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## **Dietary Guidelines on trial: the charges are not evidence based**

Criticisms of nutrition guidelines confuse health professionals and the public and provide justification for inaction by policy makers. Claims that carbohydrate rather than saturated fat be restricted are based on incomplete assessment of existing evidence and undermine measures aimed at reducing non-communicable diseases (NCDs). Current nutrient guidelines recommend a wide acceptable range of total fat and carbohydrate intakes, emphasizing quality and source rather than quantity of macronutrients, substantial restriction of free sugars and typically restriction of saturated fat.<sup>1</sup> Wide dietary variation including universally accepted healthy dietary patterns can be accommodated within such nutrient based advice.

The 2015 updated Cochrane Review on dietary fat reported a meta-analysis of 15 trials of at least 2 years duration involving 59,000 participants.<sup>2</sup> The trials that involved replacing saturated (SFA) with polyunsaturated fats suggested a 27% reduction in cardiovascular disease (CVD), but no clear health benefits were seen in those trials involving replacement of SFA with carbohydrates or proteins. A dose-response analysis showed that the degree of protection was proportional to reduction of total cholesterol, in turn influenced by extent of reduction in saturated fat consumption. No effect on all cause or CVD mortality was observed or expected, given the short duration of trials (around 4 years), that most CVD events are not fatal and only about one third of total deaths were attributed to CVD. Prospective analysis of PREDIMED trial data demonstrated an inverse association in high-risk individuals between mono and polyunsaturated fats and CVD and death, whereas SFA and trans fat were associated with higher risk of CVD.<sup>3</sup> No effect of SFA is seen in cohort studies which do not take into account nature of replacement energy source.<sup>4</sup> Some

evidence from cohort studies suggests that saturated fat from meat but not from dairy food is associated with increased cardiovascular risk.<sup>5</sup>

The importance of considering the nature of replacement energy is confirmed by short-term experiments examining the effects of various dietary fatty acids on lipids, lipoproteins and the ratio of total:HDL cholesterol.<sup>6</sup> Replacing *trans* and saturated fat with carbohydrate or *cis*-unsaturated fat reduces total and LDL cholesterol. However the total: HDL cholesterol ratio and apolipoprotein B are only reduced when *cis*-unsaturated fatty acids replace saturated fatty acids. The four major saturated fatty acids (lauric, myristic, palmitic and stearic acids) have different effects, lauric acid (found in coconut oil) having a less marked effect on LDL cholesterol than myristic and palmitic acids, with stearic acid having no effect. Ecological data also contribute to the totality of evidence. In Finland 40% of the decline in coronary mortality between 1982 and 1997 was attributed to the decline in cholesterol, 60% of which was attributed to changes in dietary fat composition; the reduction occurred prior to the widespread use of statins.<sup>7</sup> Declining smoking prevalence, an important contributor to the CVD decline, occurred at very different times in men and women so cannot be a primary determinant of the turning point in mortality which began at the same time in both sexes. Neither can changes in medical care account for the turning point because countries with very similar medical care systems have very different time trends in CVD mortality.<sup>8 9</sup>

While future research may enable advice regarding saturated fat to be refined in terms of food source or individual saturated fatty acids, there is an overwhelming body of evidence, including from RCTs, to justify recommendations to restrict total saturated

fat and to use instead unsaturated fatty acids (with a *cis* configuration) derived from vegetable oils.<sup>1, 10</sup>

Since there is now universal acknowledgement of the role of free sugars as a cause of obesity and its comorbidities as well as dental caries and therefore the need for restriction,<sup>11, 12</sup> the case for reducing carbohydrate in general centres on whether there are benefits associated with reduction of starches and non-starch polysaccharides. In overweight people, low carbohydrate diets can produce rapid and more striking short-term weight reductions than other dietary prescriptions. However longer term studies have suggested only a small difference (typically around 1kg) between “high” and “low” carbohydrate weight-reducing diets, and that compliance with dietary advice rather than macronutrient composition is the main determinant of weight loss.<sup>12</sup>

Meta-analyses of trials undertaken in people not attempting to lose weight show modestly lower body weight loss on diets relatively low in fat (30% or less TE) than on carbohydrate-reduced higher fat diets.<sup>13</sup>

Failure to take into account the nature of dietary carbohydrate may explain not only modest differences in weight loss but also adverse metabolic consequences of altering amounts of total carbohydrate. Foods in which starches are rapidly digested and absorbed (e.g. highly processed breakfast cereals and breads) are associated with higher triglycerides, lower HDL and in people with diabetes, higher blood glucose levels when compared with minimally processed fibre-rich grains, pulses, fruits and vegetables. Wholegrains and other fibre-rich starchy foods are associated with a lower risk of several NCDs including cardiovascular disease, diabetes and colon cancer.<sup>14</sup>

Thus the nature and source of carbohydrate are more important than amount, with a

wide range of acceptable intakes, and relatively high carbohydrate intakes an appropriate option for avoidance of weight gain.

Limitations of RCTs, theoretically the strongest form of evidence, in the nutrition field require that evidence-based food and nutrition guidelines consider the totality of evidence, including short-term and long-term trials of macronutrient manipulation involving both clinical and surrogate endpoints as well as cohort and ecological studies which identify protective foods and nutrients.<sup>9</sup> Current evidence-informed nutrient-based guidelines permit a wide range of carbohydrate and fat intakes, which can be translated into dietary patterns as diverse as the traditional high-carbohydrate low-fat Japanese dietary pattern associated with the greatest longevity worldwide, and a traditional high-fat high-carbohydrate Mediterranean diet, also associated with a relatively low risk of many NCDs. Diets associated with low NCD risk tend to be high in fibre-rich fruit and vegetables, legumes, pulses, nuts, wholegrains and cis-unsaturated vegetable oils. However food-based guidelines complement rather than replace nutrient recommendations since modern dietary practices and food preparation often distort traditional approaches and may lead to nutrient intakes which increase rather than reduce NCD risk. Furthermore pitting one macronutrient versus another, or pitching simplistic messages that fats are good and carbohydrates are bad, risk confusing the public, health professionals and policy makers and will adversely influence public health.

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