

IN THIS EDITION

Can food protein influence the cause and mortality of cardiovascular diseases?

This edition contains the abstracts of the Alpro Foundation conference, held in Vienna on the 15th of April.

Cardiovascular diseases are the main cause of death in Europe.

Soya protein has a documented effect in lowering blood cholesterol levels and apparently also has a favourable effect in terms of prevention of osteoporosis, as well as a protective effect against some cancers.

This symposium highlighted the current knowledge with respect to the effect of soya protein on cardiovascular diseases.

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CARDIOVASCULAR DISEASES AUSTRIA COMPARED TO OTHER COUNTRIES

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Cardiovascular diseases are the main cause of death in the industrialized countries. In addition, there is also a significant increase in the rate of morbidity and mortality in the developing countries. In the 21st century these diseases will furthermore lead the illness spectra and death cause statistics of the industrialized countries, as well as the developing countries (according to statistical reports of the City of Vienna, 2001).



In Austria, more than 40,000 persons die every year from cardiovascular diseases; that constitutes 52.5% of all deaths. Of these 67% can be attributed to heart diseases,

of which the most common is the coronary heart disease. Strokes account for 10% of all deaths amongst men, and for 16% amongst women. Cardiovascular diseases account for the most common diagnoses at hospital discharge after malignant tumours.

Coronary heart disease is the main cause of death amongst women over 65 years of age, and amongst men as from the age of 45. The risk for men to contract cardiovascular diseases during their lifetime is always higher than for women, except for cardiac insufficiency and stroke; here the lifetime risk is higher for women (PEETERS et al, 2002).

There are regional differences between East and West; the risk of dying of cardiovascular disease is highest in Vienna, followed by Burgenland and Niederösterreich. On the other hand, the figure for Vorarlberg and Tirol is 15% lower than the Austrian average. Whereas the number of deaths in all greater federal capitals is below the national average, Vienna, as the only city, shows a cardiovascular mortality rate that is higher

than average. The differences in mortality rate, which are established for Austria as a whole, can also, however, be seen inside Vienna.

The age class standardized mortality appears to be exceptionally unfavourable in Districts 10, 11, 15 and 20, when compared to the national average. Of these, District 20 shows the highest total mortality (all causes of death).

The scientifically proven and frequently observed connection between general socio-economic conditions and morbidity and mortality rates, which are typical for major cities, can also be found in Vienna, in respect of health conditions and life expectancy. According to studies by ÖBIG (Austrian health institute), the regional distribution of cardiovascular disease-linked mortality in Vienna shows a high rate of conformity with indicators of social stratification of the Viennese township districts. The higher the share of the population that is at a lower socio-economic level, the higher, as a rule, is the mortality rate with respect to cardiovascular diseases (statistical reports of the City of Vienna, 2001).

Collectively, the socio-economic influence on the overall mortality amongst men is stronger than amongst women, and the differences in mortality, in connection with the level of education, are greater in men. In this case,

cardiovascular diseases constitute an exception, as women show a potentially higher connection between the level of education and the difference in mortality rates compared to men. Disease specifically regarded is the mortality of cardiovascular diseases amongst the two genders highest at low levels of education. This applies to ischaemic heart diseases and cerebrovascular diseases (MACKENBACH et al, 1999; MENHEM et al, 2000).

In most industrialized countries the mortality rate in respect of cardiovascular diseases is decreasing since the sixties, and is connected to a change in the presence of risk factors. Also when a decline of the mortality rate has occurred, it is, especially in ischaemic heart diseases, unclear if the incidence has declined as well, or if the decline of the mortality rate only reflects the higher survival rate. This higher survival rate is contributed to an improved availability to medical care, and simultaneously the number of serious cases has declined as a result of primary and secondary preventive measures.

The age specific mortality also declines. However, with the increasing proportion of elderly people of the population, the number of persons suffering from cardiovascular diseases has, in absolute terms, increased (according to statistical health reports of the City of Vienna, 2001).

According to recent statements we may, however, again see an increase of the mortality rate in the coming years and decades, due to the higher prevalence of adiposity, metabolic syndromes and type II diabetes in the population, and further, as a result of the higher prevalence of female smokers, compared to the last thirty years.

In a comparison with European countries, as regards the rate of mortality due to coronary heart disease amongst both men and women, Austria finds itself in the middle field. The East European countries top the mortality statistics, the Mediterranean countries have, in both gender categories, the lowest mortality rates. The mortality rates show, since 1965, a significant decline. The decline in the male population was not so strong as in the female part of the population. In Austria one can actually speak of a stagnating, or even a reversed, increasing trend, of the mortality rate amongst women.

Comparing Austria with some selected countries, such as Russia, Japan, USA, Hungary

and the European Union as a whole, it appears that the coronary heart disease-linked mortality, as well as the mortality rate due to cerebrovascular diseases, is higher in Austria than the average in the European Union. Today, Russia and Hungary have the highest mortality rates in this comparison (the figures from Russia are available since 1985), with partially increasing trends amongst both genders.

Of the trends since 1965 the strong decline amongst the Japanese women as regards the cerebrovascular diseases, and the decline in

coronary heart diseases amongst the American population, is particularly striking.

The World Health Organization has in its health targets for 2020 formulated the goal to further decrease, by another 40%, the mortality rate caused by cardiovascular diseases, especially amongst those under 65 years. In order to successfully reach this goal, some crucial preventive measures are also needed.

There is far reaching evidence that such prevention programmes are a feasible and cost effective means to lower the cardiovascular

THE EFFECT OF SOY PROTEIN ON LIPIDS/LIPOPROTEINS AND OXIDATION MECHANISMS

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Soy proteins provide a striking example of how dietary proteins may affect one major parameter, ie cholesterolemia. This well documented effect has resulted in the FDA approval of soy proteins for coronary prevention in 1999.



The basis for the approval were mainly the clinical studies, carried out in Italy and Switzerland over 25 years ago, in hypercholesterolemic

patients. The mechanism of the cholesterol reduction appears to involve an up-regulation of liver LDL-receptors, typically depressed in hypercholesterolemic individuals. A frequently reported meta-analysis (Anderson et al, NEJM, 332, 276, 1995) gives clear indication that the patients with elevated cholesterolemias, ie above 300 mg/dl (7,5 mmol/l), achieve maximal cholesterol reductions, whereas those below 220 mg/dl (5,5 mmol/l) get less benefit from the dietary substitution/integration. This "predictive formula" has been confirmed in the vast majority of later studies.

Other mechanisms of cholesterol regulation have been hypothesized. The suggestion that isoflavones (phytoestrogens) may regulate cholesterolemia, has not been supported by either animal or human findings. It was recently

shown that plasma phytoestrogen levels in primates given an isoflavone rich diet, are directly related both to cholesterolemia and to arterial disease, thus casting doubt on this potential protective mechanism.

Isoflavone free soy hydrolysates have shown excellent hypocholesterolemic effects, and, finally, elimination of isoflavones from soy not through a gross ethanol extraction, but by a more acceptable column chromatographic procedure, did not lead to any loss of the hypocholesterolemic effect (Fukui et al, J Agr Food Chem 50, 5717, 2002).

The stimulation of liver LDL receptor expression, a unique mechanism of cholesterol reduction, has been recently reproduced by a small series of pharmaceutical agents ("LDL receptor upregulators"). It has to be attributed mainly to the soy 7S globulin, and particularly to its a' subfraction.

Soy globulin mutants without this subfraction do not induce LDL receptor activation. Very

INFLUENCE OF LIFESTYLE ON CARDIOVASCULAR RISK

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mortality, and to reduce the damage caused by these diseases. The WHO has given the implementation of these programmes the highest priority, as the influence of cardiovascular diseases in all socio-economic groups will further increase, and the costs, caused by these diseases, will also rise significantly.

(Literature list available on demand)

The lifestyle factors that determine cardiovascular risk are essentially diet, body weight, physical activity and smoking. Dietary errors such as excessive energy intake, particularly in the form of animal fats, while neglecting fibre-rich food products of vegetable origin promote the development of diseases in which dietary factors play a part. These include obesity, diabetes, dyslipoproteinemia and hypertension, which are major cardiovascular risk factors.

recently, proteomic studies have investigated differences between products used in Western Europe (generally eliciting a more marked hypocholesterolemia) and in the US. These latter show a clear dysruption of the globulins, mainly 7S, possibly responsible for the hypocholesterolemic activity (Gianazza et al, J Nutr 133:9, 2003).

Isolated protein components, both the 7S and the most active subfractions, stimulate LDL receptors at the promoter level, reaching essentially intact the cytoplasm of liver cells, not the nucleus (Manzoni et al, J Nutr., 133: 2149, 2003). Membrane interaction occurs mainly with thioredoxin, possibly acting as a carrier.

This can potentially indicate a powerful antioxidant mechanism. Very recently, in fact, testing soy protein, essentially phytoestrogen free, on a focal lesion in carotid of rabbits resulted in a marked regression of the lesion (Castiglioni et al, Atherosclerosis 171: 163, 2003). As expectable, lipid levels were markedly reduced, with however, an astonishing reduction in LDL oxidability, congruent with the hypothesis that soy proteins per se may exert a powerful antioxidant activity.

Very recent approaches to the use of soy proteins for therapy include the testing of isolated components. One of these, the 7S α ' globulin, is extremely active in vivo in animal models. It can lower total cholesterol and triglycerides in rats, with an activity almost 10-fold higher vs a reference hypolipidemic drug (Lovati et al J Nutr 2004, in the press).



These dietary factors and specific foodstuffs which are particularly important for cardiovascular risk include the quantity and type of fatty acids, fibre, alcohol

and fruit and vegetables. The DACH (Germany, Austria, Switzerland) reference values give 30% of dietary energy as the guideline for fat in the diet. Saturated fatty acids should account for no more than 10% and polyunsaturated fatty acids should supply no more than 7% of dietary energy. N-3 fatty acids reduce the frequency of acute cardiac death due to their antiarrhythmic effect. More than 30 g of fibre per day and five servings of fruit and vegetables each day, along with small quantities of alcohol, have a protective effect on the heart, while obesity, particularly in young people, and saturated fatty acids and trans fatty acids increase cardiovascular risk.

Diet is not only the sum of all nutrients, but it is above all the result of interactions and synergies between all the components of a balanced diet. To that extent the positive effects of a favourable dietary pattern, in the form of a balanced diet, are crucial in defining the overall lifestyle.

Smoking increases cardiovascular risk through its negative impact on HDL cholesterol and triglycerides in plasma, platelet adhesion

and aggregation, heart rate, blood pressure, myocardial oxygen consumption, coronary perfusion and oxygen transport. Increased physical activity is an established component in the catalogue of guidelines for primary and secondary prevention of cardiovascular diseases.

The positive effects consist mainly of reduced blood pressure when physically at rest, improved rheological characteristics of the blood, correction of endothelial dysfunction, improved oxygen uptake, reduced myocardial oxygen demand and regression of coronary artery stenoses.

Furthermore, physical activity has a positive effect on carbohydrate and fat metabolism and bone density and makes a significant contribution towards an energy balance which is at equilibrium. Moderate to intensive physical exercise for at least 30 minutes is recommended on all or almost all days of the week.

The evaluation of large prospective studies involving more than 360,000 participants, with a follow-up of 16 to 22 years, found that in men with a favourable risk profile (non-smokers with low plasma cholesterol and normal blood pressure, without diabetes and coronary artery disease), the result was a life expectancy that was 6 to 9 years higher, with a life expectancy 6 years higher for women.

HOW CAN HEALTHY NUTRITION WITH VEGETABLE PROTEIN BE PROVIDED FOR THE GENERAL POPULATION AND FOR RISK GROUPS?

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Soya beans, which belong to the pulses group, and soya food products make it easier to put into practice the general dietary scientific recommendation to eat more vegetable foods and to alter the or predominance of animal protein. In a more vegetable-oriented diet, (wholegrain) cereal products, nuts, oily seeds and grains and the various pulses can provide the necessary protein.



These food products have a high potential to promote health, alongside fruit and vegetables. Against this background an excerpt from the 2003 Austrian Diet Report is enlightening:

“Since total fat intake in Austria is too high, less animal fats (from meat and sausage, cream, butter etc.) should be consumed. Overall, it is true that consumption of bread cereals (wheat) is increasing, but the consumption of darker breads (made from rye) which have a desirable higher fibre content, is tending to fall.

The sharply declining trend in the consumption of pulses should be considered to be a negative factor, since this group of food products has many advantages. As well as high-quality vegetable protein, pulses supply a large amount of fibre and significant quantities of minerals, trace elements and vitamins. These provide sufficient grounds to rethink our ‘stingy’ use of this group of foods and plan a meal including pulses at least once a week.” (DGE info 12/2003).

This encourages us to reintroduce traditional consumption habits such as the weekly hot

pot. The encouragement to include more Asian recipes and cooking techniques in our menu also provides some useful indications.

Soya protein: valuable vegetable protein

In addition to the large quantity, the high biological quality of soya protein is also very important. New methods of evaluating protein quality such as the so-called PDCAAS (Protein Digestibility-Corrected Amino Acid Score) are based on the amino acid content and digestibility of a protein and its ability to meet the human requirement for essential amino acids in a balanced way. Using the PDCAAS method, isolated soya protein gives the highest possible value of 1.0, which also corresponds to the value for milk and egg protein.

Due to the recognised dietary and preventative properties of soya protein and its suitability for use as a high-quality vegetable protein source, soya foods containing protein can be expressly recommended as a component of a balanced diet for people who are at increased risk of cardiovascular disease, vegetarians (particularly

vegans), senior citizens, fitness enthusiasts and active sportspeople. Including more soya foods or partly exchanging them for animal foods will make it possible to achieve a balance between animal and vegetable proteins. However, people who use soya foods instead of traditional milk products (which is simplest in practice) should give priority to those which have been enriched with the essential nutrients calcium and vitamin B2, which are typical of milk.

How much soya should a person eat in the context of a balanced menu?

For preventative reasons, a good target would be to enjoy enough soya products each day to supply 25 g of soya protein. Gradually build soya foods into your menu and use this to extend your normal range of foods.

Against the background of the significant quantity of 25 g of soya protein, American soya expert Mark Messina argues that a dietary target of 15 g of soya protein would be easier to integrate with the Western diet and the requirement for the most diverse possible menu, and would also have a positive effect. By exchanging 15 g of animal protein for 15 g of soya protein, the relationship of vegetable to animal protein would be shifted towards the desired 1:1 ratio. This would give rise to many different effects that would promote health, in terms of cardiovascular health and prevention of various diseases in which dietary factors play a part.

SYMPOSIA

The 2nd Okinawa International Conference on Longevity
The Royal Society, London, UK
June 16-18, 2004

www.oic-longevity.wvma.net

Soy & Health 2004
Clinical Evidence – Dietetic Applications
Location “Oud Sint Jan” Bruges, Belgium
October 7 & 8, 2004

www.soyconference.com

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