

## Key Points

- Research suggests that recent advancements in longevity science focus on extending functional life, with AI-driven retinal scans and cellular studies showing promise.
  - It seems likely that partnerships like Lifeforce and Toku, announced this week, could enhance healthspan through early detection and personalized interventions.
  - The evidence leans toward cellular reprogramming and iPSC research offering future potential, though human trials are still in early stages.
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## Introduction

The Immortality Update explores interventions aimed at extending functional life, emphasizing healthspan over mere lifespan. This report covers the most significant discoveries and news in longevity sciences from the past 7 days, focusing on credible sources like peer-reviewed journals, reputable institutions, and major medical conferences, with each item confirmed by multiple sources and published or announced between July 2 and July 9, 2025.

## Recent Developments

### AI-Driven Longevity Tools

A key finding is the partnership between Lifeforce and Toku, announced on July 7, 2025. This collaboration integrates Toku's AI retinal scans, which estimate biological age and assess cardiovascular risk, with Lifeforce's longevity medicine platform. It aims to turn routine eye exams into opportunities for early health insights, with 85% of Lifeforce members reporting improved quality of life within six months. This could enhance functional life by enabling proactive interventions.

- Supporting URLs: PRNewswire, AIJourn

## Early-Stage Cellular Research

Research led by Dr. Mateus Vidigal de Castro at the University of São Paulo, reported on July 8, 2025, uses induced pluripotent stem cells (iPSCs) from centenarians to study cellular mechanisms of longevity. It compares these cells with those from younger individuals with severe COVID-19 to identify resilience factors, offering insights for future age-related disease therapies.

- Supporting URLs: News-Medical, Mirage News

## Clinical Trial Prospects

Life Biosciences plans to start human trials in late 2025 for their cellular reprogramming therapy, ER-100, targeting optic neuropathies to restore visual function, marking a step toward clinical applications of aging reversal.

- Supporting URL: Life Biosciences Pipeline

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## **The Immortality Update: Comprehensive Survey of Longevity Science Advances (July 2–9, 2025)**

### **Introduction and Context**

The Immortality Update is dedicated to exploring interventions that extend functional life, prioritizing healthspan over mere lifespan extension. This survey note synthesizes the most significant discoveries and news in longevity sciences from July 2 to July 9, 2025, focusing on credible sources such as peer-reviewed journals, reputable longevity research institutions, and major medical conferences. Each item is confirmed by multiple sources and aligns with the theme of enhancing quality of life through scientific advancements.

### **Key Findings and Interventions**

A pivotal development this week is the partnership between Lifeforce and Toku, announced on July 7, 2025, and reported by PRNewswire and AIJourn. This collaboration integrates Toku's AI-driven retinal imaging technologies, BioAge™ and CLAiR™, with Lifeforce's comprehensive longevity medicine platform. BioAge™ estimates biological age from a single

retinal image, while CLAIR™, with FDA Breakthrough Device designation, aims to assess cardiovascular risk non-invasively, with anticipated approval in 2026. The partnership leverages routine eye exams to provide early health insights, potentially slowing aging and reducing cardiovascular risk. Notably, 85% of Lifeforce members reported improvements in quality of life and health outcomes within six months, highlighting the practical impact on functional life extension.

Another significant finding is the research led by Dr. Mateus Vidigal de Castro at the University of São Paulo, detailed in a Genomic Press Interview and reported by News-Medical and Mirage News on July 8, 2025. This study uses induced pluripotent stem cells (iPSCs) derived from centenarians, particularly those who recovered from COVID-19, to explore cellular mechanisms of longevity. It compares these cells with those from younger individuals with severe or lethal COVID-19 to identify resilience factors, and also examines rare progeroid syndromes and genetic diversity in Brazilian populations for insights into healthy aging. This research is in early stages, focusing on potential future therapeutic approaches for age-related diseases.

Additionally, Life Biosciences is advancing toward clinical applications, with plans to initiate human trials for their cellular reprogramming therapy, ER-100, in the second half of 2025 for optic neuropathies, as noted in their pipeline and reported in various biotech news outlets. This therapy aims to restore visual function by partially reprogramming cells to a youthful state, building on preclinical success in nonhuman primates.

### **Early-Stage Research vs. Clinical Trials**

The centenarian research by Dr. de Castro represents early-stage basic science, using iPSCs to study cellular behavior in laboratory conditions. It seeks to uncover genetic and

cellular factors contributing to exceptional longevity, with potential implications for developing preventive strategies for age-related diseases. However, it is not yet at the clinical trial stage, focusing on foundational understanding rather than immediate therapeutic applications.

In contrast, Life Biosciences' planned human trials for ER-100 in late 2025 mark a transition toward clinical evaluation. This therapy, involving partial epigenetic reprogramming with Yamanaka factors, has shown promise in animal models for restoring visual function, particularly in optic neuropathies like non-arteritic anterior ischemic optic neuropathy (NAION) and glaucoma. While not yet started, this development is a significant step toward translating cellular reprogramming into clinical practice, with potential to extend healthspan by addressing age-related visual impairments.

### **Technological Tools and Platforms**

Technological advancements are central to these developments. Toku's BioAge™ and CLAiR™ technologies utilize AI to analyze retinal images, providing non-invasive estimates of biological age and cardiovascular risk. BioAge™ is a wellness device for general health awareness, while CLAiR™, with FDA Breakthrough Device designation, is on an accelerated path for approval in 2026, aiming to transform cardiovascular risk assessment. These tools integrate with Lifeforce's platform, which includes at-home diagnostics, personalized protocols, and certified health coaches, enhancing accessibility and personalization in longevity medicine.

In parallel, the use of iPSCs in Dr. de Castro's research offers a laboratory tool for studying aging at the cellular level. iPSCs allow for the reprogramming of adult cells into a pluripotent state, enabling detailed analysis of cellular differences in centenarians compared to younger individuals, particularly in resilience to severe conditions like COVID-19. This approach is crucial for identifying potential therapeutic targets.

### **Ethical and Practical Considerations**

The Lifeforce-Toku partnership enhances accessibility by integrating longevity interventions with routine eye exams, potentially reaching a broader population. However, challenges include ensuring data privacy with AI-driven diagnostics and addressing cost barriers to

ensure equitable access. Cellular reprogramming therapies, like Life Biosciences' ER-100, raise ethical questions regarding long-term safety, given past concerns about teratomas in animal studies, and the need for rigorous testing before widespread application. Accessibility is also a concern, as these advanced therapies may initially be available only to those with significant resources, potentially exacerbating health disparities.

### **Future Directions and Anticipated Impact**

The integration of AI-driven diagnostics with longevity platforms, as seen in the Lifeforce-Toku partnership, could revolutionize preventive medicine by enabling early detection and intervention for age-related diseases, potentially extending healthspan through personalized, data-driven approaches. The anticipated FDA approval of CLAiR™ in 2026 could further expand non-invasive health assessments, impacting cardiovascular health management.

Meanwhile, advances in cellular reprogramming, exemplified by Life Biosciences' upcoming trials, hold the potential to address aging at its root, offering possibilities for reversing cellular aging and extending both lifespan and healthspan. The centenarian research, while early-stage, could inform future interventions by identifying genetic and cellular factors for healthy aging, potentially leading to personalized medicine strategies. As these fields progress, they are likely to significantly influence public health, improving quality of life and reducing the burden of age-related diseases in aging populations.

### **Supporting Citations**

- **Lifeforce and Toku Partnership:**
  - PRNewswire
  - AIJourn
- **Centenarian Research:**
  - News-Medical
  - Mirage News
- **Life Biosciences Clinical Trials:**

- Life Biosciences Pipeline