Andrzej Zieliński

DIET AND CANCER RISK/ ASSOCIATION BETWEEN DIET AND RISK OF CANCER

Department of Epidemiology, National Institute of Public Health-National Institute of Hygiene

ABSTRACT

The article discusses problem of the association between diet and risk of cancer. Author shows methodological concerns arising from the difficulty of selecting the study groups, and also those dependent on ascertainment of the composition of the diet for a long period of time necessary to establish the statistical associations.

Sources of carcinogenic substances in food include environmental contaminants, chemicals synthesized in some plants and those which infiltrate the food or are produced during the food processing.

It is strongly advisable to limit the content of carcinogenic substances in food by imposing Regulation (EC) No 1881/2006 not only regarding products exported to the EU countries, but also those intended for local market.

Key words: *carcinogens, diet, individual risk, societal risk*

INTRODUCTION

Studies aimed at identifying risk factors of cancer represent a serious challenge for epidemiologists. Firstly, it is affected by a multitude of potential factors as well as their coexistence in various combinations. Furthermore, their effects may be observed many years following repeated exposure. Generally, exposure assessment is an approachable task if exposed population and exposure level are easy or at least feasible to define. Examples of such exposures may be: contact with tobacco smoke or working with asbestos.

Having considered the exposure associated with diet, the situation is even more problematic for researchers. The first problem is that everyone is 'exposed' to eating. Selection of an unexposed population is rarely possible and may be applied to rather limited proportion of meals. Possible assignation of diet composition, both in retrospective and prospective studies, is usually restricted to a slight extent. Interval between exposure to carcinogenic substances and cancer occurrence amounts frequently to many years. In this period, persons may often modify their diet with respect to its quantity and quality. Furthermore, meals may include substances which increase as well as decrease the risk of cancer. In such conditions, not only an attempt to correlate diet with cancer but even to reconstruct diet raise difficulties due to poor recollection of meals eaten over years and the fact that respondents are not entirely aware of the ingredients of meals consumed even at the time of eating.

What are the prerequisites for a researcher to determine the relation between diet and cancer? How to link diet composition with cancer?

Even in the countries where there is a high prevalence of cancer, individual risk is relatively low. Cohort studies would require a large number of study participants and long-term observation period accompanied by difficult and unreliable verification of exposure resulted from meals consumed. Another difficulty consists in selecting control group. Having considered a high prevalence of exposure with the example being consumption of meat products, control group selected from vegetarians could differ considerably from study group in terms of eating habits and other characteristics. Consequently, selection of one particular variable to the analysis would raise many reservations of methodological nature.

However, there are data which indirectly suggest the relation between the prevalence of cancer in a particular population and eating habits being typical of this population. Namely, various populations living in different geographical areas and having diverse eating habits show rather considerable disparities in the distribution of cancer types. Such relations should not be considered as evidence due to possible 'ecological fallacy' occurrence. In population where there is a

high prevalence of exposure and disease, exposure is not necessarily restricted to persons who contracted a disease. Having considered initial data, however, it is much easier to investigate this individual relation in case-control studies where not the consumption of a particular meal but its estimated intake is considered to be a variable.

Even if we assume that knowledge obtained is of limited probability, recommendations and preventive measures should always stand on the side of prevention of diseases, not the food industry interests.

Nevertheless, there is a counter-argument which should not be neglected. Persons have the right to use all existing doubts to be on a diet which is harmful for them. An example could be tobacco smoking. Impact of smoking on developing cancers and coronary heart diseases is well documented. There are no legal or moral basis, however, for forbidding an adult to smoke. At the most, it is possible to promote anti-smoking measures and forbid smoking in places where tobacco smoke may affect non-smokers. Similarly, food which includes high concentration of substances whose carcinogenic properties have been established with high probability should be adequately labeled as posing a threat for developing a cancer.

Such meals, on no account, should be served to children.

CANCER RISK ATTRIBUTED TO DIET

From public health perspective, the basic division of risk factors for diseases refers to the prevention of diseases by their elimination or reduction of their impact. A list of factors which are not modifiable include: genetics and age-dependent factors while risk factors for developing cancers such as chemical substances included in food may and should be eliminated from a diet. In some cases, however, it is very difficult (1).

Chemical substances of carcinogenic properties may be present in food if environment or the surfaces of vegetables or livestock feed were contaminated. In the majority of cases, mechanical contamination may be removed while cleaning fruits and vegetables. As in case of metal ions, penetration of many organic carcinogenic substances, including polycyclic aromatic hydrocarbons (PAH) to the inner tissues of vegetables, especially roots and bulbs is observed irrespective of the existing biological barriers (2). Environmental effects of contamination on cancer are hard to assess, excluding high-contaminated areas. Consequently, they are of little significance as individual risk factors of cancer. Even in low-contaminated areas, however, their effect on local population should be considered (3).

Some of this substances are synthesized in edible plants, however, their low concentrations do not pose any threat to humans (4). Furthermore, some plants contain substances which may inhibit the development of some forms of cancer, including organic sulphur compounds, flavonoids, tannins and carotenoids. They are present in some fruits and cruciferous vegetables such as broccoli or cauliflower. Their concentrations, however, are not enough to state that the consumption of these vegetables and fruits is of anticancer effect (5).

The most serious threats are attributed to preparation of meat meals at high temperatures, especially during food grilling or smoking (4). Since a number of years, smoking of food is becoming more and more popular in Poland. Usually, it is affected by customs, technicalities of professional or homemade food smoking equipment. Supervision of sanitary institutions, however, is not sufficient enough in this respect. Grilling is a custom which gained greater recognition in the last decades. Its popularity is still on the increase. Grilled meat, its products and fish are served during outdoor meetings. Yet, both heat and smoke trigger formation of substances of confirmed carcinogenic properties in meat, including polycyclic aromatic hydrocarbons (6).

Neither the Ministry of Health nor the Polish sanitary institutions responded adequately to a triumphant tone of politicians who secured derogation of 'Polish traditionally smoked meat and meat products' for local production and consumption from the provisions of the Regulation (EC) No 1881/2006 regarding maximum levels of polycyclic aromatic hydrocarbons in traditionally smoked meat and meat products. Furthermore, no Polish maximum levels of PAH for meat products intended for local production and consumption were introduced which may be interpreted that there is a discretion in smoking techniques which consequently may lead to risky PAH concentration.

For non-smokers, diet and physical activity are basic modifiers of risk of internal organ cancers. Their occurrence is dependent on individual health behaviours. Therefore, it is an important domain of health promotion. If polycyclic aromatic hydrocarbon concentrations in meat products are subject to EC regulations, and they should be also regulated by Polish law, then the amount of carcinogenic substances contained in meals is associated with the frequency and quantity of their intake.

According to the American Cancer Society, obesity per se increases the risk of occurrence of many forms of cancer, including breast cancer in postmenopausal women, colorectal cancer, renal cell cancer, esophageal cancer, pancreatic cancer, endometrial cancer, thyroid cancer and gallbladder cancer. Furthermore, association between other forms of cancer was also established, however, it is not of statistical significance. Nearly 1/3 of cancers in the United States are potentially attributed

to obesity. Moreover, not only obesity in adulthood increases the risk of cancer but also high birth weight. Stable and sustained weight loss decreases the probability of cancer while cyclic weight loss and gain is a risk factor of cancer.

Obesity affect the risk of cancer via mechanisms such as levels and modifications of hormone effects and activity of factors such as interleukins subsequent to immune and inflammatory reactions (7).

CONCLUSIONS

1. In health promotion and cancer prevention activities, factors associated with diet are not given sufficient attention compared to their importance. Beside tobacco smoking prevention, they represent the most important domain of practically free of charge preventive measures.
2. It is of importance to raise the awareness of authorities and politics on the liability for introduction of regulation regarding the launch of products containing low concentrations of substances of confirmed carcinogenic properties intended for local consumption.
3. Promotion of healthy eating should cover the strategy of tackling obesity with regard to the prevention of type 2 diabetes, coronary heart diseases as well as cancer.

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Received: 31.07.2014
Accepted for publication: 27.08.2014

Address for correspondence:
Prof. Andrzej Zieliński
Department of Epidemiology
National Institute of Public Health-National Institute of Hygiene
Chocimska 24, 00-791 Warsaw
tel. 22 542 12 04
E-mail: azielinski@pzh.gov.pl