

Peer Review

Review of: "Magnesium and Longevity"

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This review presents an ambitious and integrative hypothesis positioning magnesium (Mg) as a central, underrecognized modulator of multiple longevity-associated pathways, including gut microbiome metabolites (butyrate, indoles, secondary bile acids), vitamin D metabolism, methylation cycles, NAD⁺ recycling, telomere maintenance, HDL functionality, HRV, and Ca:Mg balance. Its principal strength lies in its systems-level synthesis, linking biochemical Mg dependency across enzymatic networks with aging hallmarks such as oxidative stress, inflammaging, insulin resistance, and epigenetic drift. The discussion is mechanistically rich and extensively referenced, and the Ca:Mg ratio emphasis offers a clinically relevant perspective often absent from conventional longevity narratives. However, the manuscript frequently shifts from biochemical plausibility to causal inference without sufficient clinical evidence, and many claims (e.g., majority MTHFR prevalence implications, widespread chronic latent Mg deficiency, broad potentiation of all longevity agents) are presented with stronger certainty than supported by interventional data. The review would benefit from clearer differentiation between mechanistic hypothesis, associative epidemiology, and randomized clinical trial evidence; condensation of repetitive Mg-enzyme dependency arguments; a more balanced discussion of null or conflicting supplementation trials; and a structured summary table grading the strength of evidence for each longevity pathway discussed. Framing Mg as a potentially important permissive cofactor rather than a unifying master regulator would improve scientific neutrality and increase its credibility for higher-impact aging or metabolic journals.

Declarations

Potential competing interests: No potential competing interests to declare.