EDITORIAL

Hunter-gatherer fitness – implications for health

A recent thought-provoking paper compared modern lifestyle to the lifestyle of our ancestors, the hunter-gatherers.[1] There is a distinct contrast to the low levels of physical activity in modern times compared with when our ancestors lived as hunter-gatherers, expending large amounts of energy while they obtained food and water, maintained their shelters and escaped from predators. The genes governing the characteristics required for this lifestyle were passed on for approximately 84 000 generations which spanned this period. This, however, is not a long time from an evolutionary perspective. Consider, for example, that the agricultural revolution, during which time food became more readily available, occurred about 350 generations ago, the industrial revolution about seven generations ago and the digital age about two generations ago.[1] Each phase of development placed less emphasis on the necessity for superior physical ability for survival and success. For example, hunter-gatherers covered about 6 - 16 km per day, with daily energy expenditure for physical activity of 800 - 1 200 kcal – this is 3 - 5 times more than that of the average modern-day American. Despite the physical demands of modern-day lifestyles being less than it was several generations ago, the physiological and metabolic characteristics of humans in 2011 are still wired to deal with the physical demands of the hunter-gatherer era, where the norm was to have a high level of energy expenditure. This manifests as modern-day diseases such as heart disease, obesity, diabetes and stroke – diseases which all have a link to low habitual physical activity.

There are other examples of the mismatch between design and action. In the hunter-gatherer era, any stressful situation was of a physical nature where the physiological response was to prepare to either fight or flee from the danger. In modern times, although stress can have emotional or psychological origins, the physiological response prepares us for fighting or fleeing. The consequences manifest as heart disease and hypertension. Another example can be found in the truck-driving industry. Long-haul truck drivers sit motionless for most of the day, for most of their adult working careers – there is surely no coincidence that truck drivers have an unusually high incidence of haemorrhoids, thought to be a consequence of the poor circulation as a result of inactivity for long periods. Our genetic coding has not adapted to this modern-day requirement.

The relationship between genes and medical conditions is not new – the 'thrifty gene' hypothesis has been around since 1962 when anthropologist James Neel suggested that human ancestors were adapted for a feast or famine scenario. As hunter-gatherers they either had periods during which food was readily available or periods during which food was scarce. Their metabolism was efficient at storing food as fat to prepare them for the famine. This efficient metabolic mechanism does not work as well in a situation where food is plentiful, resulting in the problem of obesity which is so common in developing countries.

Probing the genetic aspect in more detail, a study described the results of four Khoisan tribal leaders who live as hunter-gatherers in different parts of the Kalahari.[2] These four tribal leaders had their entire genomes coded and as a result joined an elite group of 11 humans who have also had their entire genomes sequenced.[3] Archbishop Desmond Tutu and James Watson, the scientist who explained the structure of DNA, are other famous names in this unique group. This study concluded that, despite being from similar geographical regions, the genetic diversity of the four Khoisan was unexpected.[2] The authors concluded that it is most important to include Africans in studies on human genetics. Firstly the genetic diversity was novel, and secondly Africa is the birthplace of humanity. As a consequence it is reasonable to assume that the genetic profile of indigenous Africans may have differences compared with examples from other parts of the world. The researchers point out that this may have implications for medical research – most of the decisions linking genes to disease are based on Eurocentric genetic databases. A database of indigenous Africans may be needed to solve some of the regional medical problems.[3]

On a practical level, the response to the problems associated with low levels of physical activity in modern society is gaining momentum through the Exercise is Medicine™ movement (www.exerciseismedicine.org). The South African Sports Medicine Association has taken up the challenge to promote physical activity as a significant modifier of disease and quality of life and has established a regional chapter. Other active organisations such as Global Advocacy for Physical Activity, and African Physical Activity Network, both with strong South African networks, are starting to communicate, so the message of promoting physical activity and translating this into action in South Africa will be stronger than ever.

1. O'Keefe J, Vogel R, Lavie C, Cordain L. Achieving hunter-gatherer fitness in the 21st century: back to the future. Am J Med 2010;123(12):1082-1086.
2. Akst J. African genomes sequenced. The Scientist - Magazine of Life Sciences. http://classic.the-scientist.com/blog/display/57147/, 2010 (accessed 13 June 2011).
3. Schuster SC, et al. Complete Khoisan and Bantu genomes from southern Africa. Nature 2010;463(7283): 943-947.

Mike Lambert

Editor-in-Chief