IN THE NEWS

Outrunning dementia

For many of us, one of our greatest fears of approaching old age is the risk of dementia. Now it seems that regular exercise may be beneficial to ongoing cognitive, as well as cardiovascular, health. Researchers at the Ageing Research Centre of Sweden's Karolinska Institute report in *The Lancet Neurology* that taking regular exercise during midlife can dramatically decrease a person's chance of developing Alzheimer's disease, the most common form of dementia.

The study involved almost 1,500 people, aged between 65 and 79, whose levels of physical activity had been surveyed at intervals during the 1970s and 1980s. Those who had exercised for at least 20 minutes twice a week during their late forties and early fifties had cut their risk of developing dementia by about 50%, with exercise apparently most beneficial to those at a higher genetic risk of developing Alzheimer's disease.

Dr Miia Kivipelto, who led the research, said, "These findings may have wide implications for preventative healthcare … If an individual adopts an active lifestyle in youth and at mid-life, this may increase their probablility of enjoying both physically and cognitively vital years later in life" (*The Scotsman*, 5 October 2005).

The results did not change when health risks such as smoking and drinking were taken into account, which suggests that exercise itself makes a difference, and that the findings are not influenced by the probability that those who live healthier lifestyles are more likely to exercise.

According to an Alzheimer's Society spokeswoman, "This study backs up the evidence so far … Studies seem to suggest that leading a healthy lifestyle — exercising regularly and eating a balanced diet — helps protect against dementia" (*BBC News Online*, 4 October 2005).

Sarah Archibald

BRAIN EVOLUTION

Brains under pressure

It has taken us many millions of years to evolve the big, sophisticated brains that we are so proud of. But they're unlikely to be the best we will ever have. New work shows that two genes involved in brain development arose at culturally crucial times during human history and, indeed, might still be evolving.

It makes sense that genes involved in brain morphology, like so many other developmental genes, are subject to natural selection. Bruce Lahn's initial investigation into the subject was reported last year, when he and his colleagues found that two genes that regulate brain size — microcephalin (*MCPH1*) and abnormal spindle-like microcephaly associated (*ASPM*) — have been under strong selective pressure in the human evolutionary lineage since we split off from the chimpanzee lineage. Recent work has looked more closely at these two genes to see whether there are signs of more recent selection.

To do this, the distribution of haplotypes for the two genes was studied in a panel of ~90 cell lines that are representative of human diversity. In both cases, one haplotype stood out as being present in a large proportion of cell lines — a frequency that could not be explained by random or demographic factors and might, therefore, have been driven up in abundance by positive selection. The population distribution of polymorphisms at the two loci and the extent of linkage disequilibrium around each candidate positively selected region support this idea and also point to the occurrence of a recent 'selective sweep' that is still ongoing.

A statistical analysis that is based on estimating the past mutation rate of the genes placed the emergence of the high frequency alleles at ~37,000 years ago for *MCPH1* and ~5,800 years ago for *ASPM*. These dates coincide with significant periods in recent human history, the first with the emergence of cultural traits such as music, art and symbolism, and the second with the building of the first cities in Mesopotamia.

The young age of the frequent *ASPM* variant makes it likely that brain evolution is still continuing. As the authors themselves point out, however, the results should not be overinterpreted. For example, as we cannot tell what force is driving the positive evolution of gene variants, we cannot ascribe it to variation in cognitive function (both genes are also expressed outside the brain). For the same reasons, we should be wary of reading any adaptive significance into the current geographical distribution of *MCPH1* and *ASPM* alleles.

Tanita Casci, Senior Editor,
Nature Reviews Genetics

References and links

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WEB SITE

Bruce Lahn's homepage: http://www.genes.uchicago.edu/fri/lahnres.html