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Commentary

Characteristics and Cell Biology of Aging

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DESCRIPTION

It is inevitable for humans to age. Increased sensitivity and vulnerability to disease result from the progressive decline in physiological capability and the diminished capacity to respond to environmental stimuli. As a result, mortality from all causes rises exponentially as we age. The complexity of the issue restricts attempts to comprehend the causes of ageing. Environmental influences influence experimental data, secondary effects make it difficult to understand primary causes, and there aren't any well-defined, easily measured "biomarkers" for ageing. Aging changes are also visible at the molecular and organismic levels. Since the mechanisms of ageing in many animals, tissues, and cells may be highly varied, there may not be a single unifying explanation [1,2].

It is believed that the post-reproductive physiology of an organism (i.e., ageing) is an epigenetic and pleiotropic manifestation of the optimization for early fitness since evolutionary pressures have selected for successful reproduction [3].

When two requirements are met, ageing is defined. First, as an organism ages, the likelihood that it will pass away at some point rises. This statistical description captures the gradual aspect of ageing and applies to organisms ranging from yeast to mammals. Second, because of the limiting processes, all individuals phenotypes gradually alter over time [4].

The phenotypic definition is equally inclusive and helpful in separating the ageing process from age-related disorders like cancer and heart disease. All members of a population are affected by ageing phenotypes, whereas only a portion are affected by ageing diseases. Both, but in distinct ways, have an effect on lifespan [5].

For instance, the average lifespan of people in industrialized countries has significantly increased as a result of the numerous medical and public health advancements made in this century. The maximum human life duration, however, has not significantly changed as a result of these advancements because they have not changed how people age in general [6].

Characteristics of aging

During maturation, there is an increase in mortality that is exponential in nature. Gom-Pertz initially identified this phenomenon in the early nineteenth century, and it is still true today [7].

Age-related changes in the metabolic makeup of tissues include a noticeable loss of lean body mass and total bone mass in humans. Total fat stays the same even while the amount of subcutaneous fat either stays the same or declines. As a result, fat tissue percentage rises with age. Many cellular ageing indicators have been identified in a variety of tissues from various organisms [8].

Age-related physiological decline: Both cross-sectional and longitudinal investigations have shown numerous physiologic alterations. Decreases in glomerular filtration rate, maximal heart rate, and vital capacity are a few examples [9].

Age-related reduction in the capacity to adjust to environmental stimuli: The loss of homeostasis maintenance capacity is a key aspect of senescence. This is shown by a changed response to an external stimulus, like exercise or fasting, rather than by changes in baseline or resting characteristics. Losing "reserve" can lead to dampened maximum reactions, delays in reaching peak levels, and delays in going back to basal levels [10].

Increased susceptibility and sensitivity to disease: Several diseases have higher incidence and fatality rates as people age, which parallels the exponential rise in mortality rates with age.

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