

The explosion of aging research: The emergence of aging biomarker research consortiums

Guobing Chen^{1,2} (✉)

¹Department of Microbiology and Immunology; Institute of Geriatric Immunology; School of Medicine, Jinan University, Guangzhou 510630, China

²Guangdong-Hong Kong-Macau Great Bay Area Geroscience Joint Laboratory, School of Medicine, Jinan University, Guangzhou 510630, China

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The world has entered an era of population aging, leading to unprecedented concerns for the health of the elderly. With the continuous emergence of new technologies and methods, previously unanswerable questions in the field of aging are now being addressed. Unlike diseases with clear diagnostic criteria, aging is influenced by genetic heterogeneity and environmental factors, resulting in individual variations in aging rates. As a result, there is currently no scientific measure for evaluating the success of anti-aging strategies. Consequently, research on aging biomarkers has become a critical focus in the field of aging studies, prompting active collaboration among scientists worldwide to establish aging biomarker consortiums.

In 2015, the MARK-AGE Consortium was established by scientists from 26 institutions in eight EU countries, including 21 universities and research institutes, as well as 5 companies in related fields [1]. The consortium initially recruited a cohort of 3200 volunteers to identify aging-related biomarkers such as DNA-based markers; markers based on proteins and their modifications; immunological markers; clinical chemistry; hormones and markers of metabolism; markers of oxidative stress; vitamins; and markers based on trace elements. To date, the MARK-AGE Consortium has published 38 research papers.

Two aging biomarker consortiums have recently been established in the United States and China, respectively. The Biomarkers of Aging Consortium (BAC) was formed by 27 experts from America and Singapore, as announced in a review titled “Biomarkers of aging for the identification and evaluation of longevity interventions” [2]. The review presents a comprehensive framework for classifying, assessing, and evaluating aging biomarkers. With the big ambitions, the Chinese scientists have established the Aging Biomarker Consortium (ABC) with the review “Biomarkers of aging” [3]. They have proposed six different categories of aging biomarkers, including physiological characteristics, imaging traits, histological features, cellular alterations, molecular

changes, and secretory factors. The consortium has also summarized three essential characteristics of biomarkers: specificity, systemic and serviceable. ABC plans to release a series of consensus statements on aging biomarkers in various organs such as the heart, lungs, brain and nervous system, liver and blood vessels, bone, muscle and so on.

The advancement of new technologies and methodologies, such as single-cell transcriptome, proteome, epigenome, metabolome, metagenomic and phenomic data, has enabled the generation of multi-dimensional, multi-modal and multi-omics big data. With the assistance of artificial intelligence, it is anticipated that critical objectives such as identifying human aging biomarkers from large-scale data sets, defining individual aging indices, and establishing specific aging clocks will be achieved. As research on aging biomarkers continues to grow in Europe, the United States of America, and China, we are confident that our comprehension of aging mechanisms and our ability to accurately measure and effectively intervene in the aging process will improve significantly. Together we can work towards building a global community focused on promoting common health for all mankind.

References

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