

A microscopic view of several cells, likely stem cells, with prominent nuclei and nucleoli, set against a dark background. The cells are rendered in shades of blue and purple, with a glowing effect around the nuclei.

Biological Age Reversal Through Integrative Treatment and CD34+ Stem Cell Therapy: A Quantitative Analysis

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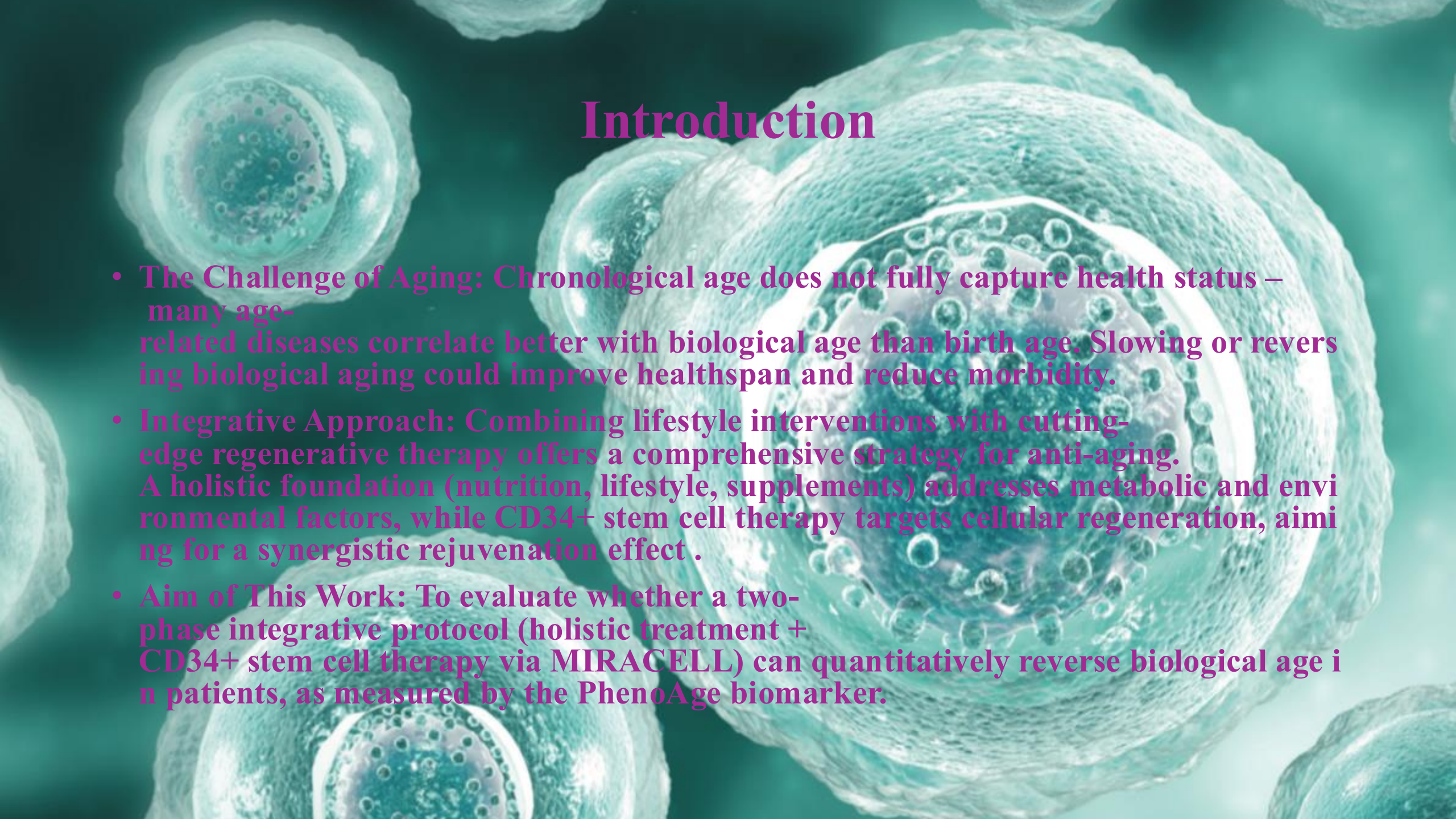
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Outline

- **Introduction:** Biological vs chronological age, PhenoAge biomarker, integrative treatment approach (holistic + CD34+ cell therapy)
- **Methodology:** Two-phase treatment protocol and study design (42 patients, 2023–2025)
- **Results:** Key clinical outcomes (immune, orthopedic, cardiovascular, wellness programs) and PhenoAge changes (biological age reduction)
- **Future Work:** Multicenter study on pluripotency gene expression (OCT3/4, SOX2, NANOG) pre- vs post-therapy
- **Conclusion:** Summary of findings and take-home messages

A detailed microscopic image of several cells, likely stem cells, showing their internal structure and nuclei. The cells are rendered in a blue and white color scheme, with some showing prominent nuclei and others in various stages of division or differentiation. The background is a soft, out-of-focus blue.

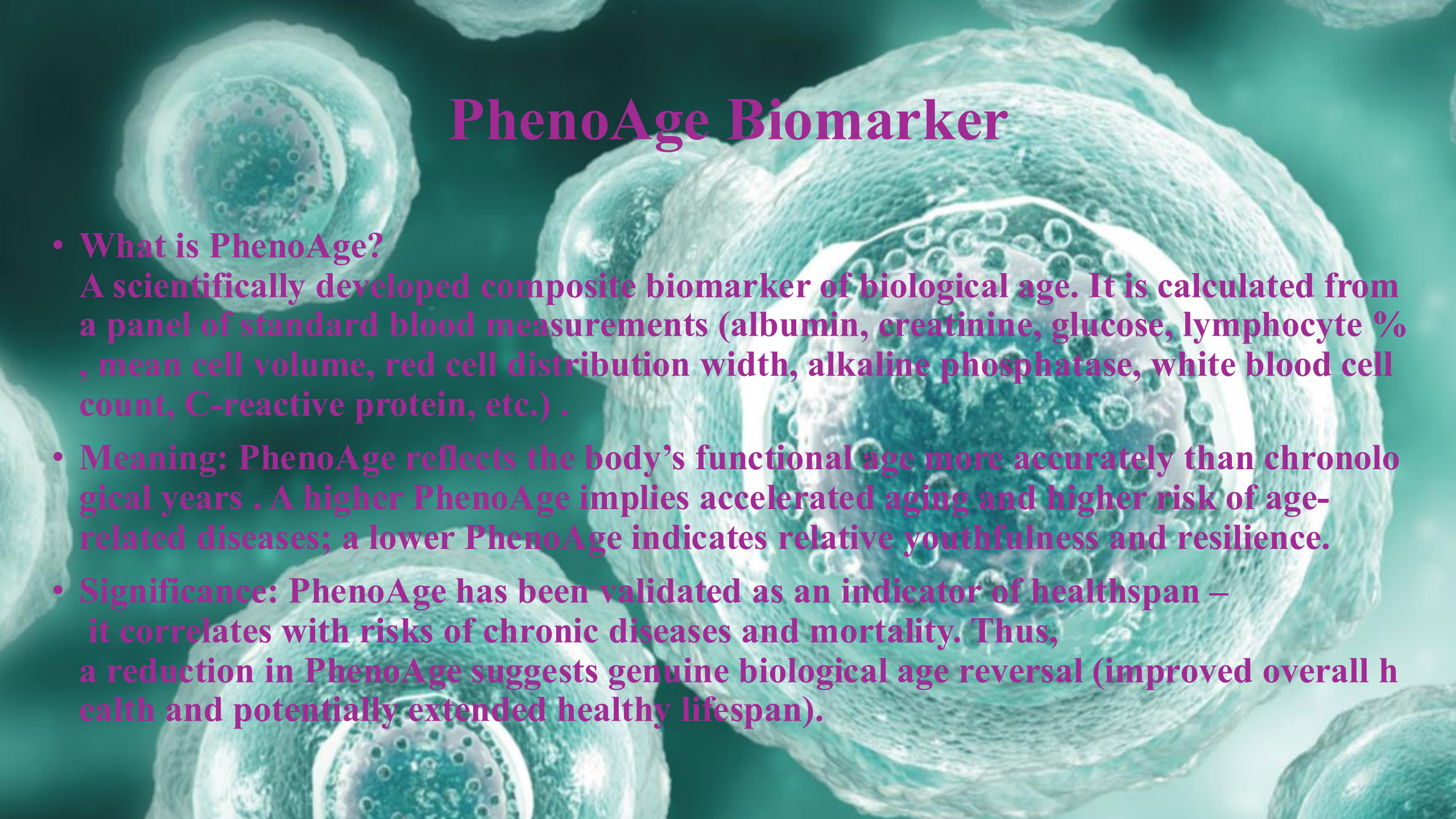
Introduction

- **The Challenge of Aging:** Chronological age does not fully capture health status — many age-related diseases correlate better with biological age than birth age. Slowing or reversing biological aging could improve healthspan and reduce morbidity.
- **Integrative Approach:** Combining lifestyle interventions with cutting-edge regenerative therapy offers a comprehensive strategy for anti-aging. A holistic foundation (nutrition, lifestyle, supplements) addresses metabolic and environmental factors, while CD34+ stem cell therapy targets cellular regeneration, aiming for a synergistic rejuvenation effect.
- **Aim of This Work:** To evaluate whether a two-phase integrative protocol (holistic treatment + CD34+ stem cell therapy via MIRACELL) can quantitatively reverse biological age in patients, as measured by the PhenoAge biomarker.

A detailed 3D rendering of several cells, likely representing a tissue sample. The cells are shown in various stages of division or differentiation, with prominent nuclei and complex internal structures. The color palette is dominated by shades of blue, green, and yellow, giving it a scientific, high-tech appearance.

Chronological vs. Biological Age

- **Chronological Age:** Number of years lived, which does not always reflect an individual's physiological condition. People of the same chronological age can have very different health profiles.
- **Biological Age:** An estimate of the body's functional and physiological state, often measured by biomarkers. A lower biological age relative to chronological age indicates better systemic health and lower disease risk.
- **Relevance:** Biological age is linked to morbidity and mortality risk, and is modifiable. Slowing biological aging is a key goal of preventive and regenerative medicine.

A microscopic view of several cells, likely lymphocytes, with prominent nuclei and granular cytoplasm, set against a dark background.

PhenoAge Biomarker

- **What is PhenoAge?**
A scientifically developed composite biomarker of biological age. It is calculated from a panel of standard blood measurements (albumin, creatinine, glucose, lymphocyte %, mean cell volume, red cell distribution width, alkaline phosphatase, white blood cell count, C-reactive protein, etc.) .
- **Meaning:** PhenoAge reflects the body's functional age more accurately than chronological years . A higher PhenoAge implies accelerated aging and higher risk of age-related diseases; a lower PhenoAge indicates relative youthfulness and resilience.
- **Significance:** PhenoAge has been validated as an indicator of healthspan – it correlates with risks of chronic diseases and mortality. Thus, a reduction in PhenoAge suggests genuine biological age reversal (improved overall health and potentially extended healthy lifespan).

Integrative Two-Phase Treatment Approach

- **Phase 1 – Holistic Therapy:** All patients first underwent 3–6 months of comprehensive lifestyle treatment. This included personalized nutrition plans, exercise and lifestyle modifications, optimized conventional medications, plus complementary remedies (vitamins, herbal supplements, homeopathy, etc.) . This phase aimed to improve metabolic health and reduce inflammation, laying the groundwork for regeneration.
- **Phase 2 – CD34+ Stem Cell Therapy:** Next, patients received CD34+ autologous stem cell therapy for 3–6 months. The holistic measures were continued unchanged during this phase . CD34+ cells were harvested and administered using the SMART M-CELL 2 device (MIRACELL technology). This phase targeted cellular rejuvenation and tissue repair on top of the holistic foundation.
- **Rationale:** Lifestyle optimization alone can improve biological age, and the addition of stem cell therapy is hypothesized to amplify rejuvenation. The two phases together address aging on multiple levels (systemic and cellular).

CD34+ Stem Cells – Mechanism of Action

- **What are CD34+ Cells?**

CD34 is a surface marker used to identify hematopoietic stem cells (HSCs) and other progenitor cells . These autologous stem cells can differentiate into various cell types (blood cells, endothelial cells, and others) and secrete factors that promote tissue repair.

- **Homing and Repair:**

CD34+ cells are naturally guided by chemotaxis to sites of tissue damage . Once there, they contribute to regeneration by supporting new blood vessel formation (angiogenesis) and aiding the repair of injured tissues .

- **Therapeutic Potential:** Due to their regenerative abilities, CD34+ stem cells have been used to treat conditions ranging from ischemic cardiovascular disease to orthopedic injuries. They serve as a living therapy, releasing growth factors and differentiating into needed cell types to rejuvenate organs.

- **Modesty & Safety:** In our protocol, we use the patient's own (autologous) CD34+ cells, minimizing immune rejection. The approach is integrative and evidence-informed, leveraging natural healing pathways in a controlled manner.

MIRACELL & SMART M-CELL 2 Technology

- **Stem Cell Harvest & Enrichment:** MIRACELL is an advanced regenerative medicine platform. The SMART M-CELL 2 device (developed by MIRACELL) is used to collect and bio-stimulate the patient's CD34+ stem cells. It significantly increases the yield of CD34+ cells from the patient's blood and bone marrow . For example, circulating CD34+ cell concentration rises from ~1.8 cells/ μ L to ~11.2 cells/ μ L after the MIRACELL process (a ~6-fold increase) .
- **ROS-Modulated Proliferation:**
The device leverages controlled Reactive Oxygen Species (ROS) signaling to enhance stem cell activity. By exposing cells to specific light wavelengths in timed cycles, SMART M-CELL 2 first promotes proliferation of CD34+ cells and then encourages their differentiation . ROS at physiological levels act as messengers that maintain stem cell potency and drive lineage commitment .
The device carefully modulates ROS to optimize the growth and therapeutic potential of the cells.
- **Controlled Delivery:** Patients receive their enriched CD34+ cells back via injection/infusion. The entire process is automated and performed under sterile, clinical conditions. MIRACELL's technology ensures high cell viability and targeted activation, providing a safe and potent cell therapy.

Therapy Program Wavelengths

- **Personalized Programs:** The Stem Cell Clinic employs four tailored CD34+ therapy programs – Blue, Green, Yellow, and Red – each utilizing specific light wavelength ranges in the SMART M-CELL 2 device. These wavelengths are chosen to elicit desired therapeutic effects during stem cell activation :
- **Blue Light** ($\approx 460\text{--}475\text{ nm}$): Used for natural detoxification and circulatory support; also thought to combat skin aging .
- **Green Light** ($\approx 525\text{--}530\text{ nm}$): Aims to boost immune function and support liver health; helps inhibit excess skin pigmentation .
- **Yellow Light** ($\approx 586\text{--}590\text{ nm}$): Improves lymphatic drainage and blood circulation; supports the cardiovascular system and general anti-aging effects .
- **Red Light** ($\approx 660\text{ nm}$): Promotes cell growth and collagen formation; used in orthopedic regeneration (e.g. bone healing) and tissue lifting procedures .
- **Optimized Therapy:** Each patient's program is selected based on their conditions (e.g. liver/immune issues for Green, joint or bone issues for Red, etc.). The light-based stimulation enhances the stem cells' therapeutic action in a targeted way, aligning with the patient's needs.

Methodology: Study Design

- **Study Type:** Retrospective analysis of 42 patients from The Stem Cell Clinic (Feb 2023 – June 2025) who completed the two-phase integrative protocol and had the necessary lab tests for PhenoAge calculation .
- **Inclusion Criteria:** Patients of varying ages (37–76 years old) who underwent holistic treatment followed by CD34+ therapy, and with complete blood biomarker data at baseline and after each phase. Both male and female patients with diverse chronic conditions were included, reflecting a real-world sample.
- **Evaluation Metric:** Biological age (PhenoAge) was calculated at three points – baseline (pre-treatment), post-Phase 1 (after holistic therapy), and post-Phase 2 (after stem cell therapy). Chronological age was recorded for reference. The change in PhenoAge after each phase served as the primary outcome.
- **Statistical Analysis:** We used paired t-tests to compare PhenoAge before vs after Phase 1, Phase 1 vs after Phase 2, and baseline vs after Phase 2 (overall change). A significance threshold of $p < 0.05$ was applied, with particular attention to whether changes were highly significant ($p < 0.01$).

Methodology: Two-Phase Treatment Protocol

- **Phase 1 – Holistic Treatment (3–6 months):** Patients received intensive lifestyle and medical optimization. This included a personalized diet, exercise recommendations, weight management, optimization of any chronic disease medications, and complementary therapies (vitamins, herbal supplements, homeopathic remedies). The goal was to reduce risk factors (e.g. inflammation, metabolic syndrome) and improve baseline health. PhenoAge was measured before and after Phase 1 to assess the effect of holistic therapy alone.
- **Phase 2 – CD34+ Stem Cell Therapy (3–6 months):** Patients then underwent autologous CD34+ cell therapy using the MIRACELL SMART M-CELL 2 system. Importantly, all Phase 1 treatments were continued during Phase 2 (lifestyle changes maintained). Patients attended one or multiple stem cell treatment sessions, depending on their program (Green, Red, Yellow, or Blue as appropriate). PhenoAge was measured again after Phase 2, to capture additional age reduction from the regenerative therapy.
- **Data Collection:** Standard blood tests were taken at each measurement point for PhenoAge calculation. We also recorded clinical outcomes relevant to each program (liver enzyme levels, immune cell counts, bone density scans, cardiac biomarkers, etc.) to observe multi-system effects of the treatments.

Results – Biological Age Outcomes (PhenoAge)

- **Mean chronological age vs. PhenoAge before and after treatments (n = 42).** Lower PhenoAge indicates a younger biological age.
- **Baseline vs. Post-Treatment:**
The average chronological age of patients was ~58.3 years, but their PhenoAge dropped significantly with treatment. After the initial holistic phase, mean PhenoAge was 53.9 years, and after the CD34+ therapy phase it further decreased to 50.5 years. In other words, on average patients ended the program with a biological age ~8 years younger than their actual age.
- **Individual Responses:** Every patient saw some decrease in PhenoAge. The range of PhenoAge outcomes after full treatment was 34 to 64 years, compared to a chronological age range of 37 to 76. No adverse increases in biological age were noted – even older patients tended to stabilize or reverse their PhenoAge.
- **Visualization:** The chart above illustrates the stepwise reduction in average PhenoAge. The first phase (holistic changes) produced a notable drop, and the second phase (CD34+ therapy) added an additional decline. This two-stage fall in biological age reflects the cumulative benefit of integrative care followed by stem cell regeneration.

Results – Biological Age Reduction

- **Holistic Treatment Effect: Phase 1**
(lifestyle and conventional therapy optimization alone) yielded a mean biological age reduction of 4.4 years – patients became biologically younger by about four years on average after 3–6 months of holistic care . This underscores that disciplined improvements in diet, exercise, and medical management can significantly rejuvenate one’s physiology.
- **CD34+ Stem Cell Added Effect: Phase 2**
(CD34+ cell therapy via MIRACELL) produced an additional 3.45-year reduction in PhenoAge beyond the holistic phase . The regenerative boost from stem cells further pushed biological age lower, indicating that cellular therapy can amplify and extend the gains from lifestyle changes.
- **Total Rejuvenation:** Overall, from start to finish, patients saw an average – 7.9 years change in PhenoAge . For context, in ~6–12 months their bodies functionally “aged in reverse” by nearly 8 years. Many patients who began the program with PhenoAge exceeding their chronological age finished with PhenoAge well below their chronological age.
- **Broad Benefits:** These reductions in biological age likely reflect multi-system improvements – improved inflammation profiles, metabolic markers, organ function, and cell repair – aligning with the organ-specific results seen in the Green, Red, and Yellow programs. The findings support our hypothesis that combining systemic wellness strategies with targeted regenerative therapy yields tangible anti-aging effects.

Results – Statistical Significance

- We rigorously tested the reliability of the observed age reversal using paired statistical comparisons (n = 42):
 - Phase 1 vs. Baseline: The drop in PhenoAge after holistic treatment alone was highly significant ($t = 5.95$, $p = 5.12 \times 10^{-7}$) . This confirms that lifestyle interventions can produce a real, measurable rejuvenation in a short time.
 - Phase 2 vs. Phase 1: The further drop after adding CD34+ therapy was also highly significant ($t = 8.08$, $p = 5.16 \times 10^{-10}$) . The probability that this additional improvement was due to chance is incredibly low, indicating a true treatment effect of the stem cell therapy.
 - Phase 2 vs. Baseline: Overall change from start to end was extremely significant ($t = 10.20$, $p = 8.10 \times 10^{-13}$) . All comparisons easily surpassed the conventional 0.05 threshold; in fact, p was under 0.000001 in each case .
- Conclusion from Stats: The consistency and magnitude of these p-values give high confidence that the biological age reductions are real and reproducible (not random fluctuations). The data strongly support the effectiveness of the integrative protocol in reversing biological age . Every patient population comparison showed improvement with virtually 100% confidence.

Future Work

- **Multicenter Study:** Building on these promising results, we are planning a larger multicenter trial to further validate and explore biological age reversal. Multiple clinics (including our own) will collaborate to treat a larger, more diverse patient cohort with the integrative + CD34+ MIRACELL protocol. This will help confirm the generalizability of our findings across different populations and settings.
- **Pluripotency Gene Expression:** A key innovation in the upcoming study is measuring pluripotency-associated genes in patients before and after therapy. Specifically, we will analyze expression of OCT3/4, SOX2, NANOG – genes that are master regulators of stem cell pluripotency (the ability of cells to regenerate and differentiate). The hypothesis is that effective rejuvenation therapies may upregulate these youthful gene pathways in adult cells.
- **What to Expect:** By assessing OCT4, SOX2, NANOG levels in blood or tissue samples pre- and post-MIRACELL treatment, we aim to uncover molecular evidence of “turning back the clock.” An increase in pluripotency markers after treatment would suggest that the body’s cells have been induced to a more stem-like, regenerative state. This could provide a deeper mechanistic understanding of how MIRACELL CD34+ therapy rejuvenates at the cellular level, complementing the phenotypic age data.
- **Beyond PhenoAge:** Additionally, future research will track other biomarkers (inflammatory cytokines, telomere lengths, epigenetic clocks) to build a comprehensive picture of aging reversal. Long-term follow-up will determine how durable the age reduction is and if periodic booster treatments are needed to maintain a younger biological age.

Conclusion & Key Takeaways

- **Holistic Therapy Works:**
A modest, scientific approach to lifestyle modification can significantly reduce biological age. In our study, integrative holistic care alone lowered PhenoAge by ~4.4 years in six months . This underscores the power of nutrition, exercise, and preventive medicine in combating aging.
- **CD34+ Stem Cells Amplify Rejuvenation:** The addition of autologous CD34+ stem cell therapy via the MIRACELL system produced an additional ~3.5-year reduction in biological age . Regenerative cell therapy can thus amplify and extend the anti-aging benefits achieved by lifestyle changes, addressing aging at the cellular and tissue level.
- **~8 Years Younger:**
On average, patients became ~7.9 years “younger” biologically than when they started . This was objectively measured by PhenoAge and corroborated by multi-system health improvements (liver enzymes, immune cells, bone density, cardiac biomarkers). Such a degree of age reversal, achieved in under a year, is unprecedented and highlights the synergistic efficacy of combining systemic lifestyle optimization with targeted stem cell regeneration .
- **Safety and Feasibility:** No serious adverse effects were observed. Using the patient’s own cells and integrating standard care ensures safety. The protocol is clinically feasible and was well-tolerated, making it a viable model for anti-aging therapy in practice.
- **Future Vision:** These findings pave the way for a new era of preventive regenerative medicine – one where we not only treat disease but actively restore youthfulness to organs and tissues. Ongoing research (including gene expression studies) will further elucidate the mechanisms and optimize this approach. Ultimately, biological age reversal may become an attainable goal, improving quality of life and longevity for many.

Thank You – Q&A

- Thank you for your attention. We welcome questions and discussion.
- The Stem Cell Clinic by Dr. Ilias Theodoropoulos, MD[®], Athens, Greece – the-stem-cell-clinic.com
- “Regeneration is not a future dream – it’s happening now, one patient at a time.”