

SURVEILLANCE

Paradoxes in medicine: an access to new knowledge?

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Abstract: The analysis of health and nutrition data from various countries shows many surprising and seemingly incomprehensible facts and paradoxical relationships. Health status of a country is the result of long-term factors and therefore it cannot be changed from day to day. For example in Central European countries there was a sudden increase in life expectancy after the fall of Soviet hegemony. French paradox is the oldest example of apparent contrast between “unhealthy” nutrition and low cardiovascular mortality. Although, the consumption of animal fat and milk and milk products in Switzerland is very high, but premature cardiovascular mortality of Swiss men and women is the lowest in Europe. In USA there is concomitant increase of obesity and decrease in cardiovascular mortality. In Cuba, in spite of great economic problems its relatively high male and female life expectancy is very similar to the rich USA. The life expectancy in Albania is significantly higher than in many countries in Central Europe and in the Balkan region, in spite of the fact that Albania remains the poorest European country. Analysis of these unexpected and paradoxical relations indicate the importance of the quality of medical care, control of cardiovascular risk factors (USA) and the influence of modest but biologically balanced diet on low prevalence of cardiovascular disease in Cuba and Albania. The experience from former communist Central European countries suggests important influence of chronic stress and psychosocial factors on heart diseases and life expectancy. These paradoxes open the door to new information (Fig. 5, Ref. 11). Full Text (Free, PDF) www.bmj.sk.

Key words: paradoxes, life expectancy, nutrition, obesity, cardiovascular diseases.

The results of medical research may become highly surprising, paradoxical and leading to questioning of commonly accepted knowledge. The absurdity of such a paradox is often, not obvious in the beginning. Paradoxes are an active way of how to show that we should not support the commonly accepted ideas absolutely. There are situations known in many countries when seemingly irrefutable facts were refuted because of their paradoxical nature or highlighted relations based only on assumptions. The most frequently cited is the French paradox.

French paradox

French paradox is the oldest example of apparent contradiction between “unhealthy” life style and low cardiovascular mortality. Nutrition in France contains a lot of butter, whipped cream, and eggs, but cardiovascular mortality in France was in 1970 low (Fig. 1) (1, 2). Many authors ascribed it to the favourable effect of the Mediterranean diet containing many fruits, vegetables, cereals, fish, olive oil and red wine. However, it is important to emphasize that this concept was not based on exact

statistical data, these were adjusted only later. Authors of the French paradox have not taken into account the specific geographic and health non-homogeneity of France. The lowest cardiovascular mortality is in the heart of France – Ile de France, and not in the departments washed by the Mediterranean Sea,

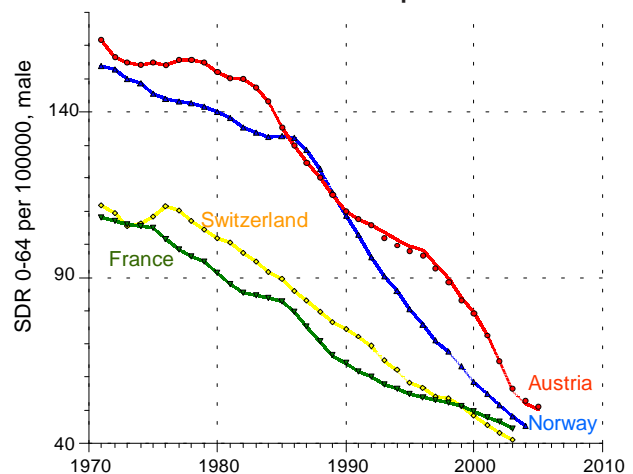
Decrease of premature cardiovascular mortality in France and Europe

Fig. 1. Similar trends and small differences in the contemporary cardiovascular mortality between France and West Europe.

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e.g. in Provence or Cote d'Azur. Trends in cardiovascular mortality indicate that France could be proud of its low cardiovascular mortality in the years 1960–70 but not today, as the mortality almost approaches the “old” European Union (Fig. 1).

The French paradox has drawn attention of the US business sector. When the news about the French paradox reached the USA, the red wine consumption there has increased by 44 % and some wine producers have even begun to lob for the right to mark their products with an etiquette “healthy food” (!).

In YAHOO database we can find over 3 million citations (especially in adman format) referring to the French paradox, in the GOOGLE database there are “only” 1 440 000 referencies but in the scientific database PubMed only one study discussing the French paradox can be found in the last year.

Despite the scepticism of experts, the French paradox has stimulated serious research and some additional factors (3) have been integrated into the group of mechanisms protective of atherogenesis. It was shown that moderate alcohol consumption can decrease the incidence of cardiovascular diseases, can affect favourably the structure of plasma lipids (increase in HDL-cholesterol), haemostasis and aggregation of thrombocytes, arterial vasodilatation and induction of cardioprotective proteins. Moreover, it can increase the insulin sensitivity and decrease the intensity of inflammatory processes (4). The attention is being paid to various components of wine, e.g. antioxidant activity of polyphenols that decrease significantly the concentrations of TNF- α (tumor necrosis factor) and interleukin (IL)-6.

Proposition: Moderate consumption of alcohol and some flavonoids can favourably affect the cardiovascular system. These findings opened an important path: from epidemiology to physiology and back.

Swiss paradox

This paradox resembles the situation in France. Undoubtedly, saturated fatty acids in butter and some dairy products have an atherogenic effect, as they increase the level of low density lipoproteins (LDL) in the blood. Consumption of milk and milk products in Switzerland is very high but premature cardiovascular mortality of Swiss men and women was and is the lowest in Europe (Fig. 1) (1, 2). Polyunsaturated n-3 fatty acids from sea fish are essential for normal growth and development and may play an important role in the prevention and treatment of coronary heart disease, hypertension, diabetes, and in other inflammatory and autoimmune disorders. Some vegetable plants produce polyunsaturated fatty acids with shorter carbon chain, e.g. 18-carbon α -linolenic acid (ALA). ALA (all-cis-9,12,15-octadecatrienoic acid) can be converted to long-chain n-3 polyunsaturated fatty acids and can therefore have similar function as fish oils. Another interesting 18-carbon fatty acid, conjugated linoleic acid (CLA) is present in dairy products and meat from ruminants. CLA refers to a family of many of and has some positive and some negative metabolic effects (5).

Milk of cows grazed in higher alpine localities contains high levels of n-3 fatty acids and also low amount of saturated fatty

Cheese consumption in Europe (kg per head per year)

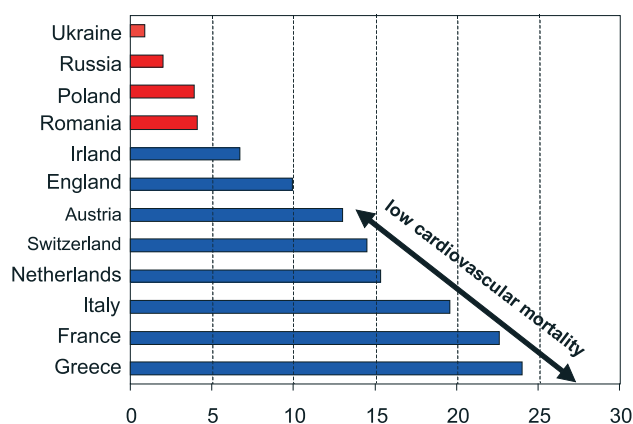


Fig. 2. Low cardiovascular mortality in countries with high consumption of milk products.

acids and arachidonic acid (which amplifies inflammatory processes). Concentration of n-3 fatty acid including ALA in cheese made from alpine milk is high, therefore it can compete with fat from sea fish (also it contains no mercury). Milk products rich in short-chain fatty acids and calcium help to decrease the frequency of metabolic syndrome (6). The metabolic syndrome, a very significant cardiovascular risk factor has become increasingly common in the USA. It is estimated that over 50 million Americans have it (7). In Europe, countries with high consumption of cheese belong to countries with the lowest cardiovascular mortality (Fig. 2).

Proposition: Some milk products can protect human vascular system because they contain n-3 polyunsaturated fatty acids and prevent the development of metabolic syndrome.

American paradox

The cardiovascular disease risk is associated with obesity. The entire USA population, children as well as adults, are under the danger of obesity pandemics. In the country where the media have presented a slim and physically active personality without a gram of abundant fat as an ideal American, in that country the idea has fallen to the ground. Nowadays, only one third of adult Americans has normal “healthy” weight, one third suffers from overweight, and one third is obese (body mass index BMI >30). Obesity rates have increased in USA over the past 25 years. On the other hand, the US statistics confirm another surprising fact: number of deaths caused by cardiovascular disorders has decreased (8). How is it possible that in USA, beside rapid increase in obesity prevalence, cardiovascular mortality has decreased, and the life expectancy has increased by almost 5 years during the period of the past 20 years? National Health and Nutrition Examination Survey (NHANES) has shown a decreased incidence of cardiovascular risk factors except for diabetes during the last 40 years. The growing use of medications for hypercholesterolemia and hypertension is believed to be the main reason of the improvement (8). Paradoxically, the most remarkable de-

Life expectancy of males and females in USA and Cuba

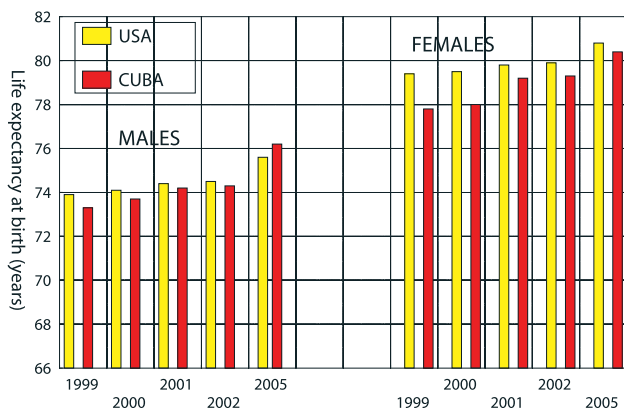


Fig. 3. Surprising similarity in the life expectancy between Cuba and USA males and females.

crease in cholesterol level, high pressure and smoking was observed in individuals with overweight or obesity, possibly as a result of extended medical care.

Proposition: Extended medical care of patients suffering from obesity can explain the American paradox (increase in obesity, decrease in cardiovascular risk). However, only rich countries can carry out such a solution. Prevention of obesity would be a better solution for the population (but not for the pharmaceutical industry).

Cuban paradox

For many years, Cuba has belonged to developing countries with inadequate public health status. After the revolution in 1959, the leaders postulated two main priorities – population literacy and health service (Che Guevara was “medico”). In spite of economical consequences of the totalitarian government the health status of Cubans started to improve. All inhabitants of Cuba can have free medical care, a family practitioner’s system has been successfully introduced and all children get vaccinated against 13 pediatric diseases. Preventive measures are enforced, for instance iodized salt and fortification of food with vitamins A and C, folic acid and iron. The energetic value of food of the most Cubans is low because of economic difficulties but their diet is biologically balanced (high consumption of vegetables, fruits, pulses and fish around the year). In spite of much lower financial cost for the health care, in comparison with the USA, the mortality of infants in Cuba is similar to the United States. Mortality structure of Cuba reminds of the countries with developed economies, whereas mortality from infectious diseases typical for developing countries, is low. Malaria, tuberculosis and parasitic diseases have been nearly completely eliminated. In Cuba, the life expectancy of both males and females is similar to that in the USA (Fig. 3). The critics of Cuban totalitarian government suggest that gaps in data collection and limitations of data

sources undermine the value of these data but the experts from Canada and Spain believe in them.

Proposition: Countries with less developed economics can also reach good public health status under rational management of their medical and education care, together with consumption of low caloric, biologically balanced food.

Albanian paradox

It has been proposed that poverty, backwardness in health service and long life are not compatible. Albania was and still remains the poorest European country. Until 1990 it was tightly separated from the other world. Its gross domestic product is nearly fifty times lower than the gross domestic product of the United Kingdom. The standard of health service simulating the Soviet model, is not very high. However, very pronounced decrease in infant mortality after 1990 and increase in life expectancy suggest that public health service is improving (1, 2). The life expectancy of Albanian males is the same as in Portugal and it is considerably higher than in several post-totalitarian countries of the Central and East Europe, the Slovak Republic including (Fig. 4). The chief reason is the low premature cardiovascular mortality of Albanian males. These differences cannot be explained by better health services but possibly by the composition of Albanian food: low content of calories and low meat consumption; with high consumption of fruits, vegetables and vegetable fat. A favorable relation between nutrition and cardiovascular diseases is evident especially in South Albania where olive oil is the main source of dietary fat.

Proposition: Nutrition based predominantly on vegetable food (fruits, vegetables, olive-oil) can retain the health status of a poor country at an acceptable level.

Central European paradox

It is believed that the health status of a country is a result of long-term factors and thus it cannot be rapidly changed. Under

Male life expectancy in the years 2004–5

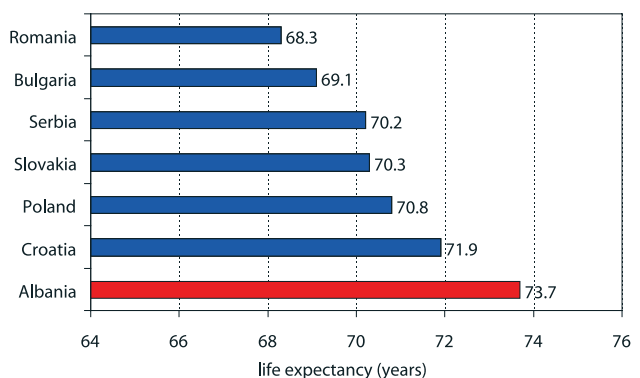


Fig. 4. Unexpected high life expectancy of male population in Albania.

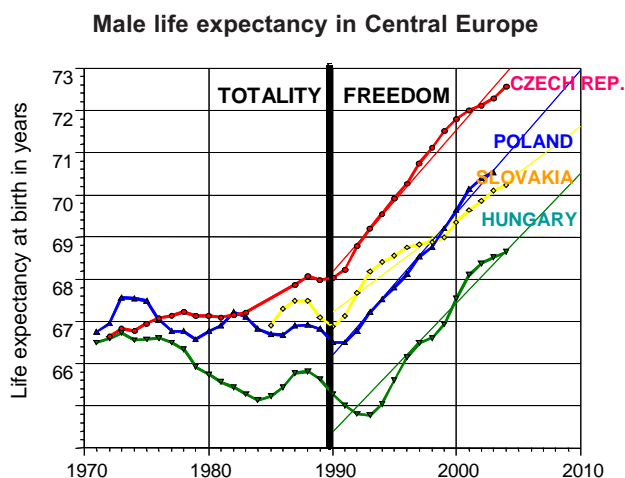


Fig. 5. Unexpected sudden increase in life expectancy in the former communist countries in Central Europe immediately after the fall of Soviet hegemony.

the Soviet domination, the health status of the inhabitants of the Central-European region was permanently unsatisfactory and it markedly tailed behind democratic Europe (1, 2). Male inhabitants of the Slovak Republic lived on average six years shorter than the neighbouring Austrians. Unexpectedly rapid and remarkable upgrade arrived after the fall of the totalitarian system in 1989. During the first months and years after 1989, inhabitants of Poland, Czechoslovakia and Hungary were drunk by freedom. Who would like to die in days filled with unexpected new hope? Positive changes like decrease in premature cardiovascular mortality and increase in life expectancy in the post totalitarian Central Europe preceeded the modernisation of medical care for several years (1, 2) (Fig. 5). Positive changes have occurred so rapidly that the progress in medical care could not play a decisive role in this surprisingly fast response. Nutritional factors, e.g. high import of cheap fruits, vegetables and vegetable oils as a source of antioxidants and polyunsaturated fatty acids, also had a positive effect (9). Possibly, decrease in chronic stress, better

mental relaxation and the rise of a new hope are playing a decisive role (10, 11).

Proposition: The rapid improvement in Central European health status shortly after the fall of totalitarian regimes indicates a significant and rapidly manifested effect of psychological factors on health status of population.

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