

# Primary prevention of cardiovascular disease and other chronic noncommunicable diseases in the centre of attention of the United Nations: special importance of a prudent diet

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Cardiovascular disease (CVD) have an annual death toll of about 20 million people, including 10 million below 65 years of age [1, 2]. This large epidemic occurs both in the developed and the developing countries. Other chronic noncommunicable diseases, mainly including cancer, diabetes and chronic respiratory diseases, are also a major and growing problem. The United Nations recognise the need for intensive population preventive measures to control this epidemic in all countries, and this issue entered the agenda of the 66<sup>th</sup> Session of the General Assembly on September 19, 2011.

The General Assembly passed a resolution entitled "Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases" [3], which highlights the importance of continued control of risk factors for chronic noncommunicable diseases by the member states implementing the following World Health Organisation (WHO) action plans: "Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases" [4], "Global Strategy on Diet, Physical Activity and Health" [5], and "Global Strategy to Reduce the Harmful Use of Alcohol" [6]. Issues covered in these documents were also discussed in a recent WHO publication under the title "Global status report on noncommunicable diseases 2010" [7].

According to these publications, population strategy aimed at the prevention of chronic noncommunicable diseases

should include smoking cessation, promoting physical activity, reduction of alcohol intake to non-harmful levels, and promoting a healthy diet. Even a moderate success in reaching these goals might lead to large benefits in regard to the occurrence of these diseases. Particular attention has been paid to prudent diet [2].

According to these guidelines, a healthy diet should include:

- maintaining an appropriate energy balance between dietary intake and physical activity to keep the weight within the normal range;
- reduction of total fat intake to less than 30% of calories, with reduced intake of saturated fatty acids, increased intake of unsaturated fatty acids, and elimination of trans fatty acid intake;
- reduction of sugar intake;
- reduction of salt intake (including all its sources); note that the salt used should be iodised;
- increased intake of fruits, vegetables, whole grains and nuts.

The above recommendations have been generally accepted for many years, and the statement of the Polish Forum for Prevention of Cardiovascular Diseases (Polskie Forum Profilaktyki Kardiologicznej) also complies with these guidelines [8]. Popularising these recommendations as a part of chronic noncommunicable disease prevention requires, however, that they are translated into a set of recommended food products for healthy eating. For this purpose, food based dietary guidelines are published in many countries. In Poland, they are known as the Decalogue of Healthy Eating (Dekalog Zdrowego Żywienia; Table 1) [9].

It has been, however, difficult to obtain a fully equivalent conversion of the rules of healthy eating when guidelines referring to nutrients are translated into suggested food

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products. This is mostly related to the fact that particular food products contain a mixture of nutrients that exert varying effects on pathophysiological processes in the body. Regarding healthy eating rules discussed here, the most relevant issue is fat intake, as fats are usually mixtures of various fatty acids. In addition, biological effects of fatty acids are modified by the presence of other non-fat nutrients in a given food product. This is further complicated by the fact that biological properties of a food product may change with food processing.

Saturated fatty acids have been long considered nutrients that promote atherogenesis. This is mostly related to hypercholesterolaemia resulting from their intake. This apparently obvious need to limit saturated fatty acid intake has been, however, questioned when a metaanalysis of studies looking

into the relationship between saturated fatty acid intake and the risk of ischaemic heart disease (IHD) and stroke failed to confirm such an association [10]. On the other hand, in an editorial comment Stamler [11] has cast some doubts on the methodology used in this study. As a result, in another publication the same authors took a more flexible stance and stated that the studies had shown that replacing dietary saturated fatty acids with polyunsaturated fatty acids, but not with carbohydrates, had a beneficial effect on the prevention of IHD [12]. The latter opinion is in agreement with the Joint Food and Agriculture Organisation (FAO)/WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition (10–14 November 2008, WHO, Geneva) which stated that convincing evidence exist that substituting polyunsaturated fatty acids for saturated fatty acids reduces the risk of IHD [13].

We believe that these convincing evidence of reduced IHD risk with dietary substitution of polyunsaturated fatty acids for saturated fatty acids translate to benefits of reduced dietary saturated fatty acids intake, and the substituted polyunsaturated fatty acids may be both omega-6 and omega-3 fatty acids. Thus, when it comes to recommendations based on food products and not nutrients, it seems prudent to recommend replacing dietary animal fats with vegetable fats as a logical measure to prevent atherosclerosis.

Saturated fatty acids that should be limited in intake are mostly lauric acid, myristic acid, and palmitic acid. In contrast, stearic acid does not elevate serum cholesterol level, as it is metabolised to monounsaturated oleic acid. Short-chain saturated fatty acids also do not raise cholesterol level. Table 2 shows the content of various fatty acids in selected food products. Of note, the three saturated fatty acids mentioned above are present in large amounts in fat milk, which has led to a recommendation to limit the intake of butter, cream,

**Table 1.** Decalogue of Healthy Eating [9]



**Table 2.** Content of various fatty acids in selected fats (g/100 g)

Fatty acids	Canola (rapeseed) oil	Sunflower oil	Olive oil	Soft margarine (80% of fat)	Lard	Butter
Saturated, including:	5.59	11.05	14.86	18.22	46.54	54.72
short-chain	0	0	0	0.23	0.04	3.03
lauric acid	0	0	0.01	1.15	0.04	2.37
myristic acid	0	0	0.04	0.56	1.20	9.73
palmitic acid	3.7	6.36	11.60	10.82	26.21	28.87
stearic acid	1.08	3.66	2.51	4.94	18.58	8.72
Monounsaturated, including:	61.02	19.45	70.12	26.35	42.48	22.41
oleic acid	48.20	19.31	68.97	26.07	40.00	19.79
Polyunsaturated, including:	28.76	65.05	10.61	31.76	6.52	1.16
linolic acid	18.69	64.44	9.78	30.57	6.02	0.88
linolenic acid	9.91	0.61	0.83	1.19	0.29	0.28
P:S ratio*	5.14	5.89	0.71	1.743	0.14	0.021

\*P — polyunsaturated fatty acids; S — saturated fatty acids. Source: Kunachowicz H, Nadolna I, Przygoda B, Iwanow K. Tabele składu i wartości odżywczej żywności [Food product composition and nutritional value tables]. PZWL, Warszawa 2005.

whole milk and its products, and full-fat cheeses for prevention of atherosclerosis.

These seemingly logical dietary recommendations have recently been questioned, however, as the increase in low-density lipoprotein cholesterol level due to consumption of whole milk is partially counterbalanced by a concomitant increase in high-density lipoprotein cholesterol level, and calcium present in milk inhibits fat absorption by soap formation and binding cholesterol and biliary acids in the intestine [14]. It has also been suggested that calcium, magnesium, and potassium that are present in milk have a beneficial effect on the development of hypertension which is another major risk factor for atherosclerosis. As a result, as indicated by a comprehensive review of randomised cohort studies by Elwood et al. [14], all-cause mortality, mortality due to IHD and stroke, and diabetes risk all seem to be lower in people consuming large amounts of dairy products. It cannot be excluded, however, that these benefits are in fact brought by simultaneous intake of other, but unaccounted for food products, i.e. the mechanism underlying the observed benefit might be that other aspects of the actual diet comply more closely with healthy eating rules needed for atherosclerosis prevention compared to control subjects. With this perspective, any beneficial effect of dairy products on the development of atherosclerosis requires further studies. More evidence are available to support the notion that fermented dairy products, such as cheeses and yoghurts, do not increase the risk of development of atherosclerosis [15]. These observations are very interesting indeed, but the underlying mechanisms have not been clarified yet.

From a practical point of view, it is also particularly important whether butter, being a mixture of various fatty acids, increases the risk of atherosclerosis. A significant increase in serum cholesterol after dietary substitution of butter for olive oil was reported by Bronte-Steward as early as in 1958 [16]. In a careful literature review, however, Elwood et al. [14] found only 5 cohort studies examining deaths or vascular events in relation to butter intake, and conflicting results of these studies do not allow drawing any meaningful conclusions.

Another argument for health benefits of milk fat brought by some authors is the presence of vaccenic acid and conjugated linolenic acids in milk [17]. However, levels of these acids in milk fat are very small, and any health benefits of their intake in usual diet need to be proven yet.

To summarise these considerations, a view held by Nestel [15] may be cited that currently available data suggesting only a modest preventive effect of dairy products on the development of atherosclerosis and diabetes are insufficient to formulate practical recommendations. More supporting evidence can be found for a beneficial effect of low-fat dairy products and probably also fermented dairy products.

A separate issue of practical importance is a long-held view regarding the need to limit egg consumption in the prevention

of atherosclerosis. Although a recommendation to limit cholesterol intake (from all sources) to 300 mg daily remains valid, current population strategies to prevent CVD allow consumption of one egg per day, as the average cholesterol content in one egg, about 180 mg, is below the currently recommended daily cholesterol intake as a part of a prudent diet.

Putting aside these somewhat discordant views regarding evidence in support of changes in the intake of some food products that would favour prevention of atherosclerosis, there is a general agreement that an appropriate overall nutrition profile may be an effective preventive tool when some well established healthy eating patterns are conformed to. This is primarily exemplified by the traditional Mediterranean diet which is characterised by consumption of large amounts of vegetables, fruits, legumes, nuts, cereals (mostly whole grains), and plant oils as the main type of fat consumed; reasonably large consumption of fish and other seafoods; moderate consumption of dairy products, mostly in the form of cheeses and yoghurts; limited consumption of meat; and regular moderate consumption of wine. Recommendation of a Mediterranean diet-based nutrition scheme for the prevention of chronic noncommunicable diseases is increasingly supported by national and international experts [8, 9, 18–25].

Large observational data provide important arguments for promoting nutrition schemes based on the Mediterranean diet in the prevention of chronic noncommunicable diseases. A classical example may be the North Karelia Project, which was targeted at the whole population. During 35 years since 1972, promotion of a healthy lifestyle, and particularly a nutrition scheme based on the Mediterranean diet, resulted in significant reductions, both in men and women, of cholesterol levels, blood pressure, and smoking (although the latter effect was observed only in men). As a result, mortality due to CVD in the North Karelia decreased by 80%, and mortality due to cancer decreased by 67% [25].

In Poland, major changes in nutritional habits occurred after 1991. Animal fat intake (and particularly butter intake) decreased, and at the same time a large increase in the intake of vegetable fat could be observed. Consumption of red meat decreased, replaced by an increased consumption of poultry. Fruit intake nearly doubled, while vegetable intake remained at a quite high level in these years. As a result, mortality due to CVD decreased in 1991–2008 by 42% [26–28]. Similar changes in mortality were also observed in some other Central and Eastern European countries.

A reduction in CVD mortality observed in Poland following spontaneous (not planned) changes in nutrition habits at the population level that were in accordance with the rules of healthy eating promoted by WHO calls for efforts to continue this trend in the future. A helpful or even necessary approach would be to introduce a planned population nutrition policy conforming to public health requirements. Such policies are already being developed in other countries [29, 30]. Participa-

tion of the Polish Cardiac Society in appropriate nutritional initiatives would be highly welcome. The resolution adopted by the General Assembly of the United Nations which was mentioned earlier in this article provides good support and justification for such efforts.

**Conflict of interest:** none declared

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