Anti-Aging Medicine and Research: A Realm of Conflict and Profound Societal Implications

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Biogerontologists have recently launched a war of words on anti-aging medicine. They seek to discredit what they judge to be fraudulent and harmful products and therapies, and to distinguish their own research from what they regard as the pseudoscience of anti-aging injections, special mineral waters, and other services and products. Yet, many of these biogerontologists are themselves trying to develop interventions that will actually slow or arrest the fundamental processes of human aging and substantially extend average life expectancy and maximum life span. Achievement of these biogerontological goals would drastically alter the nature of individual and collective life, radically transforming virtually every social institution and norm. Biogerontologists who are engaged in anti-aging research need to undertake more active leadership in helping the public to understand their goals, to deliberately consider the implications of their fulfillment, and to begin thinking about ways to shape those ramifications in constructive fashions.

In the spring of 2002, three scientists who have undertaken research on aging for many years—Jay Olshansky, Leonard Hayflick, and Bruce Carnes—launched a war of words to discredit a burgeoning anti-aging medicine movement. They published an article in Scientific American entitled “No Truth to the Fountain of Youth” in which they declared that,

The hawking of anti-aging “therapies” has taken a particularly troubling turn of late. Disturbingly large numbers of entrepreneurs are luring gullible and frequently desperate customers of all ages to “longevity” clinics, claiming a scientific basis for the anti-aging products they recommend and, often, sell. At the same time, the Internet has enabled those who seek lucre from supposed anti-aging products to reach new consumers with ease. (1, p. 92)

They went on to assert that “no currently marketed intervention—none—has yet been proved to slow, stop, or reverse human aging, and some can be downright dangerous” (1, pp. 92–93). They also presented their interpretations of various lines of biological research relevant to the underlying nature of aging, and their promise, or lack of promise, for slowing the progression of aging.

The Scientific American essay was a summary of a lengthier position statement, “The Truth About Human Aging,” that had been posted a month earlier on the website of the magazine (2), and explicitly agreed to by an international roster of 51 scientists and physicians that Olshansky, Hayflick, and Carnes had organized and worked with for about a year in order to achieve a text that was mutually acceptable to a group comprising a wide range of views (3). Shortly after the essay appeared, the full position statement, under a slightly different title (4), was also posted online at the Science of Aging Knowledge Environment (SAGE KE), a subdivision of the website of the American Association for the Advancement of Science and the journal Science. It was then reprinted in the Journal of Gerontology: Biological Sciences (5) and arrangements were also made to have it published (in translation) in Chinese, French, German, Korean, and Spanish journals (6). The scientists’ message also reached a very large audience when the AARP Bulletin, with a circulation of more than 35 million, made the Scientific American article the lead story in its next issue (7).

The biogerontologist’s enemy in this war is what they regard as the pseudoscience of practitioners and entrepreneurs that purvey hormone injections, special mineral waters, dietary supplements, and other services and products purported to combat the effects of aging. Yet, even as these biogerontologists are attacking the contemporary anti-aging medicine movement, many of them are themselves trying to develop interventions that will slow or arrest the fundamental processes of aging dramatically (8–10). Their wide variety of anti-aging research efforts—that they variously describe with labels such as “aging well research,” “longevity research,” and other terms—have potentially radical societal ramifications that should be widely discussed.

This article analyzes why this war on anti-aging medicine is taking place, and assesses it. Then it addresses the profound implications of anti-aging research.

Why the War on Anti-Aging Medicine?

From a sociopolitical perspective, what is the recent effort to discredit anti-aging medicine about? After all, measures
promoted as anti-aging interventions—measures to slow, arrest, and reverse phenomena associated with aging and to extend the human life span—have been part of human culture and societies for millennia. They have been embodied in myth as early as 3000 B.C. (11), and perhaps date in practice from 2500 years ago or earlier (12), with criticisms of such measures waxing and waning over the years.

A Public Health Message

On the surface, the position statement and the Scientific American article can be seen as part of a larger public health effort to educate health professionals and the public regarding harmful and misleading aspects of anti-aging interventions and claims. In this respect, it joins other contemporary efforts of this kind. For instance, Robert N. Butler, who was the first director of the National Institute on Aging (NIA), convened a workshop that produced a consensus report entitled Is There an ‘‘Anti-aging’’ Medicine? (13) and is responsible for two subsequent journal articles with the same title (14,15). The U.S. Senate Special Committee on Aging held a hearing focused on fraudulent marketing tactics for anti-aging medicines (16). The U.S. General Accounting Office issued a report on the physical and economic harms wrought by anti-aging products (17). The editor-in-chief of Experimental Gerontology wrote a similar denunciation of both anti-aging products and treatments (18), and two geriatricians published an editorial entitled ‘‘Antiaging Medicine: The Good, the Bad, and the Ugly’’ (19). NIA produced an ‘‘Age Page’’ called ‘‘Life Extension: Science or Science Fiction? ’’ in which it discredited ‘‘very much exaggerated’’ anti-aging claims for pills containing antioxidants, DNA, and RNA, as well as for dehydroepiandrosterone (DHEA) and growth hormone (20). And the website of NIA promoted a free fact sheet on ‘‘anti-aging’’ ‘‘miracle drugs’’ (21).

There are good reasons for a public health campaign against some aspects of anti-aging medicine. Although certain anti-aging medicine practices such as promoting exercise and appropriate nutrition can be beneficial, others can be harmful or ineffective. For example, studies have indicated that some short-term anti-aging hormone treatments can have adverse effects such as diabetes and glucose intolerance (22,23), and that long-run administration of growth hormone to older persons may potentially elevate the risk of cancer (24). Similarly, hormone replacement therapy consisting of estrogen plus progesterin for postmenopausal women has been shown to elevate their risks of dementia (25) and of breast cancer, coronary heart disease, stroke, and pulmonary embolism (26).

Moreover, the mere ineffectiveness of some anti-aging interventions can also have deleterious consequences for the welfare of patients and consumers. Engaging in an ineffective anti-aging therapy may preclude patients from participating in other regimens that could be beneficial, and waste money that could be used for helpful medical interventions.

There are also issues of economic harm from anti-aging medicine. For some treatments, the sums involved can be substantial. Growth hormone replacement costs between $7500 and $10,000 annually according to one report (27), and ‘‘longevity clinics’’ are charging as much as $2000 per day (7). Granted, the majority of older people and baby boomers interested in anti-aging interventions are not able to spend such sums. But even those who can buy comparatively inexpensive mineral waters and ineffective dietary supplements are caused some degree of economic harm.

Boundary Work

In addition to its public health dimensions, however, the war of words on anti-aging medicine can also be understood as an attempt by established gerontological researchers—including those who are optimistic about the future of anti-aging interventions—to preserve their scientific and political legitimacy that took many years to achieve, as well as to maintain and enhance funding for research on the basic biological mechanisms of aging. As such, it is ‘‘boundary work’’ that parallels disputes in many other areas of science in which rhetorical demarcations are employed to maintain legitimacy and power (28). As Taylor observes, ‘‘Practicing scientists, consciously or otherwise, discursively construct working definitions of science that function, for example, to exclude various nonsciences or pseudosciences so as to sustain their (perhaps well-earned) position of epistemic authority and to maintain a variety of professional resources’’ (29, p. 5). Such is the case with biogerontology.

The Struggle for Legitimacy and Funding

In his monograph on the history of ideas about ‘‘prolongevity’’—significant extension of the human life span and/or average life expectancy, without lengthening suffering and infirmity—Gerald Gruman observes that the subject tends to be:

[...]

The struggle for legitimacy and funding of biogerontology fit rather well the perceptions of biomedical research on aging held by many in the scientific community until recent decades. In her history of the development of federal support for research on aging, published some 20 years ago, political scientist Betty Lockett observes: ‘‘Those who would study aging in order to retard or halt the process have been considered on the fringe of biomedical research, looking for the fountain of youth . . . a marginal area . . . with so little backing from the scientific community’’ (30, p. 5). As a consequence, the history of biomedical research on aging is a story of a struggle for legitimacy and funding. The present effort of gerontologists to downplay ‘‘the fountain of youth’’ can be best understood in this context.

As Achenbaum (31), Hayflick (32), and Lockett (30) detail, the early development of the modern research...
enterprise in the biology of aging in the United States, and in geriatrics as well, was to a significant degree stimulated by the Josiah Macy Foundation. During the late 1930s, it supported surveys on aging and commissioned a seminal volume titled Problems of Aging: Biological and Medical Aspects, which reviewed research knowledge and issues regarding how to prolong human life and how to reduce disabilities and chronic diseases in old age (33). The Foundation also funded a series of professional conferences that brought together researchers from a variety of disciplines and professions who formed a Club for Research on Ageing. In 1940, the Surgeon General of the United States, who had attended a meeting of the Club, took the lead in establishing a small National Institutes of Health (NIH) research program in gerontology housed at the Baltimore City Hospital and Almshouse. Through a cooperative agreement, the hospital provided laboratory and office space, as well as access to patients and the elderly men who were residents of the almshouse, and NIH funded staff, equipment, and supplies (with the Macy Foundation financing the first year).

Over the next three decades, the broad field of gerontology grew, but the development of the biomedical research enterprise in gerontology stagnated. To be sure, in 1945, the two dozen members of the Club for Research on Ageing incorporated themselves as a professional association, the Gerontological Society, to (among other purposes) “promote the scientific study of aging” (34, p. 94); the new organization (known since 1980 as The Gerontological Society of America) began publishing the Journal of Gerontology and grew 100-fold over the next 25 years to comprise nearly 2,400 members from a wide variety of academic disciplines and professions (35). However, the NIH Baltimore intramural program barely got off the ground during World War II as it was diverted by research devoted to the war effort. In 1948, it was designated as the Gerontology Branch of the National Heart Institute, was given a line-item budget, and conducted physiological research on elderly men. This work eventually blossomed into the Baltimore Longitudinal Study that became the prime element of NIH intramural research on aging (31). However, NIH administrative support and funding for the growth of extramural biomedical research explicitly focused on aging was quite limited from the 1940s through the early 1970s.

Although an NIH Gerontological Study Section for reviewing extramural research applications was created in 1946, and was among the first such study sections established (36), it was abolished in 1949 by the chief of the NIH Research Grants Office. Lockett’s documentary research and interviews reveal that, even though the Study Section approved a percentage of applications that was average for all study sections, it was perceived by some NIH officials as too favorably biased toward applications because there were so few researchers in the field of aging that many of them were members of the Study Section and were reviewing their own proposals. Ironically, according to Dr. Nathan Shock, head of the Baltimore intramural research program and a member of the study section, the community of gerontological researchers had fought for the establishment of the Gerontological Study Section because they thought that there was a bias against them—“they felt that other study sections automatically turned down proposals that had the word ‘aging’ in them” (30, p. 36). In any event, gerontological applications were subsequently reviewed by other study sections that, according to one NIH staff member, “downgraded gerontology research,” and the percentage of approvals “went from one extreme to another” (30, p. 37).

During the 1950s and 1960s, extramural research on aging gained little ground at NIH. A Center for Aging Research was established in 1956 to foster research in the field, but it was essentially a “paper organization” created to mollify several members of Congress who were interested in the development of gerontological research, and thereby head off the possibility of designated funding for research on aging that would threaten the turf of NIH disease-oriented research programs (30). During this period, and in response to these same pressures from Congress, five regional multidisciplinary centers for aging research and training were funded through NIH’s program project mechanism. Only one of these centers (at Duke University) ultimately survived, and an internal NIH evaluation of the work of these centers was pointedly uncomplimentary concerning the quality of gerontological research: “One conclusion to be drawn from the history of the old Centers on Aging is that high mission motivation on the part of NIH and sometimes universities coupled with mediocre scientific competence does not lead to strong centers” (30, p. 41). In the meantime, a Senate Subcommittee on Problems of the Aging and Aged issued a report “disparaging the quality of gerontologic research” (31, p. 200).

When the National Institute of Child Health and Human Development (NICHD) was established in 1963, aging was designated as one of its five program areas and existing NIH programs on aging became part of NICHD’s Adult Development and Aging Branch. Although the branch had an external peer review committee composed of a multidisciplinary roster of gerontological researchers, it only reviewed applications for program projects and training and career development grants, not research grants. Over the next 10 years, gerontologists expressed their disappointment with the NICHD arrangement, especially the low proportion of that institute’s funds earmarked for research on aging (37,38). By the late 1960s, frustrated by NIH’s lack of funding for research on the basic mechanisms of aging, biogerontologists set in motion the forces that ultimately led to the establishment of a separate National Institute on Aging in order to ensure that earmarked funds for gerontological research would be adequate. They drafted a bill in 1968 that called for a new NIH Institute with a 5-year research plan “to promote intensive coordinated research on the biological origins of aging” (30, p. 85). In order to gain the support of the Gerontological Society, however, the bill was subsequently broadened to include the medical, behavioral, and social sciences (see Appendix note).

During the subsequent political processes that finally led to the establishment of NIA in 1974, themes suggesting the marginal status of biogerontology persistently emerged. For one thing, the key political actor in the successful lobbying effort, Florence Mahoney, was an ardent pursuer of anti-aging interventions. Mahoney was a powerful Washington
“insider” with politically elite connections, a long-time behind-the-scenes effective advocate for expanded government support for biomedical research. She was very interested in rejuvenation therapies offered by an institute in Bucharest, Romania, and accustomed to taking serum treatments that were purported to slow or prevent aging. As noted in her biography, Mahoney’s “accuracy in separating real science from charlatan [sic] science was not precise; she occasionally backed a rejuvenation expert who had mastered promotion and mystique” (39, p. 237). At the point when biogerontologists attempted to persuade her to make legislation for a separate institute her prime objective, she was more than happy to do so. Her receptiveness to their cause was not only nourished by her personal interest in anti-aging interventions, but also by her experience as a citizen member of the NICHD Advisory Council from 1963–1967, where she felt that gerontological research was short-changed. Regarding her NICHD experience, Mahoney observed: “Every time a grant came up about aging, it was turned down . . . Everyone said aging came naturally. I never believed the effects of old age were irreversible . . . I kept telling them not to discourage those grants, or they would have to have another institute” (39, pp. 237–238).

Throughout the protracted legislative history of NIA’s establishment, from 1969 through 1974, various opponents of such an institute were quite candid regarding their negative view of the quality and promise of gerontological research. At a Senate hearing in 1971, for instance, an assistant secretary in the Department of Health, Education, and Welfare argued that the field of aging was not ripe for the injection of major new resources because it lacked “a substantial body of interested and competent research investigators, plus enough research leads, or promising ideas within the field to challenge the researchers to productive endeavors” (30, p. 98). Similarly, in a House of Representatives hearing in 1972, the president of the Association of American Medical Colleges asserted that “there is a paucity of trained researchers and valid ideas in the field of aging research” (30, p. 122). When one version of the bill passed in 1972, a memo from the Office of Management and Budget to President Nixon urged him to veto it—which he ultimately did—because an NIA “could raise false expectations that the aging process can somehow be controlled and managed through biomedical research” (30, p. 139).

Despite Nixon's veto—and consistent opposition from high-level NIH officials who apparently did not want to have a new institute carving out its own share of NIH appropriations (30,38)—Mahoney, the gerontologists, and several key members of Congress persisted in their efforts. In 1974, in the midst of calls for his impeachment, Nixon signed the legislation creating NIA (40).

The establishment of NIA provided for biogerontology the kind of institutionalization that confers scientific stature and power (41). It began a process that legitimated research on aging both as more of a “mainstream” subject for biomedical research than the broader scientific community had regarded it, and as an appropriate area in which to invest sizable amounts of public funds. Since NIA began operation, a number of important scientific frontiers have been opened up in research on the fundamental biological process of aging (42,43). Moreover, the overall NIA budget, which was only about $20 million in its first year of operation (30), has grown rapidly over the years to reach just under $1 billion by fiscal year 2003 (44).

The Anti-Aging Medicine Movement Versus the “Gerontological Establishment”

Even as biomedical research on aging achieved scientific and political legitimacy in the late 20th century, however, a new challenge to its reputation was developing in the form of an “anti-aging medicine” movement in the 1990s. Perhaps historian Carole Haber (45) is correct in suggesting that the contemporary emergence of this movement lies in the appeal of its promises to aging baby boomers who grew up in a youth-oriented cultural period; recent scientific discoveries that seemingly have potential relevance to slowing the rate of aging in humans; and in concerns about negative economic consequences for society associated with the baby boom reaching old age. In any event, the use of anti-aging products, particularly dietary supplements, soared following the enactment of the Dietary Supplement Health and Education Act of 1994, which relaxed regulation of such products (17). During the same period, several dozen anti-aging books were published (46–50). A refereed scientific publication, the Journal of Anti-Aging Medicine, began publishing in 1998 (51). Two nonrefered publications with similar sounding names—Journal of Longevity and The International Journal of Anti-Aging Medicine—have also appeared (52). Websites like “Youngevity: The Anti-Aging Company” market products such as “The Vilcabamba Mineral Essence” to enable people to “live their lives in a state of youthfulness” (53). There are no hard statistics on the size of the overall anti-aging market in the United States but there are some estimates available. A research report prepared by a “knowledge services company,” FIND/SVP, estimates that the anti-aging market was about $43 billion in 2002 and could increase to $64 billion by 2007 (54). However, it defines the market very broadly in terms of five categories: cosmetic treatments and surgery; exercise and therapy; food and beverages; vitamins, minerals, and supplements; and cosmetics and cosmeceuticals.

The element of the anti-aging movement that has most directly challenged the established gerontological community is the American Academy of Anti-Aging Medicine (A4M), which states that the present anti-aging global market is $30 billion (55). A4M proclaims that “anti-aging medicine is ushering in the Ageless Society” (56) and that its organization is “the undisputed leader in advancing anti-aging medicine around the world” (57). Founded in 1993 by “pioneering anti-aging physicians and practitioners” (58, p. 4), A4M claims that it has 12,000 members and receives 1.8 million hits per month on its website (55). Its latest publicly available tax returns indicate that its net assets increased from $650,000 in 1997 (59) to $5.3 million in 2000 (60).

Although A4M is not recognized by the American Medical Association or the American Board of Medical Specialties, it has established three board certification programs under its auspices—for physicians, chiropractors, dentists, naturopaths, podiatrists, pharmacists, registered nurses, nurse practitioners, nutritionists, dieticians, sports trainers and
fitness consultants, and PhDs (61). According to A4M, it has organized more than two dozen international conferences on anti-aging medicine, and conducted educational meetings on Capitol Hill to inform key legislators about the necessity of funding anti-aging research leading to clinical anti-aging therapies (62). In addition, the organization publishes a quarterly magazine entitled Anti-Aging Medical News.

The president and the chairman of this organization, Ronald Klatz and Robert Goldman, respectively, are Chicago-based osteopaths. In the 1980s, they published books on the subject of drugs and training regimes intended to enhance performance in sports (63,64). But since the inception of A4M, they have turned to a different subject matter, publishing more than a half dozen books with such titles as 7 Anti-Aging Secrets (65), Stopping the Clock: Why Many of Us Will Live Past 100 and Enjoy Every Minute (66), and Grow Young with HGH: The Amazing Medically Proven Plan to Reverse Aging (67). The cover of one of Klatz’s books, Ten Weeks to a Younger You, promises “age reversing benefits of the youth hormones” such as “enhance IQ,” “eliminate wrinkles,” “increase memory,” and “enhance sexual performance” (68).

A4M states that it does not sell or endorse any commercial product or promote or endorse any specific treatment. But it actively solicits and displays numerous advertisements on its website for products and services (such as cosmetics, and alternative medicines and therapies), anti-aging clinics, and anti-aging physicians and practitioners, some of them listing board certification by A4M (69). The website also has an “A4M Longevity Store” where anti-aging medicine publications and individual and organizational memberships in A4M can be purchased.

Although what A4M terms “the traditional, antiquated gerontological establishment” (70) may disagree with many of the organization’s messages and the measures it promotes, most elements of A4M’s broadly stated goals seem to be the same as those of many biomedical researchers and practitioners in gerontology and geriatrics (71). The stated mission of A4M is:

[T]he advancement of technology to detect, prevent, and treat aging related disease and to promote research into methods to retard and optimize the human aging process. A4M is also dedicated to educating physicians, scientists, and members of the public on anti-aging issues. A4M believes that the disabilities associated with normal aging are caused by physiological dysfunction which in many cases are ameliorable [sic] to medical treatment, such that the human life span can be increased, and the quality of one’s life improved as one grows chronologically older. A4M seeks to disseminate information concerning innovative science and research as well as treatment modalities designed to prolong the human life span. Anti-aging medicine is based on the scientific principles of responsible medical care consistent with those of other healthcare specialties. (72)

(A4M’s use of the term life span in this and in other statements in which it describes historical improvements in longevity seems to refer to what is customarily termed average life expectancy rather than maximum species life span.)

To be sure, most if not all biogerontologists would probably quarrel with A4M’s notion that at present human life expectancy for adults can be significantly increased or prolonged (5). But many of them believe that in the future, on the basis of further research, average life expectancy and maximum life span can be substantially extended through biomedical interventions (8–10,73).

Although there is a resemblance between the broad goals of A4M and those of the established community of gerontologists and geriatricians, the organization presents anti-aging medicine as a “new health care paradigm” (74). Moreover, it actively promotes itself as a challenger to the established gerontological community. For instance, A4M has produced a document entitled “Intellectual Dishonesty in Geriatric Medicine—Truth Versus Fallacy” in which it berates NIA for its public information campaign regarding anti-aging therapies, characterizing it as anti-competitive censorship.

As the worldwide popularity of anti-aging medicine grows, the NIA has scrambled to brand their own flavor of anti-aging medicine as “successful aging,” “healthy aging,” and “aging gracefully.” The only perceptible difference between these terms seems to be that the latter phrases are somehow politically correct, mirror-image clones of anti-aging as put forth by A4M’s trailblazing work in this field. . . . NIA wishes to absorb what it cannot contain: by discrediting “anti-aging—medicine” in lieu of its notion of “healthy aging” they silence the most visible outside source of innovations in aging research and education. The status quo of research funding, academic interests, and—most importantly to NIA—the consolidation of power—is thereby maintained. (70)

NIA has not responded to this interpretation of its activities. Indeed, publicly, NIA has appeared to ignore A4M altogether. Individuals in the field of gerontology, however, have certainly responded to the marketing of anti-aging products and therapies by A4M and others.

MAINTAINING LEGITIMACY: RESPONSES FROM GERONTOLOGISTS

The active promotion of anti-aging medicine and the superficial resemblance between its broad goals and those of established biological and medical researchers in the field of aging, have clearly led members of the latter group to become worried about being confused with the former. The Scientific American position statement signed by 51 scientists was the most publicized but not the only effort to distance the field of gerontological science from anti-aging medicine. Although different types of strategies have been employed in these efforts, one common goal has been to ensure that the hard won respectability attained by the community of gerontological researchers not be tainted by the anti-aging movement. As the position statement acknowledges, “Our concern is that when proponents of antiaging medicine claim that the fountain of youth has already been discovered, it negatively affects the credibility of serious scientific research efforts on aging” (5, p. B295).

One approach to maintaining the legitimacy of research on aging has been to invent new terminology to describe its possible benefits. As some gerontological researchers put it in a letter to Science, “Misuse of the term ‘anti-aging medicine’ has led many scientists . . . to shy away from using the term at all, for fear of guilt by association” (52).
Butler argues that in order to ensure that research on aging does not lose credibility and funding, “we should rename the field of aging medicine ‘longevity medicine,’ to differentiate it from anti-aging practitioners and their nostrums” (14, p. 64). Similarly, in a workshop convened by Butler, participants selected “Longevity Science and Medicine” as an alternative term to “anti-aging [which] has acquired a tarnished image” (13, p. 12).

A second approach has been to discredit the anti-aging medicine movement by disparaging it for making a “quick profit” by fraudulently “exploiting the ignorance and gullibility of the public” (75, p. 25). To this end, Olshansky, Hayflick, and Carnes have constituted themselves as a committee to designate annual “Silver Fleece Awards” (emulating the practice of former U.S. Senator William Proxmire who periodically announced “Golden Fleece Awards” to designate government funding for research projects that he regarded as devoid of any redeeming value to society). In early 2002, Olshansky arranged for his university’s office of public affairs to publicize that he was announcing the first annual Silver Fleece Awards in “a lighthearted attempt to make the public aware of the anti-aging quackery that has become so widespread here and abroad” and presenting to the winners (in absentia) bottles of salad oil, labeled “Snake Oil” (76). The Silver Fleece Award for “Anti-Aging Quackery” went to Clustered Water (528) for being the product “with the most ridiculous, outrageous, scientifically unsupported or exaggerated assertions about aging or age-related diseases.” The Silver Fleece Award for an Anti-Aging Organization went to A4M, which Olshansky characterized “as responsible for leading the lay public and some in the medical and scientific community to the mistaken belief that technologies already exist that stop or reverse human aging” (76).

A third and more subtle approach has been to mobilize the adjective “legitimate” to modify research on aging and thereby distinguish it from anti-aging medicine. Thus, in an article reporting an increase in funding for NIA, the newsletter of Butler’s International Longevity Center exhorts, “It is essential in the years ahead, however, that the political influence of Florence Mahoney—a woman responder to the marketing of anti-aging charlatans—is now understandably trying to distinguish itself from what it regards as pseudoscientific entrepreneurs and practitioners.

Will the war on anti-aging medicine succeed in preventing erosion of the scientific and political legitimacy of research on aging and funds for conducting it? Or will it in truth or fact, seeks to discredit tens of thousands of innovative, honest, world-class scientists, physicians, and health practitioners” (78, p. 1). In response to the Scientific American position statement, A4M set forth 10 alleged “gerontological biases” and purported to refute each of them by describing various articles and data. In conclusion, it asserted:

Simply put, the death cult of gerontology [emphasis added] desperately labors to sustain an arcane, outmoded stance that aging is natural and inevitable … Ultimately, the truth on aging intervention will prevail, but this truth will be scarred from the well-funded propaganda campaign of the power elite who depend on an uninterrupted status quo in the concept of aging in order to maintain its unilateral control over the funding of today’s research in aging. (79)

Olshansky dismisses these retorts as “more humorous than anything” and observes that the “conspiracy theory” they express “should be transparent to anyone knowledgeable about the science of aging” (6). Moreover, these A4M statements only appear on the organization’s website and, therefore, may fairly be estimated to have a negligible impact on the broader public’s perceptions of the gerontological community.

**AN ASSESSMENT OF THE WAR TO DATE**

Few, if any, in the gerontological community would quarrel with the goals of those gerontologists who have recently focused their attention on the anti-aging movement. One goal has been to disseminate a public health message to “scientists and health care workers because they should be on the front warning the public about the possible dangers associated with the use of anti-aging substances” (6). This effort is a commendable complement to the public health messages disseminated by NIA (20,21), the U.S. Senate Special Committee on Aging (16), and the U.S. General Accounting Office (17), described above.

Another goal, clearly—and more important in its ramifications for the gerontological community (and ultimately, perhaps, for society)—is to preclude the anti-aging movement from stigmatizing research on aging, once again, with the charlatanic baggage that biogerontology carried until the establishment of NIA ushered it into the mainstream of science in the last quarter of the 20th century. As Butler observes, “Unfortunately, anti-aging medicine is often confused with serious research. Consequently, public and private philanthropic organizations are less interested in funding serious aging research . . .” (14, p. 64). It is certainly ironic that the field for which the major stride toward legitimacy and funding was largely achieved through the political influence of Florence Mahoney—a woman responsive to the marketing of anti-aging charlatans—is now understandably trying to distinguish itself from what it regards as pseudoscientific entrepreneurs and practitioners.
boomerang as gerontologists persist in their attacks on the anti-aging movement?

Olshansky, Hayflick, and Carnes have been well aware of the possibility that their criticisms of the anti-aging movement might provide it with what they would regard as undue recognition and standing. They initially submitted their position statement to the *Journal of the American Medical Association*, and the journal said they would consider publishing it if a companion piece written by a proponent of anti-aging medicine could be considered to appear alongside it. The gerontologists declined the offer because they “did not want to legitimize” the anti-aging movement (3). Nonetheless, from evidence available in the short run, it is possible to argue that efforts to criticize the anti-aging movement have provided it with greater visibility. When the *AARP Bulletin* published its lead story on the *Scientific American* position statement, the president of A4M, Ronald Klatz, was enabled to reach a readership of more than 30 million persons, gaining attention for his organization and issuing a strong indictment of gerontologists. A4M was described at some length in the article, and Klatz was quoted as saying: “The A4M is the first serious affront to the gerontological establishment in 30 years and they want to kill anyone with a competing philosophy.... The old-line philosophy was aging is inevitable, nothing can be done, get used to it, grow old and die” (7, p. 3).

To be sure, the publication of this and other Klatz quotations and the description of A4M in the *AARP Bulletin* was not the first recognition that A4M and Klatz had received from long-established organizations in the field of aging. In 1997, A4M received a grant from the Retirement Research Foundation to expand its “educational program and to establish the American Board of Anti-Aging Medicine” (80). In early 2002, *Generations*, the journal of the American Society on Aging, published an issue on the topic of anti-aging (81). In it, Klatz (71) was provided the same platform to spread his message as was provided to Butler (14) and Hayflick (75), two of the most distinguished and senior figures in the field of gerontology. Moreover, the very fact that the author of the *AARP Bulletin* story felt that it was appropriate to get several quotes from Klatz and display his photo in a sidebar—even though neither he nor A4M were mentioned in the *Scientific American* article or position statement—was an indication that his organization had already attained some measure of legitimacy in the larger society. But the new exposure that Klatz received through AARP’s publication of his quotes was surely a major escalation in recognition for A4M because of the bulletin’s huge circulation. One wonders how many of the 35 million AARP members who learned about A4M by reading this story subsequently attempted to access the website of Klatz’s organization to pursue an interest in anti-aging products and therapies. A number of them, on AARP’s Internet message boards, did denounce the “No Truth to the Fountain of Youth” theme of the biogerontologists as a scare tactic (82).

In addition to providing some limelight for A4M, the war on anti-aging medicine might also have the unintended consequence of blurring public understanding of the difference between the anti-aging movement and the anti-aging aspirations of some biogerontological researchers that could eventually lead to significant improvements of health conditions in old age. Consider that among highly-respected biogerontologists—including three who signed the Position Statement on Human Aging—there are those who maintain that substantive progress toward “engineered negligible senescence,” or aging reversal, will be feasible “within about a decade” and urge investment in its development (9).

One wonders if public (and thereby) financial support for researchers in this camp, as well as those who have somewhat less ambitious goals for modifying aging (8,10,32), will be inadvertently weakened by confusion with the objects of attacks on anti-aging medicine. After all, a highly visible sidebar in the *AARP Bulletin* quoted Olshansky (somewhat out of context) as saying, “Anyone who claims that they can stop or reverse the aging process is lying” (7, p. 4). (In the text of the article Olshansky qualified this statement by adding, “It is not currently possible” (7, p. 3) [emphasis added]. Moreover, he is hopeful that future research will “produce a method of slowing the rate of aging in humans” (6).

Yet, regardless of any unintended consequences, it was inevitable that gerontologists would launch a war on the pseudoscientific elements of the contemporary anti-aging movement sooner or later. For one thing, the gerontological community has an ethical responsibility to do so. As Olshansky says:

The anti-aging entrepreneurs are taking advantage of the legitimate scientists by taking our research, extending and exaggerating our findings well beyond our own views, and then selling their false anti-aging potions to the public with the claims that there is science behind them. By ignoring them, we’re indirectly supporting them, and that had to stop. (6)

More importantly, as indicated by the early history of U.S. biogerontology, it is probably essential for biogerontologists to debunk anti-aging products and therapies so that the image of research on aging will not become blemished once more. Hayflick expresses the situation in an extremely cogent fashion: “After some 25 years of legitimizing the field of biogerontology, it is our responsibility to maintain that legitimacy so that public support for research that advances understanding of the fundamental biology of aging and longevity determination will be sustained and enhanced” (3).

**Anti-Aging Research and the Need for Public Discussion**

Meanwhile, even as the biogerontological community is striving to distinguish itself from the contemporary purveyors of anti-aging products and services, research on measures to achieve what Gruman (11) termed “prolongevity”—significant extension of the length of human life, free from diseases and disabilities now associated with old age—is a mainstream activity sponsored and supported by NIA and other institutes of the National Institutes of Health (83). A great deal of research has established, for instance, that dietary caloric restriction in various species of experimental animals increases average life expectancy and maximum life span, and slows age-associated changes (84). By 1999, NIA and the National Institute of Diabetes, Digestive, and Kidney Diseases regarded work in this area to be sufficiently
important to jointly convene a Caloric Restriction Clinical Implications Advisory Group to explore the implications “for the development of interventions to affect human age-related changes and diseases” (85, p. 5). More than 50 scientists assembled for the occasion, working in six panels, produced a substantial agenda of opportunities for research on the human implications, including aspirations to slow fundamental processes of aging and extend maximum life span (83). In line with this goal, some biogerontologists are now working on the development of pills that could mimic the anti-aging effects of dietary caloric restriction (8,10).

Three Prolongevity Paradigms

Regardless of whether their research is in the area of caloric restriction or other areas such as genetics or stem cells, the anti-aging aspirations of biogerontologists in general can be summarized by three paradigms. The most conservative of these is commonly described as compression of morbidity, a term first promoted by a Stanford physician, James Fries, a quarter of a century ago (86). In this scenario, humans live long and vigorous lives, terminated by a sharp decline in functioning mandated by senescence, followed relatively swiftly by death. “The basic syllogism of the compression of morbidity is that since the age of first infirmity can be postponed but the lifespan itself is genetically fixed, the period of infirmity can be shortened” (87, p. 6). The ideal envisioned by Fries is for all of us to lead long lives free of chronic disease and disability, and then die rather quickly as we reach the limits of the human species life span because we are “worn out” from the fundamental processes of aging. Compressed morbidity includes the possibility of increases in average life expectancy, but not in maximum life span for the human species.

A more ambitious paradigm is decelerated aging, in which the processes of aging are slowed and average life expectancy and/or maximum life span are increased. In contrast to the compression of morbidity ideal, late-life functional disabilities are not eliminated but occur at a more advanced age than has been the case historically. University of Cambridge geneticist Aubrey de Grey and colleagues argue that this phenomenon is already taking place in the context of greater average life expectancy; they do so by drawing on data showing that the onset of late-life frailty is occurring at later ages than previously, but the period of time for which it is experienced is not becoming shorter (88). Richard Miller of the University of Michigan suggests that it may be possible through decelerated aging to “produce 90-year-old adults who are as healthy and active as today’s 50-year-olds” (p. 155), as well as “increase the mean and maximal human life span by about 40 percent, which is a mean age at death of about 112 years for Caucasian American or Japanese women, with an occasional winner topping out at about 140 years” (8, p. 164).

The most radical paradigm is arrested aging, in which the processes of aging are reversed in adults. In contrast to slowing the rate of aging, the goal of reversing aging is to restore vitality and function to those who have lost them akin to the rejuvenation theme that has been present in prolongevity myths and quests for millennia. Some scientists envision that reversal could be accomplished through strategies that remove the damage inevitably caused by basic metabolic processes and thereby attain “indefinite postponement of aging” (88, p. 670) or negligible senescence (9). Success in achieving arrested aging would be tantamount to bringing about “virtual immortality”—that is, an increase in healthy adult life span of such a great magnitude that the consequence would be societies in which no one dies except from accidents, homicides, and suicides, or from choosing to forego or being excluded from the interventions that bestow continuing vigorous life. A leading proponent of the likelihood that interventions to arrest aging will be achieved, de Grey, asserts that it is “inevitable, barring the end of civilization, that we will eventually achieve a 150-year mean longevity” (89, p. 369). Moreover, he hypothesizes that in a world with universally available engineered negligible senescence, “life expectancies of around 1000 years” would be attained (90).

The Need for Anticipatory Deliberation

Although achievement of any of these biogerontological visions may seem improbable, history shows how developments in biomedical science—like the cloning of mammals—can catch society unawares by accomplishing what seemed to be “The Impossible” (91). To date, there has been some discussion of the possibility of dramatic anti-aging interventions but little, if any, of it has focused on how to deal with the societal consequences that might ensue if such interventions are achieved. Rather, the focus has been confined to whether the pursuit of prolongevity is desirable.

Among those who have addressed the latter issue is John Harris, a bioethicist in the United Kingdom who thinks that efforts to attain prolongevity should go forward because he sees no coherent ethical objections (92,93). Michael Fossell, editor of the Journal of Anti-Aging Medicine, enthusiastically embraces the “promise of a time when we will live longer and much healthier lives—of one hundred, two hundred, possibly five hundred years” (94, p. 1). In sharp contrast with Harris and Fossell is humanist philosopher Leon Kass, chairman of the President’s Council on Bioethics appointed by President George W. Bush in 2001. Kass believes that “the finitude of human life is a blessing for every human individual, whether he knows it or not” (95, p. 20), and that “to covet a prolonged life span [he seems to mean increased average life expectancy] for ourselves is both a sign and a cause of our failure to open ourselves to... any higher... purpose” (96, p. 316). He argues that even if the human life span [read average life expectancy] were increased by only 20 years, we would lose the benefits that finitude confers: 1) interest and engagement in life; 2) seriousness and aspiration; 3) beauty and love; and 4) virtue and moral excellence (95). He even condemns compression of morbidity because it will deny individuals the blessings of anticipated mortality: “[I]t is highly likely that even a modest prolongation of life with vigor or even only a preservation of youthfulness with no increase in longevity would make death less acceptable and exacerbate the desire to keep pushing it away” (95, p. 20).

Building on these long-held views, Kass set the agenda for his Presidential Commission to issue a report in late 2003 that generally takes a dim view of efforts to attain prolongevity through biotechnology (97).
Like Kass, the American bioethicist Daniel Callahan has long been an opponent of prolongevity. As early as 1987, in a prominent book that proposed health care rationing for older people, he portrayed the sizable and growing contemporary population of older Americans as a “social threat” and “a demographic, economic, and medical avalanche . . . that could ultimately (and perhaps already do) [sic] great harm” (98, p. 23). The only deaths that he regards as “premature” are those that occur before age 65 (99). And he argues that we should not seek much longer lives if they will not bring about any alleviation of the “pathologies of civilized life” such as finding “the key to world peace, eliminating poverty, stopping terrorism, achieving equitable access to health care for the world’s entire population, and curbing domestic violence” (100, p. 3).

Even biogerontologist Leonard Hayflick—regarded by many in the field as having laid the groundwork for contemporary research advances in molecular mechanisms of aging (101)—has long feared the societal implications of slowing or arresting the aging process such as worldwide overpopulation and its consequences (32,102). However, he joins with most other biogerontologists and gerontologists in regarding as highly desirable the compression of morbidity as long as it does not involve extending average life expectancy beyond 100 years.

Other biogerontologists who are engaged in efforts to decelerate aging or to arrest aging acknowledge the concerns expressed by Hayflick, but do not feel that they warrant a halt to the quest for prolongevity (8,9,93,103). Indeed, as Stephen Hall makes clear in his book, Merchants of Immortality: Chasing the Dream of Human Life Extension (104), scientists and entrepreneurs will persist in their efforts to combat aging as well as disease, with or without government funding, and with or without the approval of bioethicists, philosophers, and other critics.

Yet, biogerontologists as well as society at large would benefit from anticipatory deliberations concerning issues generated by the potential consequences of the anti-aging interventions being pursued. If dramatic increases in healthy life expectancy and life span become feasible, how should the interventions that achieve them be allocated in society? Serious ethical issues would be created if the interventions were not universally available, but allocated in accordance with wealth, social, and political status, ascribed “merit,” or some other distinguishing criteria. Alternatively, if access to effective anti-aging interventions were unlimited, what we now term the aging society would become transformed into the long-lived society, as a new large stratum of the prolonged old would be added on to the older age groups that are currently described by a trio of conventional labels: the young-old, ages 65–74; the old-old, ages 75–84; and the oldest-old, ages 85 and older (105). A long-lived society populated by numerous prolonged old persons would certainly witness radical changes in the nature of family life; labor, housing, and consumer markets; politics, public policies, and the law; and virtually every social institution.

These and other potential consequences of effective anti-aging interventions have much more profound and far-reaching implications than other current biomedical policy issues, such as the ethics of human cloning. If biogerontologists succeed in their aspirations to decelerate or arrest aging, the consequent transformations in the nature of individual and collective life may well be drastic. Yet, such transformations have rarely been addressed to date, and not in forums that reach a wide public (106–108). Biogerontologists who are engaged in anti-aging research need to undertake more active leadership—joining with colleagues in medicine, the behavioral and social sciences, and the humanities—in helping the public to understand their goals, to deliberately consider the implications of their fulfillment, and to begin thinking about ways to shape those ramifications in constructive fashions. Such discussions may be able to shape wisely the future of developments in anti-aging science and their social consequences. As a step in this direction, two members of The Gerontological Society of America—biologist Tom Johnson and political scientist Bob Binstock—have formed an Interest Group on the Societal Implications of Anti-Aging Research that met for the first time at the 2003 Gerontological Society of America annual scientific meeting and will continue to meet in the future.

ACKNOWLEDGMENTS

Portions of this article are adapted from R. H. Binstock (2003), The war on “anti-aging medicine,” The Gerontologist, 43, 4–14 (reprinted with permission), and E. T. Juengst, R. H. Binstock, M. J. Mehlman, & S. G. Post (2003), Antiaging research and the need for public dialogue, Science, 299, 1323 (reprinted with permission).

Support for the preparation of this article was provided by the National Institute on Aging (NIA) and the National Human Genome Research Institute (NHGRI), grant no. IR01AGHG20916-02, Eric T. Juengst, PhD, Principal Investigator. The opinions expressed are solely those of the author and do not reflect those of NIA or NHGRI.

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