

MEDICINE AND SOCIETY: PEER-REVIEWED ARTICLE

Should Clinicians Be Agents of Anti-Aging?

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Abstract

Pursuit of longevity has become both a biomedical frontier and a booming consumer enterprise. Popular “anti-aging” products—ranging from dietary supplements to skin care and hormone therapies—are commonly promoted as slowing or even reversing aging. At the same time, scientific advances in geroscience are yielding candidate gerotherapeutics and biomarkers for aging that will increasingly generate questions about their applicability, utility, safety, and ethical integration into care. While geroscience holds promise for extending health span, its impact will depend on how this knowledge is integrated into practice and aligned with individual values and priorities, health equity, and prevention of age-related conditions across the lifespan. This article explores the implications of geroscience, particularly for the care of older adults, by examining clinicians’ role in ethical incorporation of gerotherapeutics in practice and concludes by making systems-level recommendations.

“Anti-Aging” vs Geroscience vs Gerotherapeutics

In public and commercial discourse, *anti-aging* typically refers to a broad range of products and practices intended to combat often visible or perceived signs of aging.¹ These include cosmetic treatments, hormonal and dietary supplements, “age-defying” fitness regimens, and other interventions related to rejuvenation. In popular discourse, *anti-aging* carries connotations of aging as a medical problem by presenting aging as a condition in need of intervention as opposed to a natural and heterogeneous lifelong process. While *anti-aging marketing*, geroscience, and gerotherapeutics share a focus on aging, they differ in intent and conceptual framing.

Geroscience is an interdisciplinary field of biomedical research focused on understanding the genetic, molecular, and cellular mechanisms that underlie biological aging and age-related diseases.² Geroscience emerged from the recognition that aging processes (such as cellular senescence, mitochondrial dysfunction, epigenetic changes, and chronic inflammation) are major risk factors for many chronic illnesses in older adults.² Geroscience is grounded in the hypothesis that interventions targeting biological mechanisms of aging might delay the onset of age-related diseases, functional impairment, cognitive decline, and loss of physiological resilience over time and, in so

doing, extend health span—the period of life spent in good health and with functional independence—and possibly overall lifespan as well.^{3,4} Accordingly, rather than targeting one disease at a time, geroscience research targets fundamental aging pathways in order to prevent or delay the onset of multiple age-related conditions simultaneously.⁵

Emerging from geroscience research are proposed gerotherapeutics. These interventions (often pharmacological) are intended to modulate aging-related biology and thus delay age-associated diseases.⁶ For example, gerotherapeutics include senolytics—drugs that selectively clear senescent cells—which are implicated in aging and chronic inflammation.⁷ Studies have shown that senolytic compounds can extend health span and even lifespan in mice by reducing adverse effects of senescent cells.⁸

Another oft-cited gerotherapeutic strategy is the use of caloric restriction mimetics such as metformin or rapamycin (an mTOR inhibitor).⁹ These drugs, originally developed for other indications, have shown potential to influence aging pathways (eg, by improving metabolic and immune function in animal models) and are being used in trials such as the Targeting Aging with Metformin (TAME) study, which seeks to test whether metformin can delay age-related diseases by targeting biological mechanisms of aging.¹⁰ Rapamycin, in particular, has been shown to potentially increase lifespan in organisms from yeast to nonhuman mammals, and there is now growing interest in its potential effects on human aging as well.¹¹ Notably, no gerotherapeutics have been approved for “anti-aging” purposes in humans, and aging is not currently classified as a disease by regulators; there is broad consensus in the gerontological field against medicalizing a natural and multifaceted life process.¹²

The translation of gerotherapeutics from bench to bedside, while promising, requires interdisciplinary reflection on how such tools might reshape the meaning and management of aging. As geroscience continues to deepen our understanding of the biological mechanisms of aging, it opens new possibilities for treating and preventing age-related conditions. This article does not question the value of these discoveries but rather asks how clinicians and health systems should respond to them by examining the broader clinical and societal domains that determine who benefits, how care is delivered, and what it means to age well.

Clinicians’ Roles in Anti-Aging Narratives

Health care is participating in a convergence of accelerating geroscience research and a surging consumer anti-aging market.¹³ Breakthroughs in the biology of aging offer hope that we will someday have tools to prevent or treat age-related conditions in fundamentally new ways.¹⁴ Such hope raises the question, however, of how such interventions should be regulated and promoted and, more fundamentally, how they might affect our conception of what is normal and what is abnormal. While drugs require premarket approval from the US Food and Drug Administration (FDA), cosmetics (aside from most color additives) and dietary supplements do not; instead, manufacturers are responsible for ensuring product safety, and FDA oversight largely occurs after these products enter the market.^{15,16}

As human trials and approval of gerotherapeutics might occur in the future, clinicians eventually might incorporate them in practice. In the meantime, a practical strategy for delaying or treating age-related conditions would be to align prescribing of drugs approved for treatment of particular diseases with the principles of evidence-based prevention: if the drug demonstrates safety and efficacy for delaying the onset of

multiple diseases, it could be considered a valuable anti-aging intervention.¹⁷ Until therapies are validated for this purpose, however, other effective approaches remain relevant for supporting longevity, such as maintaining a healthy diet, staying physically active, remaining socially engaged, and managing chronic conditions. Even as drugs with gerotherapeutic properties become more widely adopted, lifestyle approaches are likely to act synergistically with them; exercise and metformin, for example, activate distinct but overlapping biological pathways.¹⁸ The tech-infused discourse regarding geroscience and “biohacking” (a wide range of practices intended to optimize biological function)¹⁹ might sometimes divert attention from these foundational health measures.

In navigating ethical issues raised by off-label prescribing of disease-targeting drugs to delay or treat age-related conditions, clinicians might find it worthwhile to draw on approaches from the fields of geriatric medicine and palliative care, which emphasize holistic, patient-centered decision-making. For example, the Age-Friendly Health Systems movement promotes the “4 M’s” framework, which addresses what matters, medication, mentation, and mobility.²⁰ This approach emphasizes that high-quality care for older adults involves aligning care with the individual’s goals and priorities (what matters), deprescribing or optimizing medications to avoid harm (medication), maintaining mental health and cognition (mentation), and preserving physical function (mobility). Any intervention for or health encounter with an older adult should ideally be evaluated in light of these broader domains. In prescribing any novel therapy, it is also important to consider the *therapeutic illusion* (overestimation of benefits due to optimism or patient demand) and remain clear-eyed about the uncertainties.²¹ Navigating the boundary between openness to innovation and regulatory reality might surface as one of the key challenges in the emerging field of gerotherapeutics.

Policy- and System-Level Recommendations

Policymakers, clinicians, scientists, research funders, regulatory agencies, and educational institutions all have a role in ensuring that longevity science is translated into meaningful public benefit.

Here are some key areas for consideration:

1. *Require robust evidence and regulatory oversight.* Before anti-aging therapies are widely promoted or integrated into practice, they should meet stringent evidence standards. For example, if a company seeks approval for or markets a “longevity” drug, it should be evaluated on outcomes such as postponement of specific age-related diseases or improvement in functional health and not just on affecting a biomarker change that might not hold much value to the individual. Conditions such as frailty and multimorbidity, which are not discrete diseases, could be used as clinical endpoints in trials of drugs intended to prevent or treat multiple age-related conditions.²²
2. *Promote more equitable access to gerotherapeutics.* As geroscience breakthroughs occur, their benefits must not be limited to those with the greatest resources. Public and private payers should proactively evaluate truly effective aging-related interventions for insurance coverage. Health care professionals, researchers, and policymakers should advocate for inclusive research and equitable distribution of validated gerotherapeutics so that extending health span does not become solely a luxury good. Additionally, government and academic research funding should support interventions that

can be delivered at scale and at reasonable cost, including nonpharmacological strategies. Community-based programs that contribute to quality of life and health span (eg, exercise classes, nutrition support, social engagement initiatives) also merit funding, expansion, and attention.

Equity also necessitates challenging the underlying ageist and ableist narratives that equate aging with decline and imply that only certain types of existence are “worth” extending. The pursuit of longevity, then, potentially engenders social hierarchies if aging “well” becomes a moral obligation tied to wealth or access. As scholars in aging have made increasingly clear, aging is as much a social and moral category as it is a biological process, and the medicalization of aging must be interrogated through this theoretical lens.²³ Policymakers and research funders can support the goal of equity by incentivizing participation in research of underrepresented populations (eg, through community-based recruitment models), calling for equity metrics in trial designs, and supporting coverage-with-evidence development models through agencies like the Centers for Medicare and Medicaid Services.

3. *Integrate more geroscience, geriatrics, and lifespan frameworks into health professions curricula.* Health professions education and health care delivery offer an opportunity to more fully integrate principles of lifespan health into care by training clinicians in the biology of aging and geroscience. In this way, students are exposed to emerging therapies and trends, as well as geriatric care principles and frameworks.²⁴ Professional societies could also create guidelines or repositories of resources on longevity or health span for patients, analogous to chronic disease management plans, which would review evidence-based preventive strategies (eg, vaccinations, exercise), discuss advance care planning, and recommend selective use of gerotherapeutics when appropriate. Whether emerging therapies in this area meaningfully improve health outcomes remains an open question that hinges on how health span is operationalized and measured.²⁵ As novel therapies are integrated into practice, health systems have an opportunity to implement monitoring processes to evaluate their clinical utility and ensure that they bolster, rather than fragment, the delivery of high-quality care.

Conclusion

As geroscience and its connotations of health span gain attention as a **promising frontier**, it is worth exploring whether their scope should remain limited to biology or also encompass the broader ecosystem of aging, such as housing, food security, and policy. This notion prompts reflection on how we conceptualize health span. Is it a biological duration of low disease burden or a dynamic sociocultural state in which people are able to live well according to their own values? While interpretations may differ across disciplines and worldviews, clarifying the conceptual scope of health span will be essential as it gains traction within both clinical and commercial spheres.

The unique challenge of anti-aging interventions is that the target (ie, aging itself or associated physical changes) might not fit neatly into conventional definitions of treatable disease, which, as discussed, complicates regulatory oversight and norms of aging. This challenge makes it all the more important for clinicians and health systems to center patient values in care delivery and to promote approaches that support function and adaptability across changing health states.

Geroscience reminds us that the biology of aging is deeply entangled with many chronic diseases, but it is the field of gerontology that elucidates how aging is experienced variably, contextually, and irreducibly. No two individuals age identically, biologically or socially. Against this backdrop, the cultural impulse to “overcome” aging can foster an insatiable drive for incremental biomedical gains, sometimes eclipsing the more fundamental commitments required to improve the everyday realities of older adults. Meeting these commitments requires grappling with the interdependence of social and caregiving contexts. By acknowledging this reality, geroscience can position itself to be a means of shaping the very systems and environments that will define our own aging trajectories. An important measure of progress will be how well advances in geroscience are translated into interventions and systemic support that help address existing health inequity.

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