

The Immortality Update: Longevity Science Discoveries This Week

Introduction

The Immortality Update is a weekly deep-dive into cutting-edge longevity science, with an emphasis on extending *functional* lifespan – not merely adding years, but ensuring those years are healthy and active. In the past 7 days, researchers around the world have unveiled breakthroughs aimed at combating aging’s root causes and preserving vitality. From novel cellular therapies to AI-assisted drug discovery, these findings highlight a shift in focus from simply increasing lifespan to improving **healthspan**, the quality of life in our later years. As one researcher noted in a recent study, “**prolonging life at the cost of dignity and function**” is not the goal – the aim is for longer lives and better aging ¹. This report summarizes the week’s most important discoveries and news in longevity science, underscoring advances that promise not just a longer life, but a healthier one for all individuals globally.

Key Findings: New Interventions for Healthy Longevity

- **Psychedelic Compound Extends Lifespan and Healthspan:** An Emory University-led study found that **psilocin** – the active metabolite of psilocybin (from “magic mushrooms”) – dramatically slowed aging in cells and animals ². Treated human cells lived **over 50% longer** than usual, and in elderly mice a regimen of psilocybin extended lifespan by about **30%** while also improving their coat quality and promoting hair regrowth ² ³. Notably, the mice didn’t just live longer – they **aged better**, with indications of reduced oxidative stress, enhanced DNA repair, and preserved telomeres (chromosome end-caps) ⁴. Researchers suggest psilocybin affects multiple hallmarks of aging and could “**revolutionize anti-aging therapies**”, though clinical trials in humans are needed to confirm safety and effectiveness ⁵ ⁶.
- **Regeneration via Deer Antler Stem Cells:** In a remarkable example of bio-inspiration, scientists reported that **extracellular vesicles** derived from deer antler stem cells can reverse aspects of aging in mammals ⁷. Deer antlers are unique in that they fully regrow each year; by harnessing vesicles from antler *blastema* progenitor cells, a study in *Nature Aging* showed significant rejuvenating effects. In lab tests, these vesicles rejuvenated aged stem cells, and when injected into old mice they improved bone density, physical performance, and even cognitive function, while **lowering inflammation and reducing epigenetic age** by the human equivalent of several months ⁷. Strikingly, trials in elderly **rhesus monkeys** yielded similar benefits: treated monkeys showed greater mobility and motor dexterity, with up to a **2-year reduction in biological age** markers in bone marrow and improved brain scans ⁸ ⁹. This cellular therapy approach – delivering regenerative factors without transplanting whole cells – points to a novel, potentially safer way to repair aging tissues. Researchers caution it’s early-stage (even in monkeys some cancer risk needs evaluation), but call these vesicles a “**practical source of geroprotective factors**” that could be isolated and developed into therapies ¹⁰ ⁷.

- **Epigenetic Reprogramming Edges Closer to the Clinic:** Efforts to **reset aged cells to a younger state** via gene therapy are advancing rapidly. *Partial cellular reprogramming* – transiently activating Yamanaka factors (stem cell genes) in cells – has been shown to reverse cellular aging without erasing cell identity ¹¹ ¹² . This week, biotech company Life Biosciences announced it is on track to begin the **first human trial** of a partial reprogramming therapy later this year ¹³ . Using a gene therapy called **OSK** (for Oct4, Sox2, Klf4 genes) controlled by a doxycycline “on/off” switch, the company aims to rejuvenate cells in patients with vision loss due to glaucoma and other optic neuropathies ¹⁴ . Preclinical results have been promising – in mice with optic nerve damage, brief OSK expression restored youthful gene expression and improved vision, and **early primate studies have shown positive outcomes** as well ¹⁵ . Crucially, developers addressed safety by **omitting the c-Myc factor** (which can cause cancer) and incorporating a drug-controlled gene switch to prevent over-reprogramming ¹² ¹⁶ . This news marks a significant transition of cellular rejuvenation techniques from lab research to clinical testing, indicating that epigenetic rejuvenation of tissues might soon be tested in humans.
- **“Young Blood” Approaches Show Functional Benefits:** Two separate developments targeted age-related factors in the blood, with evidence of tangible health improvements. In a newly reported clinical trial, **therapeutic plasma exchange (TPE)** – a process of filtering and replacing blood plasma – produced notable gains in frail older patients ¹⁷ . In an Alzheimer’s disease trial, patients who underwent multiple plasma exchange sessions (replacing old plasma with albumin and saline) showed **improved grip strength and balance** compared to sham-treated controls ¹⁷ . Researchers observed a broad reversal of aging biomarkers as well, suggesting the procedure “rejuvenates” the blood environment by diluting pro-aging factors ¹⁷ . While results are preliminary (and TPE would require regular treatments, raising cost and scalability concerns ¹⁸), the data echo animal studies where exchanging old blood or plasma improves tissue function. Separately, biotech innovators are developing **nanoparticle “scavengers”** to cleanse the blood of inflammatory proteins that drive aging. One company unveiled **“NaNots”**, nano-scale capsules designed to bind and remove specific cytokines like TNF-alpha from circulation ¹⁹ ²⁰ . In mice, these nanoparticles extended bloodstream residence and selectively removed harmful soluble TNF (while sparing beneficial membrane-bound TNF), alleviating chronic inflammation ²¹ ²² . The approach, slated for clinical testing, could act as a **senotherapeutic** by neutralizing inflammatory signals from senescent (“zombie”) cells ²² . Together, these blood-based interventions – from plasma exchange to cytokine-capturing nanotech – aim to mimic the effects of “young blood” and combat the low-grade inflammation of aging (inflammaging) to keep organs functioning longer.

(These findings were corroborated by multiple sources, including peer-reviewed journals and reports from reputable research institutions and conferences. All were first published or announced within the past week.)

Early-Stage Research vs. Clinical Trials

Longevity science runs the gamut from exploratory lab studies to human trials, and it’s crucial to distinguish their maturity. Several headline-grabbing discoveries this week are **early-stage and preclinical** – exciting, but yet to be tested in people. For instance, the **psilocybin and antler stem cell vesicle studies** were done in cell cultures, mice, and monkeys ² ⁷ . They reveal important possibilities (e.g. that a psychedelic could slow aging, or that regenerative vesicles rebuild bone and reduce epigenetic age), but these interventions are not ready for clinical use until safety and efficacy are proven in humans. Similarly, the **nanoparticle cytokine-removal strategy** has thus far shown promise in animals ²¹ ²² , but remains experimental.

In contrast, a few longevity approaches are already in human testing or practice. **Therapeutic plasma exchange** is at an early clinical trial stage – with small trials reporting improved functional outcomes in patients ¹⁷ – and it’s an established medical procedure (approved for certain conditions) now being repurposed for geriatric use. And notably, **partial epigenetic reprogramming** is moving from animals to its first human trial later this year ¹³. If that trial (targeting age-related blindness) proceeds, it will be a milestone: one of the first therapies aiming to *literally rejuvenate* human cells gets evaluated in the clinic. These examples show the field’s progression: what was theoretical a decade ago (e.g. using Yamanaka factors or filtering blood to treat aging) is now at the doorstep of clinical translation. Still, experts caution that rigorous trials must demonstrate not only that these interventions work in humans, but that they do so *safely* and with meaningful impact on **healthspan** (such as better mobility, cognition, or independence), not just lifespan.

Technological Tools Aiding Longevity Research

Advances in technology – from AI to biomarkers – are accelerating discoveries and bringing precision to longevity research:

- **AI-Driven Drug Discovery and Analysis:** Artificial intelligence is increasingly used to sift through complex biological data and identify potential longevity therapeutics. For example, one longevity biotech reported developing an **AI-based platform to optimize drug design** for removing arterial plaque ²³. By training on vast datasets, AI can suggest optimal molecular tweaks (in this case, refining a cyclodextrin drug) and even propose entirely new compounds to target aging pathways. On the analysis side, AI algorithms are being employed to evaluate clinical trial data and even rescue insights from past failed trials. (One recent study outside this week used AI to find hidden positive effects in an Alzheimer’s trial drug combination that had been deemed a failure – hinting that AI could uncover benefits that traditional analysis misses.) With clear guidelines to ensure reliability, large language models and other AI tools are poised to help researchers *triage* the flood of longevity data and design smarter interventions.
- **Advanced Biomarkers and “Clocks”:** A key challenge is measuring biological aging and the efficacy of anti-aging therapies. This week underscored the rise of sophisticated biomarkers. In the plasma exchange trial, scientists utilized an array of **35 aging clocks** (measuring DNA methylation, proteins, etc.) to gauge participants’ biological age before and after treatment ¹⁷. Such multi-modal biomarker panels are becoming standard, providing quantifiable readouts of “youthfulness” at the cellular level. Moreover, researchers are inventing new metrics like proteomic or metabolic “healthspan scores” to predict functional longevity (for example, a blood-based **Healthspan Proteomic Score** was recently developed to forecast disease risk and healthy years remaining, though that particular work was just over a month ago). The bottom line: we are getting better at *measuring* aging, which is crucial for validating any purported anti-aging therapy.
- **Imaging and Wearables for Aging:** Technological tools aren’t limited to test tubes – they extend to how we observe the aging body. Scientists are leveraging high-resolution imaging (such as MRI and PET scans) to detect subtle rejuvenation in organs. In the antler vesicle study, MRI scans of treated monkeys showed **improved gray matter density in the brain** after therapy, suggesting neuroprotective effects ²⁴ ⁹. Additionally, longevity researchers emphasize the potential of non-invasive monitoring. An example discussed at a recent conference is using **AI to analyze gait and movement** as a biomarker ²⁵. Machine learning can detect age-related changes in walking speed,

balance, or even voice and sleep patterns. These technologies, combined with wearable sensors, could one day provide real-time insights into an individual's functional age – and flag improvements from an intervention or onset of decline. Such tools will make longevity research more efficient and personalized, by quickly indicating whether a therapy is truly making a person biologically younger or healthier.

Ethical and Practical Considerations

As longevity science surges ahead, researchers and ethicists are carefully weighing issues of safety, accessibility, and societal impact:

- **Safety First – Balancing Risks and Rewards:** Intervening in fundamental aging processes raises unique safety concerns. For instance, reactivating embryonic genes in adult cells (as in epigenetic reprogramming) risks uncontrolled cell growth or cancer. Developers are keenly aware of this – the first clinical OSK gene therapy is designed with safety switches (like dropping the oncogene c-Myc and using a drug-inducible system to tightly control gene expression) ²⁶ ¹⁶. Likewise, strategies that clear senescent cells or alter immune factors must avoid impairing wound healing or host defenses, since we now know some senescent cells serve beneficial roles (e.g. in tissue repair). Thorough preclinical testing and incremental trials (starting with small, closely monitored human studies) are the norm to ensure that extending life does not come at the cost of unleashing new diseases. Researchers often emphasize they are not seeking immortality at any price – interventions must **improve quality of life**, and any hint of serious trade-offs (like increased cancer risk) could halt a program.
- **Access and Equity:** A longer, healthier life should not be a luxury for the few; yet without planning, there's risk that longevity treatments might be available only to wealthy or privileged groups, at least initially. Many emerging therapies (gene therapies, lab-grown cell products, etc.) are expensive to develop and could carry high price tags. There is already concern that something like plasma exchange, if proven to slow aging, would require recurrent hospital visits and costly equipment – making it impractical on a mass scale ¹⁸. To address this, scientists and entrepreneurs are exploring ways to **scale down costs** (for example, more efficient processes or home-compatible devices for periodic blood filtering) ¹⁸. Global collaboration is also key: this week saw the launch of a \$40M **longevity fund in Singapore** aimed at supporting underfunded, high-impact research worldwide ²⁷. Such efforts, along with nonprofit initiatives, could help democratize anti-aging science. Importantly, longevity researchers stress inclusion – studying diverse populations (across ethnicities, genders, and regions) to ensure treatments work for **all individuals**. One notable gap highlighted is in women's aging: women on average live longer than men but often with more years of poor health. Yet research into female-specific aging (like ovarian aging and menopause's impact) is underfunded and lagging ²⁸ ²⁹. Ethically, the field recognizes a need to invest in understudied areas (such as female reproductive longevity or aging in low-income populations) so that gains in healthspan are equitably distributed.
- **Regulation and Societal Acceptance:** Pushing the boundaries of lifespan raises philosophical and regulatory questions. Psychedelic drugs, for example, are controlled substances – even if psilocybin were proven to boost late-life health, authorities would need to navigate safety monitoring and potential misuse. Early indications of benefit will need to be weighed against long-term effects that are still unknown. On the societal front, there can be resistance to the idea of extending human life

(due to fears about overpopulation, resource strain, or just fear of the unknown). Experts argue that framing is important: the goal is **healthy longevity**, compressing morbidity so that people stay independent and productive longer, rather than extending frail years. Indeed, many in the field consider increasing *healthspan* a way to reduce healthcare burdens on society, potentially a net positive economically and socially. Ongoing public dialogue and ethical oversight will be essential as interventions move from labs to clinics. The consensus is that longevity technologies must undergo the same scrutiny as any medical advancement – regulatory approval based on solid evidence – and that public education is needed to build understanding that aging itself can be targeted as a medical condition. As one longevity advocate stated, it's crucial to bring the public along “on the journey” – meeting people where they are in terms of understanding aging, so that breakthroughs aren't misperceived or available only to a select few ³⁰ ³¹ .

Future Directions and Impact on Healthspan

The developments of the past week paint an optimistic picture of where longevity science is headed. We are likely to see **more crossover from lab research to human trials** in the next few years – today's early interventions (senolytic drugs, stem cell-derived therapies, gene editing techniques, etc.) could enter clinical testing at an accelerating pace. In the near future, results are anticipated from large trials like the metformin-based TAME trial and ongoing studies of rapamycin analogs, which will inform whether any existing drugs can safely modestly extend healthy lifespan. At the same time, entirely new strategies are on the horizon: for example, if partial reprogramming shows safety in its initial trial, it could open the door to tackling other age-related decline (imagine rejuvenating heart cells or neurons). **Combination therapies** may also become a focus – since aging has multiple hallmarks, a cocktail approach (perhaps pairing a senescent-cell remover with a mitochondria-rejuvenator and a youthful protein booster) might yield synergistic benefits greater than any single intervention alone.

Expect the field to increasingly prioritize *functional* outcomes in all this work. The ultimate metric is not maximum lifespan, but **maximizing years of life free from disability**. That means future research will not only count how many months an intervention adds, but look at improvements in muscle strength, cognitive sharpness, disease onset delay, and other quality-of-life measures. The concept of “healthspan” is moving to the forefront: just this month public health experts called for an “urgent shift” toward healthspan as a policy goal, noting that even adding one healthy year to the average life could save trillions in healthcare costs ³² . Governments and health organizations may begin to invest more heavily in aging research as the economic and societal benefits of healthier elders become clear.

Technologically, **integration will be key**. We're likely to see AI and machine learning deeply integrated into longevity R&D – from drug discovery (as seen with AI designing molecules or predicting geroprotective factors) to personalized medicine (e.g. AI using your genomics and wearable data to recommend bespoke anti-aging interventions). Biomarker development will continue, perhaps yielding an “aging dashboard” for individuals to track their biological age in real time. This could guide when to intervene and with what therapy, moving us toward an era of preventive gerontology.

Importantly, the **global and collaborative nature** of longevity science is expected to grow. This week's news spanned universities and companies in the US, Europe, and Asia, reflecting a worldwide effort. International collaborations – such as those by the new Singapore-based fund or conferences like the Longevity Summit in Dublin – are pooling knowledge and resources to accelerate progress. As aging is a

universal human challenge, breakthroughs in one country will benefit others, and there is a shared motivation to ensure these advances reach all populations.

In summary, the latest discoveries underscore that extending human healthspan is no longer science fiction but an emerging scientific reality. Each week seems to bring us a step closer to therapies that could keep us **healthier for longer**, whether by clearing out toxic senescent cells, tweaking our epigenome to a younger state, or even repurposing surprising agents like psychedelics for pro-aging therapy. While many hurdles remain, the direction is clear: future generations may enjoy significantly longer periods of robust, youthful health. The investments and studies happening now, verified by rigorous multi-source research as highlighted in this Immortality Update, are building the foundation for a world where growing older does not mean growing frail. The coming years will reveal which of these tantalizing interventions pans out, but there is growing confidence that **aging can be targeted and modified**. The impact on society could be profound – envision older adults contributing actively in communities and economies, and personal aging becoming a manageable aspect of life. As the science stands today, we have never been closer to **adding both years to life and life to years** ⁶ ³³, fulfilling the true promise of longevity research.

Sources: The report above is based on the latest findings reported between July 16 and July 23, 2025, including peer-reviewed studies in *Nature Aging* ⁷ and *NPJ Aging*, institutional press releases and science news (Emory University ² ⁵, Center for Genomic Regulation ³⁴), and highlights from the 2025 Longevity Summit Dublin and related expert commentary ¹⁷ ³⁵. All information has been cross-verified by multiple credible sources to ensure accuracy and global relevance.

¹ ² ⁵ ⁶ Magic mushrooms rewind aging in mice—could they do the same for humans? | ScienceDaily
<https://www.sciencedaily.com/releases/2025/07/250721223838.htm>

³ ⁴ ³³ Psilocybin delays aging, extends lifespan, new Emory study suggests
https://news.emory.edu/stories/2025/07/hs_psilocybin_aging_study_10-07-2025/story.html

⁷ Extracellular vesicles from antler blastema progenitor cells reverse bone loss and mitigate aging-related phenotypes in mice and macaques | Nature Aging
https://www.nature.com/articles/s43587-025-00918-x?error=cookies_not_supported&code=2071f681-470a-4624-827a-e7ddb169ee20

⁸ ⁹ ¹⁰ ²⁴ Vesicles From Antler Cells Restore Bone in Monkeys
<https://www.lifespan.io/news/vesicles-from-antler-cells-restore-bone-in-monkeys/>

¹¹ ¹² ¹³ ¹⁴ ¹⁵ ¹⁶ ¹⁷ ¹⁸ ¹⁹ ²⁰ ²¹ ²² ²³ ²⁵ ²⁶ ²⁸ ²⁹ ³⁰ ³¹ ³⁵ The 2025 Longevity Summit Dublin
<https://www.lifespan.io/news/the-2025-longevity-summit-dublin/>

²⁷ Immortal Dragons Launches \$40M Longevity Fund
<https://www.lifespan.io/news/immortal-dragons-launches-40m-longevity-fund/>

³² New Report Calls for Urgent Shift from Lifespan to Healthspan as ...
<https://aspph.org/news/pressroom/press-release-new-report-calls-for-urgent-shift-from-lifespan-to-healthspan/>

³⁴ Nature's longevity hack: How human eggs stay fresh for 50 years | ScienceDaily
<https://www.sciencedaily.com/releases/2025/07/250717013902.htm>