AI and the Fountain of Youth

By David B. Agus



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A recent study out of Stanford University found that the human body doesn't age gradually at an equal rate over time. Instead the body undergoes major biological shifts—in other words, aging—at roughly ages 44 and 60. Having just crossed that second milestone with a first skin cancer diagnosis and two back surgeries to show for it this year, I can confirm that aging doesn't creep. It pounces.

For generations, we've accepted this decline as inevitable. But that assumption may no longer hold true. Science fiction is becoming reality.

A study published last month in the medical journal Cell describes a remarkable experiment in which researchers at the Chinese Academy of Sciences and Capital Medical University in Beijing genetically modified a type of human stem cells, mesenchymal progenitor cells, and infused them into monkeys. Over 44 weeks, the animals' brains, bones and reproductive tissues showed measurable signs of not only halted aging but significant rejuvenation. Inflammation decreased, cellular function improved, and no harmful effects appeared.

Technological advances may turn back aging, extending the average life span by at least a decade.

Even more astonishing, when the researchers collected the exosomes—tiny molecular communication packets secreted by the altered stem cells—from these cells while the cells were growing in a petri dish, they found that these exosomes alone could replicate much of the antiaging effect in the monkeys. Researchers aren't merely slowing aging; they're learning how to reverse it.

Artificial intelligence is supercharging that ambition. Thanks to AI, the process of identifying and developing new drugs, once a decade-long slog, is being compressed into months. AI can design molecules to target precise regions of a protein, simulate how they'll behave in the body, use massive computing power to ensure they don't bind to anything else in the body, and predict immune reactions to the drugs—all before a single human clinical trial begins. This convergence of computation and biology will usher in an era not only of curing disease but of preventing it altogether. AI is allowing scientists to reach biological pathways that medicine couldn't even touch before.

AI is also revolutionizing how we understand our personal health. Large language models can now parse electronic medical records—digital junk drawers of unstructured doctor's and nurse's notes—into clean, structured data sets that are easier to analyze.

AI and big data also help reveal patterns that humans might never spot. One early finding from recent studies in the Nature journals: The shingles vaccines Zostavax and Shingrix may reduce the risk of cognitive decline later in life.

AI has also detected the molecular fingerprints of disease by interpreting medical images—including X-rays, MRIs, ultrasounds and pathology slides. Gene mutations that control growth change how a cancer cell looks, and that can be detected by AI. It recognizes the subtle patterns of the cell's structures and relationships with other cells (compared with a normal cell without the mutation) in minutes and tells oncologists which gene is fueling the tumor. This allows doctors to match each patient's cancer with drugs that target the specific gene driving it.

Beyond diagnostics, intelligent machines will also reshape care. Humanoid robots could assist the elderly or infirm. Remote monitoring and wearable sensors will collect data continuously, flagging health problems before symptoms appear. Autonomous or semiautonomous AI systems will make health delivery and administration less expensive, more efficient and more accessible.

Still, a word of caution. The marketplace is already flooded with "longevity doctors," stem-cell infusions, exosome therapies and miracle supplements. None have been proved safe or effective. Any treatment offered in a strip mall or marketed as life extension deserves immediate skepticism. Real progress won't come from hype but from rigorous science and reproducible results with regulatory oversight.

The implications of life extension are profound, and they reach far beyond medicine. Physical health can't advance without equal attention to emotional, ethical and economic health. A world in which people live significantly longer will require a new economic model focused on multigenerational, multistage employment in which a person may pursue different careers appropriate to different stages of life rather than the traditional three-stage arc of education, work and retirement. Such a world would also require a new respect for aging.

Policymakers, regulators, insurers and pension funds should take note: If science delivers on its promise, people could live a decade or more longer—and those years would be spent in good health. That raises hard questions: Does retirement at 65 still make sense? How do we fund longer lives and keep them purposeful? We haven't planned for such a future, and it's time to start doing so.

Aging, once an inevitability, is becoming a frontier. And for the first time, science offers reason to hope that the future might be younger than it looks.

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