benefits use 10 g as a serve);
- cream — 1 tablespoon (would 300 mL cream really serve 15 people?);
- cheese — 20 g (represents a single slice, but would not apply for a cheese platter); and
- popcorn — 1 cup (a fraction of what is served at the movies).

Experts also make errors estimating portion sizes and fat content. A group of 203 experienced dietitians in the United States estimated the fat and energy content of six different foods which were then analysed.[15] They underestimated the fat content in most items, sometimes by more than 50% (Box 2).

Published data may also be misinterpreted, especially for particular nutrients.[16] Sellers of supplements or those marketing nutrient-enriched foods use national nutrition survey results to claim the population lacks a nutrient, such as vitamin A, even though the survey design precludes such determinations. Similar distortions are apparent when particular industries or diet book authors claim that fat, sugar or kilojoule intake have decreased and are therefore not the cause of obesity. If Australians were consuming only as much as they report in nutrition surveys, few people would be overweight.

However, it is valid to compare data over time from surveys that have similar methods. Such data shows that there is no mystery to the increasing incidence of obesity — kilojoule intake has risen in people of all ages, and especially in children. Between 1985 and 1995, in children aged 10–15 years, kilojoule intake increased by 1420 kJ for boys and 900 kJ for girls.[17]

The evidence base for nutrition research

Randomised controlled trials are difficult to conduct in nutrition research. Double-blind studies are possible for some added nutrients, but not for foods or whole diets. There are problems with determining what people eat and measuring compliance, and also with confounding factors, such as the biological complexity of foods and the variable bioavailability of some nutrients, depending on an individual's nutrient status. Other problems in dietary studies include a predominance of poor randomised controlled trials with not enough participants, too short a timeframe, no independent confirmation of the experimental dietary change, the wrong dose, or problems interpreting outcome data. However, good cohort studies (with Level III-2 or III-3 evidence[18]) are possible, with careful assessments, correction for likely confounding factors and good comparisons with other cohort studies.[19]

The sheer number of nutrition-related studies means it is possible to find evidence for varied viewpoints. Some studies, for example, claim that salt restriction makes little difference to hypertension, while others report the opposite. It is critical to check whether the study merely asked participants about their salt consumption or used the more accurate 24-hour urinary sodium excretion to determine salt intake. Estimates of salt consumption are impossible from nutrition surveys, as over 75% of our salt is scattered among processed foods, many of which are not obviously salty (eg, cornflakes, sweet biscuits, bread or cheese). Most studies based on 24-hour urinary sodium measurements show that restricting salt intake reduces hypertension.

Confusion is also caused by failing to distinguish between effectiveness and efficacy.[20] For instance, the efficacy for benefits from a high intake of vegetables and fruits and lower intake of salt, sugar or saturated fat is amply reviewed and referenced in the *Dietary guidelines for Australian adults*.[3] When interventions encouraging such changes are not effective, the true reason may be poor compliance.

Compliance with dietary guidelines may also be jeopardised by vested interests. The salt industry lobbies against links between salt and hypertension,[21] and the sugar industry lobbied hard for changes to the World Health Organization's recommendations that added sugar should not contribute more than 10% of energy.[22]

Reducing body fat

Some journalists and authors promoting high-fat, low-carbohydrate diets claim that, as populations have grown fatter with advice to eat less fat, the guidelines must be wrong and fat can't be the culprit for obesity.[23] The real problem is that few people follow the guidelines. For example, among 10 561 women in the Australian Longitudinal Study on Women's Health, only a third complied with more than half of 13 food guidelines, and only two met all the

guidelines examined.[24] Thus, our efforts may need to be directed more at learning skills to help people make appropriate changes.

There is no simple solution to fixing excess body fat. However, primed by media publicity for dramatic weight losses with the latest diet fad, few people understand that scales do not distinguish between weight from lean tissue, fluid or fat. It takes an overall deficit of over 32 000 kJ to lose 1 kg of body fat. Few people can manage a daily energy deficit of more than about 2500 kJ. The slower, but more sustainable results reported by over 4000 participants on the National Weight Control Registry (NWCR) who have lost an average of 30 kg and maintained their loss for an average of 5 years are more useful (Level III-2 evidence).[25] Their tactics include following a low-fat, high-carbohydrate, kilojoule-restricted diet, eating breakfast regularly and walking an average of 11 000 steps a day. Less than 1% follow a low-carbohydrate diet.

Millions of copies of the low-carbohydrate Atkins Diet were sold in the 1970s, with no long-term effects on obesity levels. Four randomised controlled trials have compared the Atkins diet with a more conventional low-fat, kilojoule-controlled diet for at least 6 months; the two that continued for 12 months showed no significant difference in weight loss between the two diets (Level II evidence).[26,27] With low-carbohydrate diets, short-term success is the result of decreased energy intake, not reduced carbohydrate per se. They do lead to a greater fall in serum triglycerides (especially when fish oil supplements were supplied), but may cause low-density lipoprotein (LDL) cholesterol levels to rise, and show no major differences in fasting glucose or insulin levels. There is also a significantly higher incidence of reported side effects, including constipation, diarrhoea, headaches, halitosis, muscle cramps and general weakness (Level II evidence).[28] Before recommending low-carbohydrate diets, we need studies lasting long enough to fully assess cardiovascular risk factors as well as the effect of low fibre intake, micronutrient changes and the effects on kidney and bone health, and cancer risk.[29]

Many trials have shown good results from low-fat diets, whereas no studies have yet shown long-term maintenance of weight loss with a low-carbohydrate diet. We can advise patients there are successful alternatives to nutritionally inadequate low-carbohydrate diets that restrict important foods such as wholegrains, fruits, many vegetables and low-fat dairy products.

The quality of the overall diet is important. A review of 107 studies involving 3268 participants concluded that diets high in carbohydrate and low to moderate in fat tended to be lower in kilojoules and have the highest diet quality. The highest body mass index (BMI) occurred in those following low-carbohydrate diets (Level I evidence).[30] A meta-analysis of 16 studies involving almost 2000 people concluded that ad libitum low-fat diets led to a greater reduction in energy intake and a greater weight loss than occurred in control groups (Level I evidence).[31] In a study of 10014 US participants, plus a review of more than 200 studies on a range of health and nutrition indicators and popular diets (Level III-2 evidence), diet quality was highest among those with the highest consumption of dietary guideline carbohydrate foods (grains, cereals, bread, fruit) and lowest for those following popular low-carbohydrate diets. Energy intakes and BMI were lowest for vegetarians and those following recommendations for a high-carbohydrate, low-fat diet, with the carbohydrates chosen from grains, cereals, bread and fruit.[32]

3 Practical checklist for overweight patients

- Check that patients understand that weight problems are almost inevitable in an obesogenic environment that encourages more eating and less activity; and that the media does not always give the full picture. Explain that the best safeguard for an adequate and healthy diet is to follow well documented guidelines to eat plenty of vegetables, include fruit and wholegrain products and avoid foods high in fat, sugar and salt.
- For patients with body mass index > 25, explain:
  - the importance of permanent changes to food, drinks and exercise for long-term weight loss;
  - loss of body fat cannot occur quickly, and 1 kg fat is equivalent to a 32 000 kJ deficit (it may help to show patients 1 kg of lard or dripping);
  - small manageable changes can create an energy-intake reduction of 2500 kJ/day;
  - fast weight loss means an undesirable loss of fluids and lean muscle
  - studies do not show long-term benefits from fad diets, and side effects are likely;
  - omitting or consuming only token quantities of carbohydrate-containing foods such as wholegrain breads and cereals, fruit, many vegetables and low-fat dairy products will reduce intake of many nutrients and create a potentially serious lack of dietary fibre; and
  - movement and exercise is essential for weight maintenance.
- Suggest smaller portion sizes for most foods (except vegetables), and especially for alcohol and foods containing fat or sugar. Suggest drinking water.
- If patient insists on a low-carbohydrate or other fad diet, monitor blood fats and ask about constipation, headaches and other symptoms.
- When faced with difficult or lengthy questions on nutrition and diet, a dietitian is ideal for an individual dietary assessment and continued counselling. The Dietitians Association of Australia website lists accredited dietitians at <http://www.daa.asn.au> and provides information and practical advice.
- Medical practitioners rarely smoke and this great personal example has enabled them to counsel patients about smoking. Many doctors currently ignore their own diet and health,[33] and attending to this may be essential before helping patients make appropriate dietary changes. ◆

Changing the obesogenic environment

Many changes are needed to enable the population to be more physically active. The medical profession is in a good position to help society tackle the problems caused by high consumption of energy-dense foods. One way of doing this is to apply the checklist provided in Box 3 when consulting with patients with weight problems. Another way is to help lobby for changes, including banning inappropriate promotion of energy-dense foods to children and company sponsorship of activities in schools (which effectively silences criticism of the company's products), challenging the idea that it is normal to eat or drink whether we are hungry or not, supporting the provision of water fountains to minimise consumption of energy-dense drinks, and pushing for greater government spending on promotion of a healthy diet. A good starting point would be to join The Parents Jury,[34] an initiative of Diabetes Australia — Victoria, The Cancer Council Australia, and the Australasian Society for the Study of Obesity. The aim of these organisations is to improve the food and physical activity environments for children in Australia.

Competing interests

I have been paid an honorarium to speak at educational meetings that are sponsored by various pharmaceutical companies. I have no connection with any products from these companies, and my presentations do not relate to any pharmaceutical products.

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