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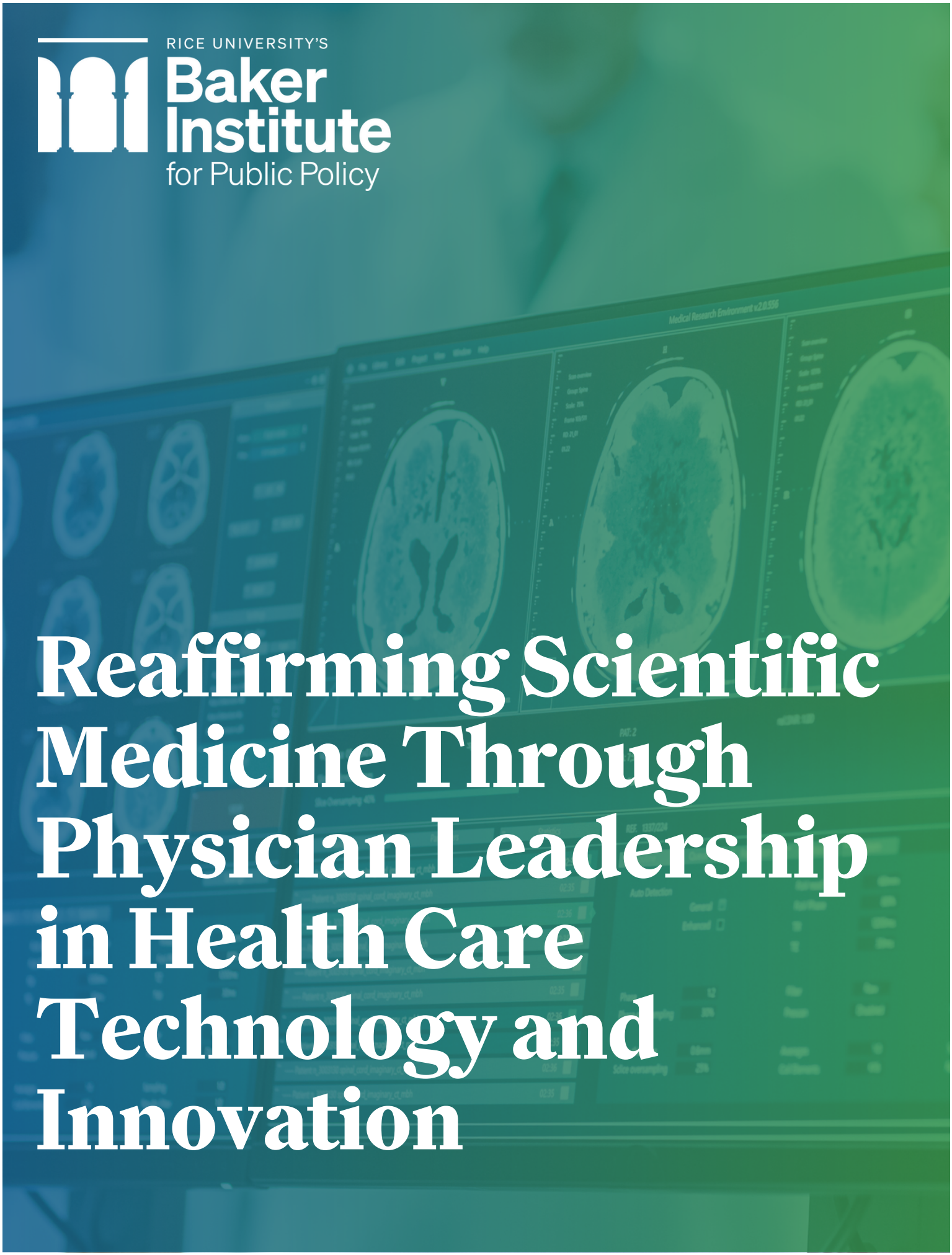

Reaffirming Scientific Medicine Through Physician Leadership in Health Care Technology and Innovation

RICE UNIVERSITY'S Baker Institute for Public Policy

Working Paper

Reaffirming Scientific Medicine Through Physician Leadership in Health Care Technology and Innovation

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Glossary of Commonly Used Terms

Academic Health Center (AHC): An integrated cluster of educational, biomedical, and health care institutions that sometimes comprise part of a larger research university. In the U.S., an academic health center would typically include a medical school, and schools of nursing, pharmacy, public health, as well as graduate school of biomedical sciences awarding the Ph.D. and other graduate degrees. Academic health centers also support major research laboratories, and one or more teaching hospitals for adult and pediatric care, as well as a center for cancer care and research.

Biohub: See Life Sciences Cluster.

Entrepreneurship: Focused aspirations and explorations (led by an individual or group) to create new economic or humanitarian value. Entrepreneurs combine resources, organizations, and innovations in novel or interesting ways. Examples could include both traditional business entrepreneurship and social entrepreneurship for the benefit of society or humanity.

Life Sciences Cluster: A federation of co-localized organizations committed to innovation in biomedicine. Typically, a life sciences cluster would be comprised of an academic health center, established and start-up biotechs or other biopharmaceutical companies, contract research organizations, management consultant groups, and vendors for essential products and services. These life sciences institutions are supported by the U.S. National Institutes of Health, private equity, venture capital, and other investments or financial services. Most life sciences clusters are in major metro areas, although a few such as the Mayo Clinic or Texas Medical Center are so large as to comprise its own business district.

Make America Health Again (MAHA): A health policy and advocacy framework led by the secretary of the Department of Health and Human Services in the second Trump administration to address chronic illness in the U.S. MAHA heavily promotes the wellness and influencer industry, often invoking pseudoscientific concepts and beliefs.

National Institutes of Health (NIH): America's lead federal health and biomedical research agency funding almost $50 billion in research annually. The NIH is both a research institute and the largest public funder for biomedical research in the U.S. (and globally). In addition to funding research, NIH also sets forward research integrity and ethical standards.

Scientific Medicine: The modern practice of medicine based on laboratory and clinical investigations, which are peer-reviewed and published in scientific journals. The current system of scientific medicine began in German research universities in the late 19th century and gained strength in the U.S. with the establishment of the Johns Hopkins University School of Medicine.

Sectarian Medicine: Systems of ideologically-driven medical philosophies, sometimes based on empiricism but mixed with pseudoscientific concepts. Examples include homeopathy and eclecticism.

Wellness and Influencer Industry: For-profit businesses operating through online and retail sales of the over-the-counter drugs, nutritional supplements, food products, skincare and self-care accessories, health trackers, health wearables, or other products, sometimes together with lifestyle coaching and health care retreats. The products are advertised on social media and podcasts, working through charismatic individuals who may or may not have medical credentials. Often wellness influencers promote products of unproven (or even disproven) clinical benefit, such as ivermectin or hydroxychloroquine for COVID-19, or pills of unknown composition claiming they can detoxify coronavirus spike proteins lodged in human body tissues. The industry often invokes pseudoscientific concepts to promote their version of a healthy lifestyle.

Executive Summary

Since the early 1800s, American medicine has reflected a persistent divide between two opposing worldviews: scientific versus sectarian medicine. *Scientific medicine* was first brought to America in the late 1700s by physicians who trained at the University of Edinburgh where they became steeped in the views of the Scottish Enlightenment before emigrating to the North American British colonies. Over the next two hundred years, such views and attitudes converged with laboratory science and the expanded availability of high-quality microscopes and other scientific instruments. In time, scientific medicine embraced discoveries based on modern molecular and cellular biology. In contrast, alternative or *sectarian medicine* approaches such as homeopathy and eclecticism emphasized personal experience and theoretical frameworks outside the scientific mainstream.

The rivalry between these approaches endures, reflected in the rise of wellness and influencer industries that represent a modern iteration of sectarian medicine. In 2025, it energized and gained political influence from the U.S. Department of Health and Human Services (DHHS) and its Make America Health Again (MAHA) campaign.

In its effort to revive sectarian medicine, the MAHA movement and DHHS secretary simultaneously seek changes that could erode public confidence in scientific medicine. These efforts risk weakening U.S. medical schools and academic health centers (AHCs), which the movement claims have been influenced by the pharmaceutical industry or that their principal outputs, namely scientific journals and papers, are compromised. Accordingly, the U.S. government has proposed significant reductions to the budget of the National Institutes of Health (NIH) and other health care cuts, as well as new political criteria for research universities and potential financial penalties on taxes on their endowments.

Even before 2025, all was not well in American medicine. MAHA is emerging in a period of accelerating physician dissatisfaction and burnout and steady declines in the physician-scientist workforce.

However, the situation is not entirely bleak. The U.S. health care industry sits atop the food chain as America's top employer, accounting for one third of all employment growth. Even with significant cuts to government funding, there is sufficient private equity and venture capital in the system to ensure sustained health sector growth.

This working paper considers these new realities and offers the following objectives or recommendations:

- **Objective 1:** To explain how the wellness and influencer industry (and its MAHA representation in the U.S. government) became the latest iteration of a sectarian medicine movement in America that goes back to the early 1800s.

- **Objective 2:** To detail the threat of this new version of sectarian medicine to modern scientific medicine in America, especially for AHCs. Also, how these shifts are occurring on top of rising physician burnout and declines in the physician-scientist workforce.

- **Objective 3:** To offer recommendations and a path for reshaping scientific medicine. This will require revising medical education and redirecting and retraining the physician workforce for leadership and entrepreneurship. Examples include both traditional business entrepreneurship and social entrepreneurship for the benefit of society or humanity. It means empowering NextGen physician entrepreneurs to establish health technology enterprises and lead the reinvention of health systems through AI or other technologies.

- **Objective 4:** To further recommend our nation's major metro life science clusters (also known as life sciences complexes or biohubs) as implementation sites for this purpose.

MAHA, the resurgence of sectarian medicine, and the reductions in government support for biomedicine should be a wake-up call for America's medical schools and AHCs. We can respond by placing physicians in charge of reimagined U.S. health systems.

Introduction and Historical Underpinnings

Since the founding of the American colonies, medical and bioscience education has undergone dramatic shifts and perspectives. Each shift has reflected dynamic tensions between what we sometimes refer to *scientific medicine*, meaning grounded in fundamental biology, chemistry, physics, or engineering, and based on quantitative and experimental observations [1], versus alternative or holistic approaches often practiced by individuals without conventional scientific or medical training. Together, these alternative approaches, such as homeopathy or Thomsonianism (later transformed into eclecticism) were sometimes referred to *sectarian medicine* [2].

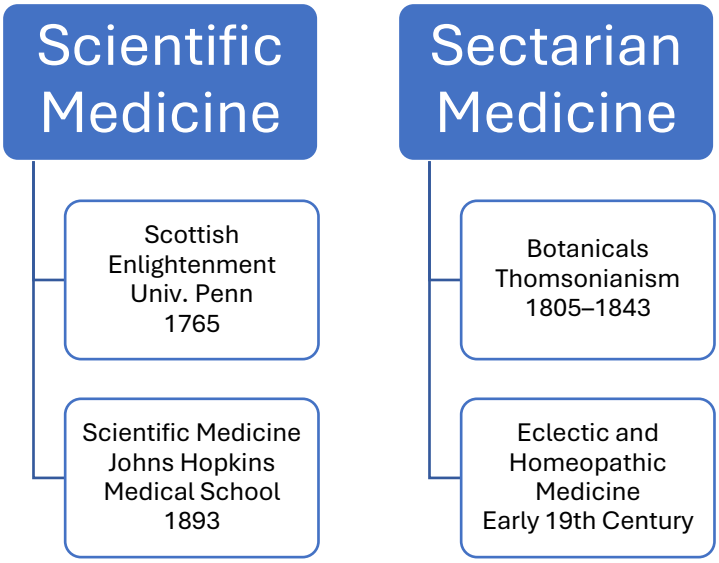
In the last half of the 18th century, the College of Philadelphia (renamed the University of Pennsylvania or "Penn") established the first American medical school. The early Philadelphia founders previously trained in medicine at the University of Edinburgh, the oldest medical school in Great Britain and one based on scientific principles of the Scottish Enlightenment [3]. Other medical schools organized along similar frameworks were established at Yale and other New England Colleges and Transylvania University in Kentucky [4]. In the early 1800s graduates of these medical schools began practices across the interior of the fledgling United States. They included three prominent early 19th-century physicians:

- Dr. Ashbel Smith, a Yale medical graduate, who relocated to the Republic of Texas to write one of the first serious medical books there — on the Galveston yellow fever epidemic of 1839 [5, 6].

- Dr. Daniel Drake, a Penn medical graduate, who practiced in Ohio throughout the first half of the 19th century, where he established journals and medical schools and wrote a detailed treatise on the diseases of the interior river valley [7].
- Dr. Crawford Long, another Penn medical graduate, who practiced in Georgia where he pioneered the use of anesthesia [8].

However, over this same period, Samuel Thomson (1769–1843), with no formal training, established an elaborate system of alternative medicine, which is sometimes referred to as Thomsonian medicine or Thomsonianism. Thomsonianism reflected a type of medical populism relying on herbs and botanicals sold to farmers (mostly in the South and Midwest) together with Thomson's bestselling book, *New Guide to Health* [9]. Thomson's populist views on the use of unproven botanical cures and health freedom aligned with the libertarian views of the Jacksonian Democrats at that time [9]. Eventually, these activities constituted a new branch of so-called *eclectic* medicine of botanical medications, which alongside *homeopathic* medicine — launched in Europe at the turn of the 19th century — became major pillars of American sectarian medicine. A scientific versus sectarian medicine rivalry ensued (Figure 1).

Figure 1 — Evolution of Parallel Tracks in 19th-Century American Medicine



Source: Author's construction.

By the 1860s, scientific medicine had diverged even further from sectarian medical practices in America. Among the drivers widening this divide, the U.S. National Academy of Sciences was established by the Lincoln administration during the Civil War (Figure 2), around the time when the first Ph.D. in America was awarded by Yale University, together with new departments of physiological chemistry forming at Yale and other medical and scientific schools [10]. These new departments were modeled on a highly admired system of German scientific universities [11, 12]. Such efforts to promote scientific medicine culminated in the establishment of the Johns Hopkins University

School of Medicine in 1893, the first of its kind through its full commitment to linking medicine to scientific research [13].

Figure 2 — Albert Herter's "Founders of the National Academy of Sciences," 1924

Source: Photograph by the author taken in Washington, D.C.
Note: The painting depicts President Abraham Lincoln signing the Charter of the National Academy of Sciences on March 3, 1863.

The Johns Hopkins University School of Medicine established a new gold standard in scientific education for other top-tier universities, to a point when in the early 1900s, the American Medical Association (AMA) asked the Carnegie Foundation for the Advancement of Teaching to make a deep appraisal of the state of medical education in America. The resulting report, *Medical Education in the United States and Canada*, written by the educator, Abraham Flexner, and published in 1910 [4, 12], drew battle lines between the medical schools adopting scientific versus sectarian approaches. The "Flexner Report" discredited schools committed to eclectic, homeopathic, or other sectarian medical practices, and most of these schools eventually shuttered [14]. However, throughout the 20th century, sectarian medical practices persisted, often operating outside the purview of scientific medicine and relying on the sales of over-the-counter medications or those made available through mail order. The sectarian medical practitioners depended on such sales for economic survival, and they lobbied the U.S. Congress and state authorities to operate beyond the reach of medical licensing organizations or the U.S. Food and Drug Administration [9].

The Rise of the Academic Health Center (AHC) and the Paradoxical Decline of the Physician-Scientist

Scientific medicine and its revamped medical schools continued to evolve until they grew and expanded into very large and complicated academic medical centers, also known as academic health centers (AHCs). AHCs connected medical schools, teaching hospitals, research institutes, and community health centers, while accelerating educational offerings in nursing and allied health sciences [15]. These AHCs led many of America's major medical discoveries during the 20th century, and into this new century [14, 15]. Among the notable examples were the Mayo Clinic [16], Johns Hopkins medical institutions [13, 17], Washington University Medical Campus in St. Louis, Harvard Medical School and its Longwood Campus of hospitals and clinics [14], and the Texas Medical Center in Houston, the world's largest AHC, which is comprised of more than 60 hospitals, medical schools, and biomedical research institutions [18, 19].

In 1930, the U.S. Congress officially established the U.S. National Institutes of Health (NIH); its growth and influence accelerated after World War II to become the largest government agency supporting biomedical research in these expanding AHC. In time, a symbiosis between the AHCs and NIH took shape: The AHCs came to depend on federal support for biomedical research, while in turn, NIH acquired tremendous oversight power and prestige through its association with Harvard, Johns Hopkins, Washington University St. Louis, and other major research universities. This period is sometimes referred to as a "golden age" or "modern era" of American scientific medicine.

In 1964 the National Institute of General Medical Sciences (NIGMS) of the NIH began supporting combined M.D.-Ph.D. training through a new Medical Scientist Training Program (MSTP) focused on producing a new generation of physician scientists [20]. I was fortunate to be a beneficiary and received M.D.-Ph.D. training at Weill Cornell Medical College and Rockefeller University, one of the early MSTPs. This program allowed me to devote my career to the development of new vaccines for neglected parasitic diseases and global health [21]. Today, there are more than 90 MSTPs across the country.

The AHCs also modernized the practice of medicine so that by the last half of the 20th century and into the 2000s, AHCs had expanded to become more than engines of biomedical scientific discovery [22]. With the rise of group hospitalization plans and the emergence of health insurance as an entitlement of employment, major health care conglomerates arose, together with a new wave of managed care and competition [15, 23]. AHCs became major employers, and in some cases leading drivers of local and regional economies [22]. They became economic powerhouses and, in some cases, even compensated for the financial declines in other employment sectors.

By the 2020s, the U.S. labor market had undergone a major "structural transformation," with sharp declines in manufacturing and retail jobs and commensurate increases in

health care employment [24]. Health care became the leading employer in most states and major cities [24], with much of that growth centered at AHCs located in major metropolitan areas. This rapid economic acceleration of the health care industry also generated new financial superstructures and attracted new types of investments. Fortune 500 companies such as GE (GE Healthcare Technologies), Oracle, and Berkshire Hathaway expanded into this space, and even private equity firms, such as the Blackstone Group, Bain Capital, and KKR (Kohlberg Kravis Roberts), became major investors in health care [25]. Among the Fortune 500 (America's largest companies) currently dozens are designated as health care companies, led by UnitedHealth Group (No. 3 on Fortune 500), CVS Health (No. 5), and McKesson (No. 9). The Fortune 500 also includes major hospital chains such as Humana, HCA Healthcare, and Tenet Healthcare; and of course, multiple pharmaceutical companies [26].

There were now a lot of dollars and serious financial investments in hospitals, clinics, and medical practices, exceeding $1 trillion according to some estimates [26]. However, the investors did not typically entrust doctors with managing or leading these complicated and expensive health care enterprises. Instead, hospital systems C-suites expanded with executives experienced in business and financial services. Not surprisingly, corporate strategies and management practices eventually affected physician training and medical education. Undergraduate medical education (UME), referring to instruction in medical schools, and graduate medical education (GME) level for residents and subspecialty fellows, underwent significant shifts. Increasingly, the AHC executives, regulators, and their insurers sought ways to maximize efficiencies and link both UME and GME to economic productivity.

Corporate executives separated medical practice and educational activities into easily quantifiable metrics, with physician-patient encounters documented through detailed electronic health records (EHRs). EHR data entry would become a significant activity for both academic physicians and their trainees. However, many physicians responded with cynicism eventually referring to EHR as the "electronic cash register," as for some it came to symbolize a form of professional capitulation to financial interests or mechanisms designed to ensure third-party reimbursement [27]. Multiple articles in academic medical journals documented how physicians became consumed by EHR, or time spent negotiating with insurers and others aligned with AHC bottom lines, as reasons for physician dissatisfaction or even burnout [28–31]. Almost every medical conference began offering sessions on helping physicians and other health care professionals forestall or manage burnouts.

Beyond burnout, the harsh demands for financial efficiencies left less time for traditional scientific medical education as originally defined (and defended) by Abraham Flexner in 1910. Medical students and aspiring physicians no longer felt an urgency to make discoveries, and increasingly, they lacked scientific mentors to encourage intellectual pursuits or activities requiring long-time horizons. Laboratory instruction evaporated at most U.S. medical schools. UME and GME learners no longer entered a laboratory, and they were no longer exposed to physician-scientists conducting laboratory or clinical investigations [1].

By the 2010s, the number of physician-scientists had declined significantly; by some estimates, scientists accounted for only 1.5% of the U.S. physician workforce [32]. A 2014 NIH Physician-Scientist Workforce (PSW) study found that only 8,200 physicians served as principal investigators on NIH grants, and these were "split evenly" between M.D.s and M.D.-Ph.D.s [33]. By 2020, just 1.3% of American physicians were engaged in research as their major activity [34]. Yet it fell to those few individuals who received added specialty training in the biosciences, chemical sciences, or bioengineering to make the discoveries leading to new innovations or drugs, diagnostics, biologics, and medical devices. Today, only a handful of M.D.-Ph.D. trainees typically graduate with each medical school class, so that the U.S. only produces between 500–600 combined M.D.-Ph.D. MSTP graduates annually [20]. Some observers lamented how the translational physician-scientist is at "the brink of extinction" [35].

Therefore, as we entered the 2020s, we saw a troubling duality unfold: an ascendancy of the AHC as an economic engine for many metropolitan areas and states, and yet a paradoxical physician burnout, especially among primary health care providers — internists, pediatricians, obstetricians, and family practitioners — with reductions in that workforce, as well as an accelerated decline in physician-scientists.

New Age Sectarian Physicians

In this complicated and conflicted setting, a modern-day sectarian medical practitioner emerged in the form of some physicians, as well as chiropractors, naturopathic doctors, acupuncturists, and Ayurvedic and other holistic practitioners, who embraced complementary or alternative medicine (CAM) approaches [36]. They often operated in private practices and therefore independent of the AHCs, although a 2017 *STAT News* article entitled "Medicine with a Side of Mysticism" noted how multiple prestigious AHCs acquired an "if you can't beat them, join them" mentality, and found it lucrative to also adopt CAM [37]. A National Center for Complementary and Alternative Medicine (NCCAM) was established at the NIH in 1999; it was later renamed the National Center of Complementary and Integrative Health (NCCIH) in 2014.

Another aspect of CAM was its ties to the growing wellness and influencer industry. This industry is multidimensional, but its core element includes for-profit businesses. Practitioners operate through online retail (e-commerce) sales of over-the-counter drugs, nutritional supplements, food products, skincare and self-care accessories, health trackers and wearables, and other products, together with lifestyle coaching and health care retreats. They advertise on social media and podcasts, working through charismatic individuals who may or may not have medical credentials. The industry often invokes pseudoscientific concepts and uses personal anecdotes to promote their version of a healthy lifestyle. It has become a formidable industry, with a market size exceeding $500 billion [38]. Some projections predict a $700 billion market size by 2030 [38], less than the overall $1.7 trillion market size.

Therefore, in the setting of endemic physician burnout among mainstream primary health care providers and a shrunken cadre of physician-scientists, modern-day sectarian physicians acquired new prestige and stature. With the COVID-19 pandemic, new wellness and influencer companies formed or expanded, sometimes in collaboration with libertarian or politically motivated doctor groups [39–42]. They received endorsements from elected officials, and their messages were amplified through podcasts and partisan media outlets, contributing to a broad and influential network that spread health-related misinformation [40–42].

They used a two-pronged approach. First, the wellness influencers made heavy use of "health freedom" rhetoric to push sales of multiple unproven or "spectacular" cures with products. Often these were low-cost generics, which they could purchase in bulk and repackaged, before pairing them with telehealth visits. Since antiparasitic drugs, such as ivermectin, hydroxychloroquine, and fenbendazole were easily available, it was no surprise that these became the medications of choice — a modern day "snake oil" — to replace effective COVID-19 vaccines [40–42]. By some estimates 200,000 Americans died because they refused COVID-19 vaccines, in many cases eschewing them for ivermectin or other unproven wellness and influencer products [41, 42].

Second, some of the leading CAM practitioners with a financial stake in companies offering wellness and influencer products worked overtime to undermine established interventions, i.e., COVID-19 vaccines and antiviral drugs, despite their proven efficacy and safety based on large and well-designed clinical trials (often led by physicians employed by AHCs). For these new wellness and influencer CAM practitioners, it was not sufficient to push supplements or other wellness products; they also positioned themselves in opposition to scientific medicine more broadly.

It began with vaccinations. The wellness and influencer industry pushed a narrative claiming that COVID-19 vaccines did not work or were not essential, or even the false assertion that more Americans died from COVID-19 vaccines than the actual virus. They claimed COVID-19 vaccines caused something called "turbo-cancers," or sudden death [40–42]. These messages spread widely on social media. The wellness influencers further claimed it was better to be exposed to the SARS-2 coronavirus because this stimulated preferential "natural immunity," or that vaccines were instruments of big government political control [40–42]. They further asserted that the AHCs and big pharma companies were essentially the same entity and portrayed serious virologists and vaccine scientists as villains in white coats or as influenced by pharmaceutical interests.

For example, I became a regular target on social media, especially as Twitter transformed into X with its purchase by Elon Musk [42]. The influencers labeled me as a "shill" for the pharma companies, even though the reality was the opposite. I had codeveloped a low-cost COVID-19 recombinant protein vaccine that was provided to vaccine producers in India and Indonesia without patents or strings attached, ultimately reaching 100 million doses administered. This provided proof-of-concept that it was possible to develop new vaccines outside of "big pharma" [21, 43].

Ultimately, this one-two punch of promoting unproven cures and seeking to undermine mainstream biomedical science set the stage for the next big thing — Make America Health Again (MAHA).

MAHA and New 21st Century Collisions

The MAHA movement began as a health alliteration of President Donald Trump's Make America Great Again (MAGA) political campaign; it was based on a provocative mix of populism, libertarianism, wellness and influencer sales, and lifestyle choices. MAHA heavily promotes the wellness and influencer industry, often invoking pseudoscientific concepts and beliefs. It also reflects the beliefs of its leader, the U.S. Department of Health and Human Services (DHHS) secretary, as well as some of his appointees, who advocate for supplements and influencer diets, ingesting raw milk, and other questionable practices, which they feel could reduce an epidemic of chronic illness in America. MAHA also criticizes big pharma and the food industry, promoting the DHHS secretary's iconoclastic views that these industries encourage dangerous practices for profit. The movement claims that a close relationship exists between the pharma companies and the AHCs, making Americans sicker for profit or even causing an epidemic of chronic illness.

A May 2025 report from the MAHA Commission (headed by the DHHS secretary but issued by the White House) describes (what they term) the "overmedicalization" of America's children [44]: "There is a concerning trend of overprescribing medications to children, often driven by conflicts of interest in medical research, regulation, and practice. This has led to unnecessary treatments and long-term health risks."

The MAHA Commission Report is conspiratorial in its tone, claiming the AHCs are subject to "corporate capture," or that "industry interests dominate and distort scientific literature, legislative actions, academic institutions, regulatory agencies, medical journals, physician organizations, clinical guidelines, and the news media" [44]. Accordingly, the MAHA movement justifies its power and influence to undermine the AHCs and modern practice of medicine. Not surprisingly, MAHA looks the other way when it comes to the harmful practices in the wellness and influencer industry, and its role in encouraging Americans to engage in questionable or even dangerous health behaviors during the COVID-19 pandemic — shunning vaccines in favor of ivermectin and other drugs that do nothing for this illness. After its release, a congressional inquiry led by House Democrats on the Oversight Committee and several media investigations alleged that parts of the MAHA report (including some nonexistent references) were generated by artificial intelligence [44].

Among MAHA's earliest actions following the DHHS secretary's confirmation in 2025, was an all-out effort to undermine public confidence in vaccines and immunizations. The DHHS secretary has a long history of making disproven claims about vaccines causing autism, and soon after he took office, he resurrected them — alleging that

autism occurs with an abrupt onset in otherwise healthy children who succumb to environmental toxins found in vaccines. Later, he added the pain reliever Tylenol to those claims even though the evidence for this is modest compared to more compelling environmental exposures such as valproic acid [45, 46].

MAHA further paints a dark picture of children and adults on the autism spectrum, advocating for registries of individuals they view as less valuable to society. According to a report from PolitiFact, a Florida-based American nonprofit project [45]: "Kennedy said many autistic children were 'fully functional' and 'regressed … into autism when they were 2 years old. And these are kids who will never pay taxes, they'll never hold a job, they'll never play baseball, they'll never write a poem, they'll never go out on a date. Many of them will never use a toilet unassisted.'"

As a vaccine scientist, pediatrician, and parent of an adult daughter with autism and significant intellectual disabilities, I had previously written the book *Vaccines Did Not Cause Rachel's Autism* following months of cellphone and online discussions with Mr. Kennedy [46]. The author found the DHHS secretary's new public rhetoric especially repugnant. Despite his daughter's disabilities, she also works, pays taxes, and goes to the movies with friends. I also observed how the DHHS secretary denied the role of autism genes or how they operate in early fetal brain development — well before children receive their first vaccines — despite the massive amount of published scientific data. I further agreed with Georgetown University's Larry Gostin (and his colleagues) assessment of the MAHA movement as "both ideologically driven and scientifically unsound" [47].

Coinciding with DHHS and White House concerning rhetoric about autism, was a disinformation campaign launched against the measles-mumps-rubella (MMR) vaccine. Tragically, the DHHS statements regarding the MMR vaccine further coincided with a deadly measles epidemic that struck the Southern Great Plains region of the U.S., beginning in West Texas in January 2025. This epidemic extended to four states and lasted eight months, resulting in 100 hospitalized children and adults and two deaths in otherwise healthy but unvaccinated school-aged children [48]. As cases and hospitalizations mounted, the DHHS secretary publicly downplayed the severity of measles, offering (falsely) that the pediatric hospitalizations were necessary because of quarantine or isolation measures rather than from illness. He also incorrectly stated that the MMR vaccine suffers from rapidly waning immunity, and that it was a "leaky" vaccine, caused "deaths every year," and was contaminated with aborted fetal material [49, 50]. He then falsely equated the benefits of the MMR vaccine to a cocktail of vitamin A, budesonide, and clarithromycin, along the lines of how the wellness influencers pushed ivermectin or hydroxychloroquine as a viable alternative to COVID-19 immunizations [42, 51]. Next, the DHHS secretary sought to discredit mRNA vaccines, denying their role in saving millions of American lives during the COVID-19 pandemic, as he halted multiple government contracts for new mRNA vaccine development [52]. He threatened to ban government scientists from publishing in leading biomedical journals [53, 54].

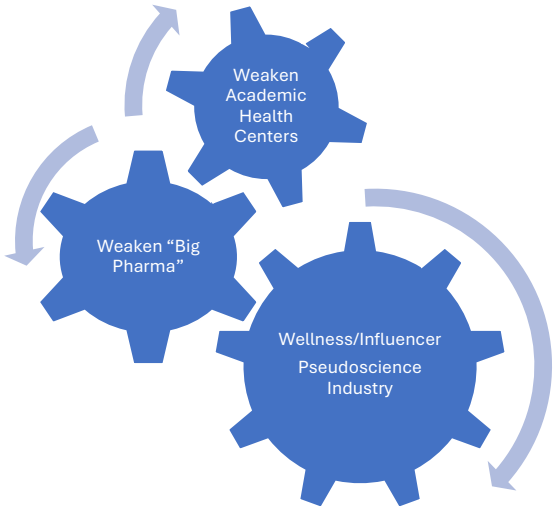
These actions may underly the proposed reductions in DHHS funding for biomedical science. The Trump administration's budget seeks significant cuts to the NIH, possibly as much as $18 billion or a 40% decrease [55]. Tang et al. noted: "In less than 6 weeks, over US$1.8 billion of National Institutes of Health (NIH) grant funding was terminated, and 20% of these grants were for training, fellowship, and career development awards" [56]. The cuts were especially devastating to young scientists.

Sectarian medicine's conflicts with the Flexner Report, as described in a piece from McGill University's Office for Science and Society, reflects aspects of MAHA's own philosophy [57]:

> To the conspiracy-minded alternative health practitioner, everything was great until the Flexner Report was published. Humanity was crushing diseases with herbal remedies and natural potions until 1910 when the "medical-industrial complex" came together and "criminalized natural therapies." We are now afflicted by Rockefeller medicine, where ill citizens are hooked on expensive drugs that never heal them and the truth about the benefits of herbs is being hidden by paid-off politicians and academics.

Thus, in 2025 the wellness and influencer movement (and its MAHA representation in the U.S. government) launched a troubling assault on the AHCs. Their approach includes significant U.S. government budget reductions for science, discrediting biomedical journals, and unsupported claims of alleged conflicts of interest with the "big pharma" companies (Figure 3).

Figure 3 — Attack on the AHCs by the Wellness and Influencer Industry



Source: Author's construction.

Such attacks were ill-timed — or perhaps well-timed depending on one's perspective. Even in the absence of MAHA, rising physician dissatisfaction and burnout in primary care specialties had become a factor in leaving the profession for other pursuits.

New Paths Forward

In an article published in March 2025 in the *Public Library of Science* (*PLOS Biology*), I previously noted that for young scientists, the combined impact of anticipated federal budget reductions for the NIH and other research agencies, along with the promotion of pseudoscience, could be discouraging, potentially deterring young people from pursuing scientific careers, at least in the U.S. [58].

Both concerns could also affect those pursuing careers in medicine and health care, especially for the few remaining American physician-scientists. If reductions to the NIH budget are sustained, for physician-scientists it will be essential to explore new partnerships with private sector philanthropy and industry (including biotechs). However, this is just the beginning: MAHA's influence on mainstream biomedicine extends beyond this aspect of scientific medicine to affect health care careers in medicine more broadly. These developments raise concerns about the future of the field [59].

As the author points out in his 2025 jointly authored book, *Science Under Siege* with Michael Mann [42], it can be challenging to remain engaged in addressing the risks posed by MAHA's pseudoscience worldview. Instead, we must consider the words of the Nobel laureate and scientist, Dr. Marie Sklowdowska-Curie, "Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less" [42].

While it is critical to acknowledge MAHA's vision for scientific medicine, the author previously identified a four-part road map for bioscientists to remain optimistic and engaged. These four points are also relevant to young physicians and those pursuing UME and GME, and restated here with modifications for aspiring physicians [58]:

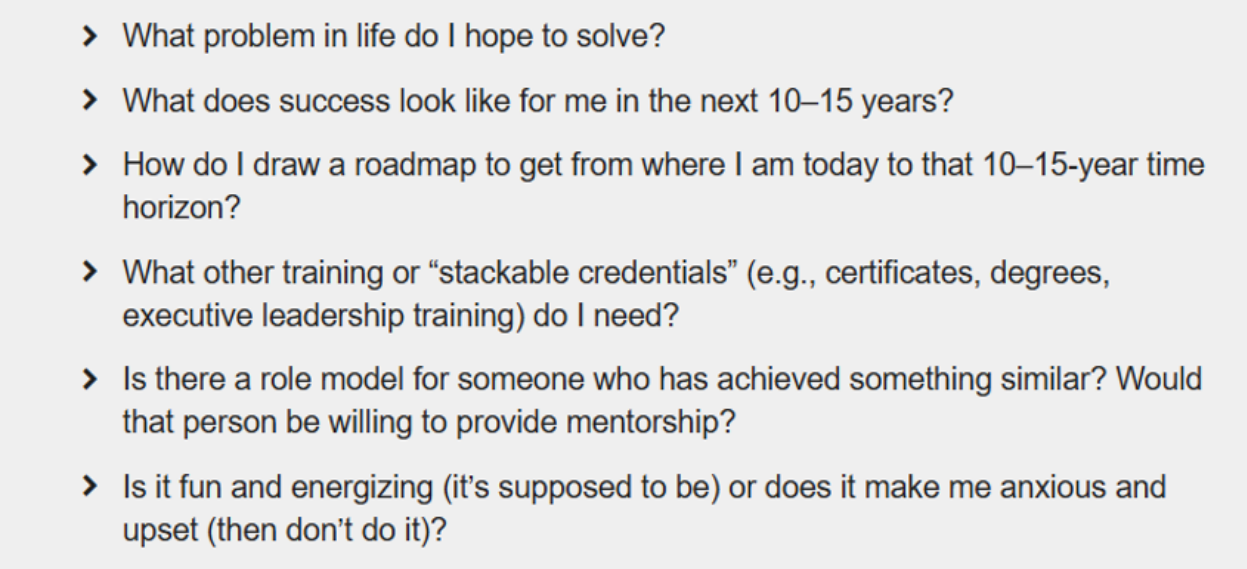
It might be a while. Too often the leaders of the AHCs dismiss the rhetoric and activities linked to MAHA (or the second Trump Administration) as an aberration or a passing phase. It is framed as an entity that will pass quickly. While this could occur, it is equally plausible that this current era of pseudoscience or health freedom tenets will become enduring. After all, health freedom taps into sectarian medical concepts that go back to the earliest history of the U.S. Therefore, it is more productive (and perhaps wiser) to plan a medical career as though MAHA will be around for a while. In other words, don't "hunker down," instead embrace the change and "lean in" but in productive and interesting ways.

Your skill set of critical thinking. UME and GME are much more than just the content of lectures, active learning sessions, and lunchtime conferences. They are even more than

medical knowledge gained from the hospital wards and outpatient clinics. Despite the rise in American pseudoscience, medical learners should remember they still have a great brain and great training. Medical education sharpens minds and provides an extraordinary skill set in the areas of problem solving, data analysis and interpretation, data presentation and communication, time and project management, collaboration, innovation, and professional leadership. It also teaches compassion and situational awareness. Medical training offers critical thought skills that can serve young physicians well in multiple sectors, including business, finance, and politics, among others.

Be proactive but play a long game. MAHA is already affecting science, medicine, and the health care system. The key is not to become paralyzed and wait for something else to happen — or as the expression goes, "don't wait for the second shoe to drop." This is a good moment to reset and think deeply about navigating new career pathways and opportunities. The concept of a "long game" is one that the author has used in career white-boarding exercises with UME and GME learners for decades. It asks the learner to address two long-term career goals regarding 1) what success might look like for them in 10–15 years — a good time frame that covers transition from early career to midcareer or midcareer to senior career; and 2) what are the big problems they hope to solve in the areas of science or health care (Figure 4).

Figure 4 — Questions for Planning a Career in Medicine and Health Care



Source: Peter J. Hotez, "Navigating Your US Bioscience Career into the 2030s," PLoS Biology, 2025 [58].

In my decades of whiteboarding the careers of young physicians and scientists, I find it interesting (and somewhat troubling) how few UME or GME learners have ever been asked those two fundamental questions even though they can be essential for building a career roadmap. Doing so allows the physician to determine what additional training

might be required to achieve long-term goals. This becomes even more essential given the steady increase in inflexible medical education requirements or testing, and the stark limits in free time afforded in medical schools and residencies to pursue creative or interesting projects.

Therefore, to do interesting things added training might be necessary. This could include new degrees or certificates or opportunities to work with selected mentors. Along those lines, it is extremely helpful for those aspiring to do big and interesting things to seek out role models who have successfully charted similar paths. A final element is a reminder that long-term goals should be energizing and a source of personal joy. As the author points out, if career decisions mostly provoke anxiety and tension, they might likely need rethinking or additional thought.

Cultivate a brand. Finally, I encourage those pursuing UME and GME to consider cultivating a personal brand in this complicated age of podcasts, social media, and other venues for public engagement [60]. Too often physicians, especially at AHCs, are invisible to the public as evidenced by the findings of surveys from Research!America, a science advocacy group based in Washington, D.C. Very few Americans can name a living scientist nor name an institution where biomedical research is conducted [61]. There is also a practical and individualistic reason for personal branding — mostly gone are the days when a physician can rely comfortably on employment with a single institution for their entire career or even most of it. More and more, building a strong personal brand can build resiliency during periods of employment transition or mobility. Personal brands are not necessarily encouraged by employers, especially AHCs, which tend to be fiercely protective of their institutional brands. Also, personal brands are not for everyone and shouldn't be thought of as always on the critical path to career success. However, the author often highlights the opportunities afforded by public engagement and personal branding, and a new book out of Australia*, The New Academic*, provides an interesting "how to" guide for academics so inclined [62].

The NextGen Physician: A Leader in Health Innovation and Technologies

Young physicians who receive UME or GME (or both) training in the U.S. gain an impressive skill set, including critical thinking, organization, and the ability to convey complexity to lay individuals. There is additional good news: Today, the U.S. health care industry rests at the top of the food chain as America's top employer, accounting for approximately one third of all recent employment growth [24]. In contrast, the previous industry leaders in the U.S. — retail and manufacturing — have remained mostly flat. Today, the pay of those in health care outstrips almost all sectors (with the possible exception of some high-tech jobs) [24].

Similarly, according to the U.S. Center for Medicare and Medicaid Services (CMS), health care spending in the U.S. now reaches roughly $5 trillion annually or $15,000 per person, while health spending is approaching 20% of the U.S. gross domestic product [63]. To

be sure, there are also some significant external challenges even to the health care industry. They include proposed government entitlement cuts to Medicaid, the public backlash against rising health care costs and the insurance industry [64], and the rise of artificial intelligence (AI), which could supplant some health sector jobs [65], but overall, the future of the health care industry appears strong and promising.

So then, what's the problem? A doctor's skill set is unparalleled and the financial future of health care in America appears bright. And the answer is, while the health care industry has ascended to the top of the economic ladder, the physicians seldom oversee or lead this climb. Physicians are not trained in entrepreneurship or modern financing, and therefore not on top and empowered to deliver new health innovations and establish health care technology enterprises. Physicians do not command efforts to reinvent health systems through AI or other cutting-edge technologies.

> ***Well— I'm an outsider to the end of my days!***
>
> **Jude Fawley**
> ***Jude the Obscure,* Thomas Hardy**

Even though physicians have essential and often superior health and biomedicine subject matter knowledge and critical thinking skills, they remain a modern-day *Jude the Obscure* [66], destined to remain on the outside looking in while chief executive officers and their vice presidents make the essential decisions and guide the future of their health care enterprises. In this scenario, physicians remain low- to middle-level players in America's fastest growing economic sector. These realities may represent unspoken elements of physician dissatisfaction and burnout.

The health care industry is undergoing constant change but also increasing complexity. As highlighted above, a cast of new types of organizations have established key roles in American health care, each contributing to the rise of the industry and accelerating it as America's leading employer. Several are listed below along with recognizable examples:

- AHCs (mostly nonprofits) and for-profit major hospital chains now listed among the Fortune 500 companies — Humana, HCA, Universal, and Tenet.
- Pharmacy chains, distributors, and retailers — CVS, Walgreens Boots, McKesson, and Walmart.
- Management consulting firms — McKinsey, BCG, Bain, Deloitte, EY, KPMG, PwC, and Accenture.
- Health Insurers — UnitedHealth and Cigna.
- Nontraditional companies moving into the health care space — GE Healthcare Technologies, Oracle, and Berkshire Hathaway.
- Biopharmaceutical companies and biotechs — Johnson & Johnson, Pfizer, Merck, AbbVie, Eli Lilly, Amgen, Gilead Sciences, Regeneron, and Thermo Fisher.
- Contract research organizations (CROs) — IQVIA, Charles River, Syneos, Labcorp, and PPD.
- Investment houses connected to private equity — Blackstone, Bain, and KKR [67].

- Venture Capital and financial services firms.
- Nonprofit philanthropies.

Currently, much of this sphere or ecosystem is beyond the reach of UME and GME. Young physicians or trainees are seldom exposed to these new organizations despite their training in health care. Accordingly, physicians, especially at the early career and midcareer stage, will need to learn how to work with these new organizations if they are to be empowered and destined to become leaders in rebuilding American health systems.

Alongside these shifts will be an urgency to provide trainees with new leadership skills, especially in the area of entrepreneurship — creating new value, both economic and humanitarian, by combining resources, organizations, and innovations in novel or interesting ways. Examples could include both traditional business entrepreneurship and social entrepreneurship for the benefit of society or humanity. This activity is essential for building health care enterprises. It will require more fluidity between AHCs and the world of business, finance, leadership, and their organizations highlighted above, as well as greater understanding of the medical device, biotech, and pharma sectors.

Emerging technologies, including AI, are revolutionizing health delivery and quality, and these would have special relevance to the physician workforce. The specific role of these technologies is detailed elsewhere [68, 69], but they could afford some of the greatest opportunities for physicians to lead current and new health-related organizations. Some key examples of emerging health care technologies are listed in Table 1.

Table 1 — Examples of Emerging Health Care Technologies

Health Technology Enterprises			
AI and Generative AI	Internet of Things, IoT	Telemedicine	Wearables
Robotics	3D Printing	Virtual Reality	Remote Pt Monitoring
Nanotechnology	Digital Therapeutics	Augmented Reality	Personal Health Apps
Neurotechnology	Bioprinting	Mobile Diagnostics	NextGen EHR
Blockchain Tech	Cloud Technology	Digital Twins	CRISPR
Mental Health Tech	Big Data	Biosensors	Augmented Coding

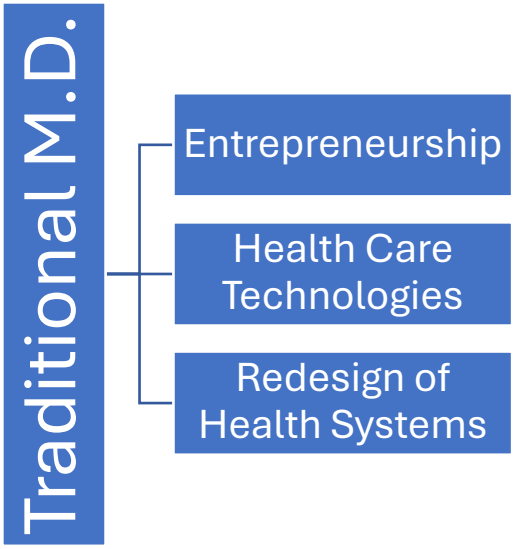
Source: Author's construction.

Thus, while it is unlikely that we will see a significant return of UME and GME learners returning to the lab to become physician-scientists (beyond the current 500–600 M.D.-Ph.D. annual graduates), many young physicians could be transformed to become experts and leaders in these new areas of health care technology with emphasis on entrepreneurship. Physicians could be versed in these businesses or encouraged to

become entrepreneurial and launch their own health care technology organizations or health system enterprises, either at the nonprofit or for-profit level.

In this model, an educational component could resemble those currently provided by the so-called "tech MBAs" offered by some U.S. business schools. Tech MBAs emphasize the integration of business principles with technology management for those interested in tech-driven industries [70]. Both UME and GME would need shifting to accommodate this new instruction (Figure 5).

Figure 5 — A NextGen Physician



Source: Author's construction.

Potentially, an increasing role of AI in health care and medicine might afford opportunities for physicians to spend less time on traditional medical instruction and more around health care innovation, biotechnologies, medical devices, and fixing health systems. As physician assistants, nurse practitioners, and other health professionals provide an increasing role in direct provider-patient encounters, medical students, residents, and physicians could begin occupying a new macro-level oversight role.

Some beginnings are already underway:

- Northwestern University's Kellog School of Management has launched The PHYSICIAN CEO™ Program focused on "private practice and entrepreneurial ventures" (https://www.kellogg.northwestern.edu/executive-education/individual-programs/executive-programs/physicianceo.aspx/).
- Stanford Medicine offers a Clinical Informatics Management Program for aspiring entrepreneurs (https://med.stanford.edu/master-clinical-informatics-management/admissions/Prospectivestudents/aspiring-entrepreneurs.html).
- Stanford Medicine also includes their own Technology & Digital Solutions team (https://tds.stanfordmedicine.org/about-us.html).

- Physician Innovator is a member-driven organization with national and international chapters (https://www.physicianinnovator.com/about-us).
- The American Medical Association has created a Physician Innovation Network (PIN), connecting medical students, residents, and practicing physicians to entrepreneurs and health technology companies (https://www.ama-assn.org/topics/physician-innovation-network) [71].

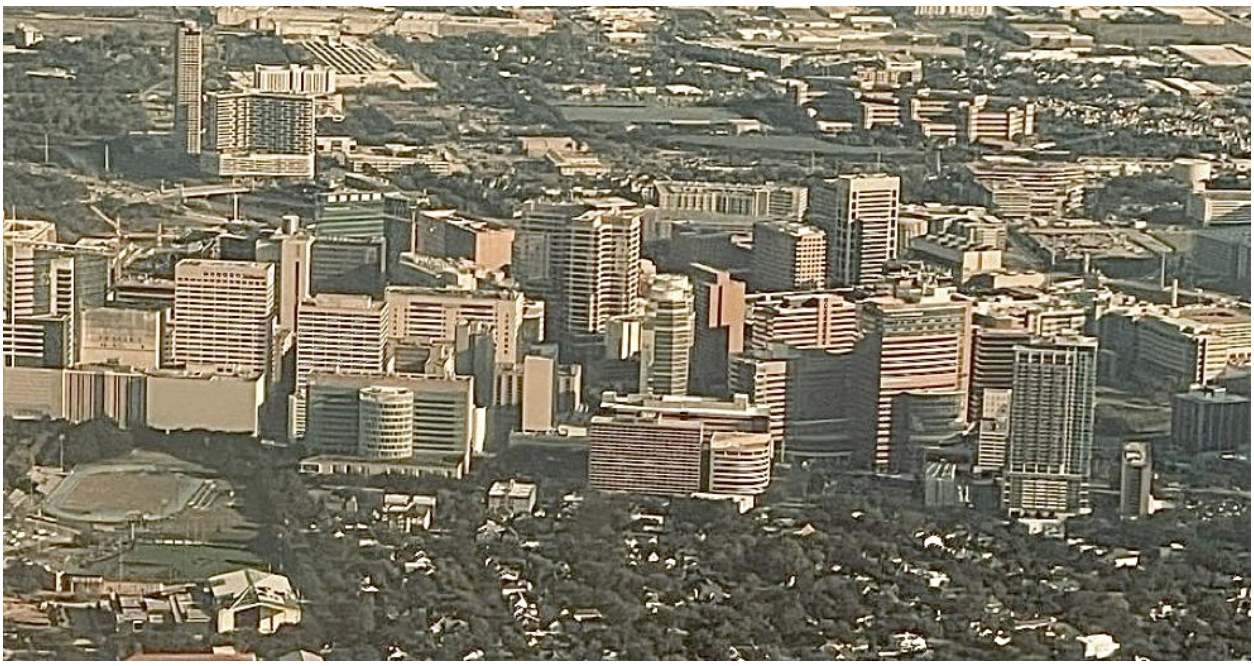
However, such efforts can now be expanded and embedded in both UME and GME to establish a new generation of physicians leading health care technologies and health innovation.

American Health Sciences Clusters

An expanded cadre of empowered physicians and entrepreneurs will require conducive environments or a special set of circumstances to launch new health care enterprises and technologies. Even with an anticipated decline in NIH support [72], there remain significant venture capital and private equity investments in health care delivery and technologies. In collaboration with their major AHCs, some concentrated metro regions of the U.S. are best positioned for accelerating these new ventures. They go by different names, such as life sciences clusters, complexes or "biohubs" that bring together organizations or businesses connected to private equity, venture capital, and management consultants and provide infrastructure for advancing biotechs and medical device companies [73]. They also have access to city, state, and regional biotechnology engines for convening potential financial and intellectual partners. Capacity for a workforce versed in AI will accelerate such activities, given its potential for revolutionizing health care delivery and technologies [65, 74].

For example, the business firm Colliers has identified and ranked 18 promising biohubs based on venture capital funding, historical NIH support, a research-oriented life sciences workforce, as well as a life sciences real estate market accepting of continued growth [73]. Probably the best-known life sciences metro complexes include the San Francisco Bay Area, perhaps even more so in the coming years given its abundance of new AI-oriented businesses and start-ups [75], as well as Boston-Cambridge, Massachusetts, and La Jolla-San Diego, California. However, there are now multiple up and coming or emerging metro-based life sciences complexes, including Seattle, New York City, Philadelphia, Chicago, Raleigh-Durham, Denver-Boulder, Minneapolis, Houston, Pittsburgh, Salt Lake City, and St. Louis, each anchored by multiple AHCs [73]. For example, Houston is home to the Texas Medical Center, the world's largest life sciences complex [18, 19], now with rapidly expanding biotech and private venture footprints, such as a new Helix Park built in the shape of a DNA double helix (Figure 6).

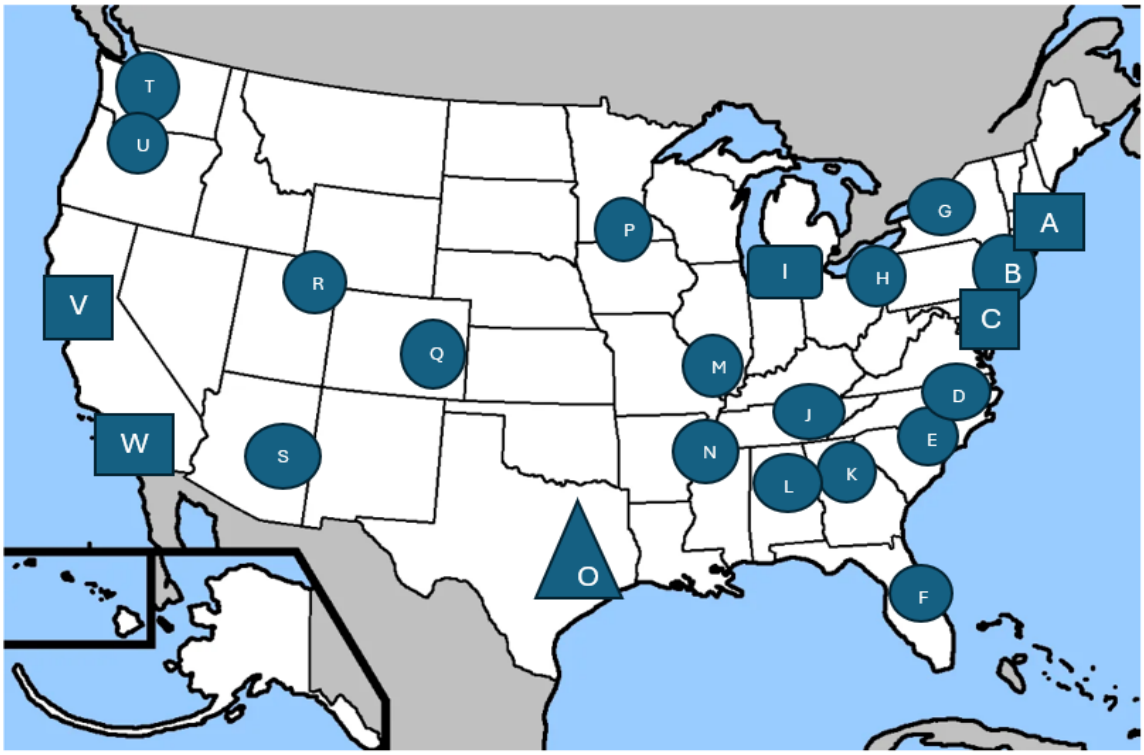
Figure 6 — Texas Medical Center



Source: Photograph by author from a Southwest Airlines flight landing at Hobby Airport.

Suburban Maryland and New Jersey have also emerged as major centers, and under the right circumstances, it is still possible to build brand new life sciences complexes from scratch. An attractive example is one known as “The Pearl” based in Charlotte, North Carolina (https://www.thepearlclt.com/mission/). It broke ground in 2022, after persuading Wake Forest University to create a second medical campus, with the promise of new partnerships between multiple health systems — including Atrium Health and Wake Forest Baptist Health — and health technology companies. The Pearl will leverage Charlotte’s strong banking and financial services and growing technology sector. The Pearl planners have looked at the Texas Medical Center as a potential blueprint for current and future growth. In Figure 7 on both the map and the accompanying table, the author identifies America’s major health and life sciences clusters, many of which he has visited and lectured, typically through pediatric or medicine grand rounds formats.

Figure 7 — Leading and Major Health and Life Sciences Clusters in the US



Letter	Name	Notes
A	Boston-Cambridge-Worcester	Harvard Med-Longwood, MassGenBrigham, MIT, UMass
B	New York-New Jersey-Philadelphia	Cornell-Columbia-NYU-Rockefeller-Penn-Jefferson-Pharma
C	Baltimore-Wash DC-Rockville	Johns Hopkins-NIH-Pharma-Biotechs
D	Research Triangle NC	Duke-UNC-NC State-Research Triangle Park Biotechs
E	Charlotte NC	The Pearl-Wake Forest Med
F	Orlando-Lake Nona FL	UCF-Nemours-UF-AdventHealth Orlando
G	Upstate-Western NY	Univ Buffalo-Roswell Park-Univ Rochester-Upstate Med
H	Cleveland OH-Pittsburgh PA	Cleveland Clinic-Case Western-UPMC-Carnegie Mellon
I	Chicago IL-Ann Arbor MI	Northwestern-UChicago-Rush-CZI-UMichigan
J	Nashville-Eastern TN	Vanderbilt-Meharry-Frist-Univ Tennessee-Oak Ridge
K	Atlanta-Athens GA	Emory Med-CDC-Georgia Tech-Univ Georgia
L	Birmingham-Huntsville AL	UAB Med-HudsonAlpha Institute
M	St. Louis MO	Wash U StL-SLU
N	Memphis TN	St Jude's Children's Research-Univ Tennessee Med
O	Texas Triangle-Hou-Dallas-Austin	Texas Medical Center-Univ Texas-UT Southwestern-TAMU
P	Rochester-Minneapolis MN	Mayo Clinic-Univ Minnesota
Q	Denver-Aurora-Boulder CO	UC Anschutz Med-Univ Colorado

R	Salt Lake City UT	Univ Utah Med-BYU
S	Phoenix AZ	ASU-Biodesign Institute
T	Seattle WA	Univ Washington-Fred Hutchiston Cancer Center-Biotechs
U	Portland OR	Oregon Health Sciences-Oregon Cancer Center
V	San Francisco Bay Area CA	UCSF-UC Berkeley-Stanford-CZI-Biotechs
W	La Jolla-LA-Orange County CA	Scripps-Salk-UCSD-UCI-UCLA-USC-Caltech

Source: Author's construction and open-access blank U.S. map, https://www.reddit.com/r/mapping/comments/nl3782/i_made_a_blank_map_of_the_united_states_of/.
Note: Leading life sciences clusters are indicated by squares, and major clusters are indicated by circles.

Limitations

This working paper provides an overview and should be considered a statement of broad aims rather than a detailed policy document. It builds on previous calls for reform in physician education, including a 2010 book, *Educating Physicians: A Call for Reform of Medical School and Residency*, published on the 100th anniversary of the Flexner Report, which calls for more active learning in medical education, standardizing learning outcomes with individualized learning processes, and fostering "a culture of creativity, innovation, and continuous improvement" [76]. Later in 2024 came a call to enhance physician leadership in medical education [77]. However, this document addresses recent and significant shifts to biomedicine occurring over the last decade and accelerating in 2025. On the positive front, the steep and recent accelerations in health care innovation and technology could revolutionize the American health system in the setting of appropriate physician engagement and leadership. At the same time, there is a new challenge from the MAHA movement in the U.S. government.

Still another aspect not addressed is a reality that the revival in sectarian medicine is partly fueled by a segment of the U.S. patient population seeking something beyond scientific medicine, including what the British medical historian William Bynum refers to as *holism*, referring to the patient's total constitution [78]. Professor Bynum rightly points out that holism is also a foundation of Western medicine, with its ancient principles going back to Hippocrates [79]. He warns us not to lose sight of the entire patient in our zeal to pursue the best scientific medicine has to offer. He quotes the words of the Romantic poet William Wordsworth, "we murder to dissect" [78]. For all its shortcomings and antiscientific views, MAHA may have tapped into this aspect of the American psyche and draws strength from it. For it to succeed, scientific medicine must also balance its major tenets accordingly.

Summary and Recommendations

Previous calls for reform in physician education predate an extraordinary revolution now unfolding in health care technology. They also do not consider the MAHA movement and its formidable challenges to modern medicine as it seeks to restore sectarian medicine practices, often linked to the wellness and influencer industry, as a perceived rival to scientific medicine. In its current form, much of wellness promotion includes criticism of U.S. medical schools and AHCs. This is playing out through threatened cuts to the NIH budget and other government health care funding, attempts to undermine the integrity of established biomedical journals, and unfounded public rhetoric by the leaders of the DHHS. Such actions accelerate earlier declines in physician satisfaction and rising burnout rates, in addition to steady reductions in the physician-scientist workforce.

Proposed here are steps to support and empower physicians and elevate their stature and profile. While health care has become America's number one employer and economic driver, much of the recent growth has come at the expense of physician satisfaction, resulting in rising burnout. This situation requires correction in the form of a new generation of physicians to take the lead in driving future health care innovation and entrepreneurship.

Proposed here are key summary points or recommendations to retool both undergraduate and graduate medical education (UME and GE) for entrepreneurship, health care innovation, and health care technologies.

- Physicians require a new skill set, one that empowers them to become leaders in rebuilding American health systems.
- While the number of physician-scientists might not increase in the foreseeable future, an alternative physician leader in health care entrepreneurship could emerge.
- Physicians need to be versed in the business of health care and entrepreneurship, including private equity, venture capital, and management consulting. Examples could include both traditional business entrepreneurship and social entrepreneurship for the benefit of society or humanity.
- An objective is to empower physicians to lead modern health care technology organizations or health system enterprises, either as nonprofit or for-profit organizations.
- This will require more fluidity between academic health care centers and the world of business, finance, leadership, and greater understanding of the medical device, biotech, and pharma sectors, as well as the emerging health care technologies (Table 1).
- An educational component could resemble those currently provided by the so-called "tech MBAs" offered by some U.S. business schools. Tech MBAs emphasize the integration of business principles with technology management for those interested in tech-driven industries.

- An increasing role of AI in health care and medicine might afford opportunities for physicians to spend less time on traditional medical instruction and more around health care innovation, biotechnologies, medical devices, and fixing health systems.
- Our nation's dozen or so life sciences clusters (biohubs) offer enhanced opportunities to bring together the business, finance, and technological expertise to shape this new workforce the fastest and most efficiently.
- We must not forget the importance of holism to American culture and be mindful that this too is important to scientific medicine; there is no reason for ceding this aspect to the wellness and influencer industry.

About the Author

Prof. Peter Hotez, M.D. Ph.D. DSc (hon) FAAP FASTMH, is Senior Fellow in Disease and Humanity at the Rice University's Baker Institute for Public Policy, and holds multiple positions in the Texas Medical Center (Houston TX) including Professor of Pediatrics and Molecular Virology and Microbiology at Baylor College of Medicine, Co-Director of the Texas Children's Hospital Center for Vaccine Development, and Dean of the National School of Tropical Medicine.

Dr. Hotez is a vaccine scientist, biochemist, and pediatrician who has led or co-led the development of vaccines for parasitic infections — hookworm, schistosomiasis, and Chagas disease (currently in clinical trials) — and several coronavirus vaccines, including two low-cost COVID-19 vaccines for global health so far administered to 100 million children and adults in India and Indonesia. He is also an ardent vaccine advocate and science explainer who combats antiscience and antisemitism in America, and globally.

Prof. Hotez has written multiple books, including *Forgotten People Forgotten Diseases* (2008), *Blue Marble Health* (2016), *Vaccines Did Not Cause Rachel's Autism* (2018), *Preventing the Next Pandemic* (2021), and *The Deadly Rise of Anti-science* (2023), and *Science Under Siege* (2025) with the climate scientist Michael Mann. Dr. Hotez obtained his B.A. (phi beta kappa) from Yale University, M.D. from Weill Cornell Medical College, and Ph.D. from Rockefeller University. He obtained his pediatric residency and fellowship training from Massachusetts General Hospital and Yale School of Medicine. Prof. Hotez is the author of more than 700 scientific papers and is an elected member of the National Academy of Medicine, American Academy of Arts and Sciences, and the Philosophical Society of Texas; he has received numerous awards and recognition.

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