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Biomarkers Role of Aging

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Biomarkers are the characteristics of body which can measure. Blood pressure is a biomarker. Now-a-days biomarkers are important in medicine. Biomarkers are integral to drug development and have several problems. The major problem is the failure rate. To improve the success rate and efficiency of drug development, a whole new generation of biomarkers is required which should be more informative and can tell developers earlier whether the drug may have toxicity or it may not work at all, and to get early results on what's going to be successful.

Biomarkers of aging may give the exact "biological age", which is different from the chronological age. Validated biomarkers of aging allow for testing interventions to extend their lifespan, because the changes in biomarkers are observable throughout the lifespan of the organism. Although maximum lifespan would be a means of validating biomarkers of aging, it would not be a practical means for long-lived species like humans because longitudinal studies take much more time. Ideally, biomarkers of aging should assay the biological process of aging and not a predisposition to disease, should cause a minimal amount of trauma to assay in the organism, and should be reproducibly measurable during a short interval compared to the lifespan of the organism. An assemblage of biomarker data for an organism could be termed its "ageotype".

Modern deep machine learning techniques are used to produce a proof-of-concept digital biomarker of age in the form of all-causes-mortality predictor from sufficiently large collection of human physical activity streams augmented by rich clinical data (including the death register, as provided by, e.g., the NHANES study).

Recent studies suggests that increased frequency of senescent CD8+ T cells in the peripheral blood are associated with development of hyperglycemia from a pre-diabetic state suggestive playing a role in metabolic aging. Recently, Hashimoto and co-workers profiled circulating immune cells from supercentenarians at single-cell resolution and identified a unique increase in cytotoxic CD4 T cells in supercentenarians.

The use for biomarkers of aging is abundant and identifies a physical parameter of aging that would allow humans to determine a true age, mortality, and morbidity. The change in the physical biomarker should be proportional to the change in the species age. After establishing a biomarker of aging, humans are able to dive into the research on extending their life spans and finding timelines of potential genetic diseases.

One of the application, DNA methylation's and its properties in tissues, were found to be almost zero for the embryonic tissues, which can be used to determine the acceleration of age and the results can be reproduced in the tissues of chimpanzee.

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