Editor's Page

Seeking the Secrets of Longevity

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It is now evident from various socio-demographic studies that a greater portion of the population survives into old age, above the seventh decade of life. Projections for Europe estimate that in 1995 13.3% of the population was over the age of 65, whereas by 2015 this figure is expected to rise to 16.3%. However, the factors that promote living after the seventh or eighth decade of life remain unknown. Therefore, a question may arise: what is the 'formula' that allows some elders to avoid chronic diseases, such as cancer and cardiovascular disease? In view of these changes in demography, the United Nations' Global Population Pyramid is undertaking a shift—from pyramid to cube—as the proportion of children and young adults declines and the proportion of elders increases. Clearly, longevity is a complex attribute determined by factors, such as exposure to disease, variability in sleeping patterns, smoking habits, physical activity and diet, that have a direct effect on longevity, in addition to their indirect emotional and cognitive influence on physiological pathways.

Few epidemiological studies have addressed the question of which factors have the greatest effect on longevity. A recently published large longitudinal study showed longevity was associated with activity, emotional stability and conscientiousness.[1] Longevity also seems to be a product of the interaction between genetic, social, behavioural and demographic factors.

More recently, the Aegean island of Ikaria has been recognised among the parts of the world with a high prevalence of octogenarians. The common lifestyle habits that have been described in those populations are a high engagement in daily physical activity, including gardening and walking; a positive attitude with an ability to articulate their sense of purpose, and enriching their day with periods of calm and midday siesta; eating wisely, with high consumption of fruit, wild plants and vegetables, and low consumption of meat products; and social activities with friends, relatives or religious groups. Above all these, healthy aging is thought to reflect the combined influence of environmental factors (lifestyle choices) and genetic factors.[2] More recently, a genome-wide association study of exceptional longevity in 1055 centenarians and 1267 controls revealed that 150 single-nucleotide polymorphisms (SNP) could predict longevity with 77% accuracy in an independent set of centenarians and controls. Further *in silico* analysis by the same authors revealed that 90% of centenarians can be grouped into 19 clusters characterised by different combinations of SNP genotypes—or genetic signatures—of varying predictive value. The different signatures, which attest to the genetic complexity of longevity, were correlated with differences in the prevalence and age of onset of age-associated diseases (e.g. dementia, hypertension, cardiovascular disease) and may help dissect this complex phenotype into subphenotypes of healthy aging.[3] Thus various genetic and environmental factors seem to interact in the appearance of longevity among populations.

Recently, the ATTICA study revealed that the burden of cardiovascular risk factors is increasing among populations.[4] Although individuals tend to change lifestyle habits in the long term, those changes are often stabilised at an advanced age, while people living in rural areas show higher adherence to more traditional dietary patterns and better relationship with morals, tradition and religion—which are affiliated with nutrition—than those living in urban areas. Recently, a epidemiological study conducted in the Greek island of Ikaria showed that, in 673 elderly (mean age 75 ± 6.5 years, 49% men) permanent residents of Ikaria and 657 below the age of 65 (mean age 54 ± 7, 46% men), elderly individuals had

a lower prevalence of smoking (17% vs. 42%), and a higher prevalence of hypertension (65% vs. 29%), diabetes mellitus (23% vs.13%), cardiovascular disease (21% vs.4%), hyperlipidaemia (42% vs. 40%), and metabolic syndrome (58% vs.45%), compared with the middle-aged. Furthermore, the elderly had higher systolic blood pressure levels (143 ± 19 vs. 134 ± 19, p=0.001), lower diastolic blood pressure levels (79 ± 11 vs. 82 ± 11, p=0.01), lower body mass index (28 ± 4 vs. 29 ± 5, p=0.01), lower total cholesterol (197 ± 41 vs. 207 ± 42, p=0.001), low-density lipoprotein cholesterol (123.7 ± 33 vs. 133 ± 35, p=0.001) and triglycerides (140 ± 73 vs. 144 ± 96, p=0.001), but higher glucose levels (108 ± 33 vs. 100 ± 26, p=0.001). With regard to other lifestyle habits, the elderly more often consumed fish, vegetables, legumes and tea, and less often red meat, alcohol, coffee and pasta, showing a higher adherence to the Mediterranean type of diet—as well as the noon siesta—and lower rates of depression compared to the middle-aged individuals.[5] As the prevalence of cardiovascular risk factors among elderly habitants in areas with high levels of longevity is high, many aspects of longevity, beyond traditional knowledge, remain unclear and in great need of future investigation.

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