The relationship between meat and evolution

The debate about whether red meat is harmful to health is pervaded by extreme views, and disagreement and confusion abound. The theory of evolution is based on scientific research. Can it be used as a logical explanatory model?

The World Health Organization (WHO) has concluded that processed meat and red meat may cause colorectal cancer (1).

In Tidsskriftet issue 8/2016 (2), Tetyana Kalchenko, as chair of the association Health personnel for plant-based nutrition, wrote an article with the title *An old-fashioned and erroneous approach to a meat-free diet* (2). This included a critique of a previous article in Tidsskriftet by guest writer, chef and author Andreas Viestad entitled *The anti-diet*, in which he claims that meat is harmless (3).

Following an international workshop in Oslo in November 2013, all the lecturers published a joint «state of the art» piece in the journal *Meat Science* (4). It is difficult to find clear differences in the prevalence of colorectal cancer between vegetarians and meateaters. It has been shown that the Samí people, who eat large quantities of red reindeer meat, have a lower prevalence of colorectal cancer than the reference population from the same region. There is also a low prevalence in most African countries and in South and Central Asia. Cancer is a lifestyle disease, particularly in Western countries. Obesity and lack of physical activity may therefore be crucial factors (4). Research on the association between red meat and colorectal cancer is thus unclear and somewhat conflicting.

It is apparently difficult to distinguish between what constitutes unscientific and scientific knowledge. Evolution is an academic field based on major scientific research. It is therefore not something you believe in; it is something you understand. Intake of a certain quantity of a nutrient can be defined as optimal. An intake either greater or smaller than that which is optimal may increase the risk of certain diseases (5). It has been claimed that an optimal diet exists for all living species – determined by the genetic inheritance of the species. Lions are programmed to eat only meat, whereas antelopes are programmed to obtain their nourishment from plants. The genetic programme for humans, which has remained relatively unchanged for 100 000 years, is adapted to a mixed natural diet but not to convenience foods (5). Processed meat has a very short history, but today it constitutes the bulk of the nutritional intake of the modern human. Humans are not genetically programmed to metabolise modern additives at no cost to themselves. One might well assume that this can overload the body and be pathogenic (6).

Programmed for another lifestyle

Evolution is a continuous process of genetic reprogramming, partly by means of random permanent mutations that can affect the organism's ability to survive and reproduce.

Mutation is a genetic process of trial and error, and «takes over» – i.e., the modification is passed on – if it is an improvement on what went before. Non-permanent, superficial (so-called epigenetic) modifications also occur, which are environmentally triggered – and which may be successful or not. For example, populations from less urban environments who are exposed to a more «modern» Western diet may fall prey more easily to lifestyle diseases, cf. the Barker hypothesis (7).

«Our genes are incarcerated in a metabolic prison designed by evolution»

One hundred thousand years ago, food had to be gathered. Fruit, vegetables, meat and fish were available through hunting and fishing, i.e. what we define today as physical endurance activity. Our genetic programme has adapted to this by means of random mutations. Those who lacked this programming modification died out. Without these errors, nothing would have developed. Thus our present genetic programme is still adapted to the time of humankind's origin, with regard to nutritional intake as well as physical activity. This is made clear by recent epigenetic research that shows favourable changes brought about through physical endurance training, a kind of repairing of genes damaged by a lifestyle that entails a risk of developing diabetes, cardiovascular disease and cancer (8). It may be said that our genes are incarcerated in a metabolic prison designed by evolution, adapted to 100 000 years of natural foods combined with hunting and fishing.

What about food? Fruit, vegetables and pure fish without colourings and added salt are acceptable. Processed meat with the addition of salt, nitrates, nitrites or other additives is strongly linked to cancer. The WHO believes that epidemiological studies show a direct association between processed meat and colorectal cancer (1).

So what about pure red meat? Since the dawn of humankind, this has been the most important component of our food chain. In evolutionary terms, our genetic programme has developed a prophylactic function, but one based on different assumptions than those facing us today. The WHO data are uncertain with regard to a direct association between colorectal cancer and pure red meat. Based on changes to the DNA of genes and biochemical overload, they only have indirect and indefinite evidence (1).

The question may be whether loss of physical activity is the variable that constitutes the cause of any harmful effects. If one wishes to study the biological effects of exercise, one cannot study the effect of physical activity alone; one must also examine the effect of reintroducing exercise to an unhealthy, sedentary population that in general terms is programmed for physical activity. Reference is made here to studies of the effect of endurance training on lifestyle diseases, including cancer (8, 9).

Tor-Erik Widerøe
tor-erik.wideroe@ntnu.no

Tor-Erik Widerøe (born 1940), Professor Emeritus at the Department of Cancer Research and Molecular Medicine, Norwegian University of Science and Technology in Trondheim.
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