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MODERN AGEING RESEARCH SHOWS THAT THERE ARE NO GERONTOGENES that cause ageing and determine the time of our death. Genes determine our ability to live and maintain health, but only for about 40-50 years. This period of life is known as the essential lifespan (ELS), required by evolution for the continuation of the species. In the absence of any ageing genes, we are able to live, and now we even expect to live, much longer than our species' ELS. However, a longer life beyond ELS also brings old age – with all its physical, mental, and social manifestations. We therefore need lifestyle adjustments and biomedical, aesthetic, and psychosocial means for maintaining health, beauty, and identity in old age.

Ageing happens individually and the methods to intervene are also required to be person-specific. The highly complex and dynamic nature of our body makes it impossible to completely stop or reverse ageing. The very act of living causes damage to our cells. There are three major sources of damage within a cell: (1) free radicals formed owing to external factors and as a result of internal metabolism; (2) nutritional components, such as glucose, fats and their metabolites; and (3) errors in the processes of DNA duplication, RNA transcription, and protein synthesis. Evolution has developed a network of molecular, cellular, and physiological maintenance and repair systems (MARS) to control the damage and assure survival during ELS. MARS create a 'homeostatic/homeodynamic space', in terms of stress tolerance, damage control, and constant adaptation.

Life beyond ELS is accompanied by a progressive shrinkage of the homeodynamic space, reduced stress tolerance, and increased vulnerability. All negative signs of old age, including age-related diseases, are due to declining efficiency of MARS. Although a variety of cosmetic, nutritional, and other lifestyle interventions are being promoted as 'anti-ageing', a promising scientific approach towards healthy ageing is that of hormesis for maintaining health and homeodynamics. Hormesis is the positive relationship between low-level stress and health. Whereas uncontrolled and unwanted stress is negative and harmful, low level 'stress of choice' can be good and health beneficial. Moderate exercise is the best example of hormesis. Exercise initially increases the production of free radicals, acids and other harmful biochemicals in the body. But MARS-based cellular responses to this mild stress protect the body and strengthen the homeodynamics. Conditions which induce hormesis are called hormetins, and are categorised as nutritional, physical, and mental hormetins. A number of food components, such as spices, flavonoids, polyphenols, and micronutrients are nutritional hormetins. Sauna, breath control, and mental challenges are examples of physical and mental hormetins. Novel combinations of multi-hormetins are under scientific investigation.

Deluding ourselves by denying the inevitable ageing of our bodies is of no use. Approaching old age with fear, hatred, and anti-ageing feelings only worsens the reality. Instead, we can learn, adopt, nurture, and practice reliable methods for undergoing healthy ageing with confidence and dignity.

Suresh Rattan PhD, DSc

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