

GUEST EDITORIAL



AGEING AND THE IMMUNE SYSTEM

The world's population is growing older. In 2002, approximately 440 million people, i.e. 1 out of every 14 globally, were over the age of 65. It is predicted that the size of the elderly population will double within the next 2 decades, and triple by 2050. The relative size of the older population will increase from 9% in 2020 to 17% in 2050. This growth in older persons will occur in all parts of the world. Globally, life expectancy at birth was 63.8 years in 2002 and it is expected to increase to 76.6 years by 2050.¹ It is only in Sub-Saharan Africa, due to AIDS, that average life expectancy at birth is declining. The reality of longer life expectancy is that once one survives early childhood and infectious diseases, the chance of living to old age is very good and the most likely cause of death will be malignancy or cardiovascular disease.

Two major hypotheses exist at present as to the cause of ageing. The free radical hypothesis of ageing as mooted by Harman in 1957 is the most widely accepted, viz. oxidative damage occurs to all cells. This results in oxidised proteins and protein aggregates (e.g. amyloid- β peptide in Alzheimer's disease and α -synuclein in Parkinson's disease). Accumulation of oxidatively induced DNA mutations results in aberrant gene expression, defective proteins and increase of cancer and cell death.²

Antagonistic pleiotropy was developed by GC Williams in 1957. The theory is that a gene may have two opposing effects, a positive one when an organism is young and a negative one when an organism is older. One example of a possible antagonistic pleiotropy mechanism is the accumulation of sterols and steroids to toxic levels during ageing (e.g. cholesterol in cardiovascular foam cells, oestrogens in precancerous breast and prostate cells).²

A number of genes play a role as mediators of the immune and stress response. Increased inflammatory markers such as interleukin (IL)-6 are associated with greater disability, increased morbidity and increased mortality in the elderly. IL-6, IL-1B, and C-reactive protein are associated with poor physical performance and muscle strength, and tumour necrosis factor- α is a predictor of increased mortality in 80-year-olds and centenarians.³

Despite the increases in inflammatory markers and reduction in one's immune system functioning as one ages, very few drug interventions have been of benefit. Multivitamins, mineral supplements and so called immune boosters have not been effective in reversing the passage of time on one's body. Meta-analyses have shown that these agents increase many disease states. The answer to our ills as we grow older may not be found in the pills, it may well be found in simple interventions such as not smoking, increased exercise and reducing our body mass index.

It is hoped that the three articles on this theme in this journal will increase understanding of the complexities of the immune system and its role in ageing.

Leon Geffen

Institute of Ageing in Africa, University of Cape Town, South Africa

Guest Editor

1. Global population profile 2002: <http://www.census.gov/ipc/www/wp02.html> (accessed 15 July 2008).
2. Cutler RG, Mattson MP. The adversities of aging. *Ageing Res Rev* 2006; **5(3)**: 221-38.
3. Capri M, Salvioli S, Sevini F, *et al.* The genetics of human longevity. *Ann N Y Acad Sci* 2006; **1067**: 252-63.