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Why Don't We Know What to Eat in the 21st Century? A Focus on Coronary Heart Disease and Dementia Prevention

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Non-Communicable Diseases (NCD) are a major cause of mortality worldwide with cardiovascular disease accounting for 17% of all deaths in South Africa in 2000 [1], while mental illness has been predicted to be the largest contributor to the burden of disease in Low and Middle Income Countries (LAMIC) by 2050. It is well recognized that both micronutrients and macronutrients in the diet are important for both physical and mental health. However, there is still ongoing debate and research to discover which nutrients are beneficial to adults for delaying or preventing cognitive decline to Alzheimer's disease or dementia and to NCDs such as cardiovascular and cerebrovascular disease, diabetes and cancer. As vascular disease is a risk factor for Alzheimer's disease and other types of dementia, dietary factors for both are inter-related [2]. Metabolic syndrome or pre-diabetes is now seen as an accumulation of risk factors for NCDs including hypertension, elevated blood glucose, triglycerides, homocysteine and cholesterol amongst others.

There has been recent controversial debate as to whether the major contributor to obesity, diabetes and Coronary Heart Disease (CHD) is saturated fat and associated high cholesterol [3] or high sugar intake and associated insulin resistance [4]. Support for the benefits of unsaturated dietary fatty acids in relation to cardiovascular disease and other NCDs, including dementia syndromes have been comprehensively reviewed [5], while low sugar and low insulin were consistently associated with 'cardiovascular-free' centenarians [6]. However, studies on the contribution of saturated fats to NCDs, especially CHD risk is still controversial. A Cochrane review [7] showed no benefit of reduced dietary fat on cardiovascular disease risk. Studies on whole diets in addition to those on individual nutrients may be useful in resolving the issues; diet-related studies take account of the synergistic effects of all components [8], but isolated nutrient studies can help clarify why the low/high fat versus carbohydrate debates have not provided all the answers.

Evidence of the benefits of adherence to the Mediterranean style of diet (which includes high legume and whole grain intake) in the protection against overall mortality and incidence of NCDs and on cognitive impairment has been reported [9]. Meta-analysis of accrued data showed a 13% reduced risk of neurodegenerative disease incidence, 6% reduced risk of mortality or incidence of neoplastic disease and 10% reduced risk of incidence or mortality from cardiovascular disease associated with the Mediterranean diet. These results were obtained using an adherence score calculated from a list of key components of the diet but not on actual amounts or calories consumed. Components of the diet are included in table 1, but of note is that not all studies reviewed included intake of nuts and poultry. An important component of the Mediterranean diet is the fatty acid intake. Long Chain Polyunsaturated Fatty Acid (PUFA) intake was attributed mostly to fish intake, and the Mono-Unsaturated to Saturated Fatty Acid (MUFA:SFA) ratio was included, (MUFA based mostly on olive oil intake), while trans-fats are not included in the diet, nor rated.

The findings of benefits of the Mediterranean-type diet are supported by studies assessing intake of fatty acids alone showing that fish intake, particularly of oily fish rich in omega-3, has benefits in maintaining cognitive function, as well as preventing cognitive decline in early stages, but not advanced stages of Alzheimer's disease [10]. Studies have also shown that reduced CHD risk is not so much due to the amount of fats consumed in the diet, as much as the quality of fats [11]. In rural China, fat consumption was estimated to only comprise 15% of the diet, while in some Mediterranean countries fat consumption accounts for as much as 40% of the diet. However, these diets are high in PUFA and MUFA rather than high palmite-containing SFA and trans-fats. In contrast, in the US the carbohydrate consumption and calorie intake has increased from an average 43% to between 49% in men and 52% in women, along with a 5% decrease in fat consumption [12] which correlates with increased CHD and obesity figures.

Further research on the fat to carbohydrate ratio intake has been published by proponents of the Paleo diet [13,14]. The Paleo diet is based on historical evidence that man as a hunter-gatherer ate plenty of red meat with fat and remained lean. This diet includes SFA from red meat but excludes dairy products, grains, legumes, refined sugar and salt. The contention is that fats, including saturated fats, do not increase the risk of CHD, whereas the main culprit is carbohydrate intake, especially of refined sugars and grains. The caveat to the argument is that there are more people than currently estimated suffering from carbohydrate intolerance who may develop pre-diabetes or metabolic

	Mediterranean Diet	Paleo Diet
High legume intake	Yes	None
High whole-grain products	Yes	None
High fruit intake	Yes	Yes, fresh
High fish/seafood intake	Yes	Yes
High vegetable intake	Yes	Yes, non starchy
High MUFA:SFA ratio	Yes	Yes
Moderate alcohol intake	Yes	None or low
Transfats, industrial fats*	No	No
Low red and processed meat	Yes	High red, grass fed; no processed
High nut intake	Yes	Yes or low n-6:n-3 ratio
Low dairy products	Yes	None
Low poultry	Yes	High, free range
High refined sugar intake*	No	No
High refined grains or cereals*	No	No

*Items not included in the Medi score.

Table 1: Comparison of high versus low intake of foods in the Mediterranean and Paleo diets.

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syndrome, and it is these people who are at most risk of CHD if consumption of carbohydrates is high [15]. Populations whose staple diet is based on complex carbohydrates are known to become obese and prone to NCDs when adopting the Western diet.

The opponents of the debate (basing their argument on results from the Women's Health Initiative study, although they showed that reduced SFA intake did not reduce the risk of heart disease) have concluded that the proportions of carbohydrate to protein and fat were less important than total calorie intake [3]. However, there is little epidemiological evidence for benefits of replacing SFA intake with carbohydrates to reduce CVD risk, while replacement with PUFA is beneficial [16]. Carbohydrates are essential for energy and glucose is necessary for brain energy metabolism, thus very low carbohydrate intake can be detrimental. Low Glycaemic Index (GI) carbohydrates (e.g., from fresh fruits such as berries, and vegetables) have been reported to be most beneficial as high GI carbohydrates are associated with insulin spikes, reduced insulin resistance and development of metabolic syndrome [7].

The differences between the Mediterranean and Paleo-diet may be worth some research in their efficacy for health benefits. The effects of SFA versus carbohydrates as risk factors for CHD are still contentious. In terms of fat intake, HDL versus LDL (or non-HDL) good cholesterol levels may be more important indicators than total cholesterol [17]. What is apparent is that certain fats are beneficial to both brain and body health Sofi et al, (2012) recommend to 'increase the consumption of fruits and vegetables up to the recommended 5 servings a day, prefer whole grains, replace saturated and trans fats with unsaturated fats, reduce the consumption of sugar and sweetened beverages, and limit salt intake. Following the principles of the traditional Mediterranean diet, a substantial reduction of the risk of incidence and/or mortality from cardiovascular disease can be easily obtained.' These recommendations would apply to reduction of the risk of cognitive impairment as well, based on the review [5].

Perhaps, it is time to concentrate on reducing refined sugar and sweetened foods rather than just fat intake. Future risk assessment for CHD might include glucose measures as well as both HDL and LDL cholesterol, not just total cholesterol, in addition to the other usual tests done by the GP.

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