Health Promotion and Healthspan: Phenotypic Biomarkers Catalyzing Modern Medicine

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Dear Editor,

We write to call attention to a paradigm shift in modern medicine that is reorienting research priorities and translational practices, signaling a potential Kuhnian scientific revolution.[1] The field of medicine is amidst a pandemic of genome-lifestyle-mediated noncommunicable diseases (NCDs) responsible for an estimated 40-45 million annual deaths and a 9.6-year global median healthspan-lifespan gap.[2-3] Of note, the global median healthspan-lifespan gap has increased from 8.5 years in 2000 to 9.6 years in 2019, a staggering 13% increase.[3] Gender-stratified data show a 2.4 ± 0.5-year wider gap in females, associated with a disproportionately larger burden of NCDs.[3] According to the recent statistical data, there is an urgent need for novel health promotion initiatives.[4]

Multimodal clinical diagnostics of the soma synergized with pharmaceutical interventions form the bedrock of modern medicine. Not confined to established clinical frameworks, we believe that mapping a multisystem profile using phenotypic biomarkers in community-based organizations will assume greater significance in future clinical practices.[5] Phenotypic biomarkers can be bifurcated into multilayered and multifaceted molecular and physical biomarkers - such as the length of telomeres and handgrip strength (HGS) - both of which may serve as predictors of healthy aging.[6] The practicality of physical phenotypic biomarkers has the potential to reframe the centrality of preventive and adjunct therapies in the evolving healthcare landscape. In parallel, it represents a reconceptualization of health from a health-disease dichotomy towards a broad continuum, in line with a salutogenic health model.[7]

Meanwhile, a retrospective cohort study including 122,007 participants shows that risk-adjusted all-cause mortality is inversely proportional to cardiorespiratory fitness (CRF).[8] CRF within the sub-25th percentile range is associated with an almost fourfold increase in all-cause mortality risk relative to a high CRF range (75th-97.6th percentile).[7] Synthesis of 38 cohort studies (n = 1,907,580) indicates that higher HGS, a proxy for whole-body strength, is associated with a 31% decrease in all-cause mortality risk.[9] Akin to level 2A evidence aggregated from cohort studies, experimental research reinforces the relevance of phenotypic biomarkers for clinical interventions. Among them, an RCT (n = 43) investigating the efficacy of a 12-week combined aerobic-strength exercise therapy, performed thrice weekly for 60 minutes, on phenotypic biomarkers in patients with Type-2 diabetes.[9] The research revealed significant improvements in muscle strength, plasma glycated hemoglobin A1C, and other psychosocial metrics compared with the control group.[10]

Given the emerging evidence of the widening healthspan-lifestyle gap and use of phenotypic biomarkers, we present the following priorities to catalyze modern medicine: (1) multisystem biological profiling, including measurements of CRF and HGS outside traditional hospital settings, should be consolidated in the continuum of healthcare; (2) funding agencies and research institutions must allocate more resources to investigating the use of practical phenotypic biomarkers in preventive and adjunct therapies; and (3) a salutogenic health model must be cultivated, shifting clinical questions from 'what is the diagnosis?' towards 'what promotes resilience?' in our patients. The question is no longer whether medicine will evolve, but how quickly practitioners will embrace the new paradigm.

Disclosure

No conflict of interest.

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