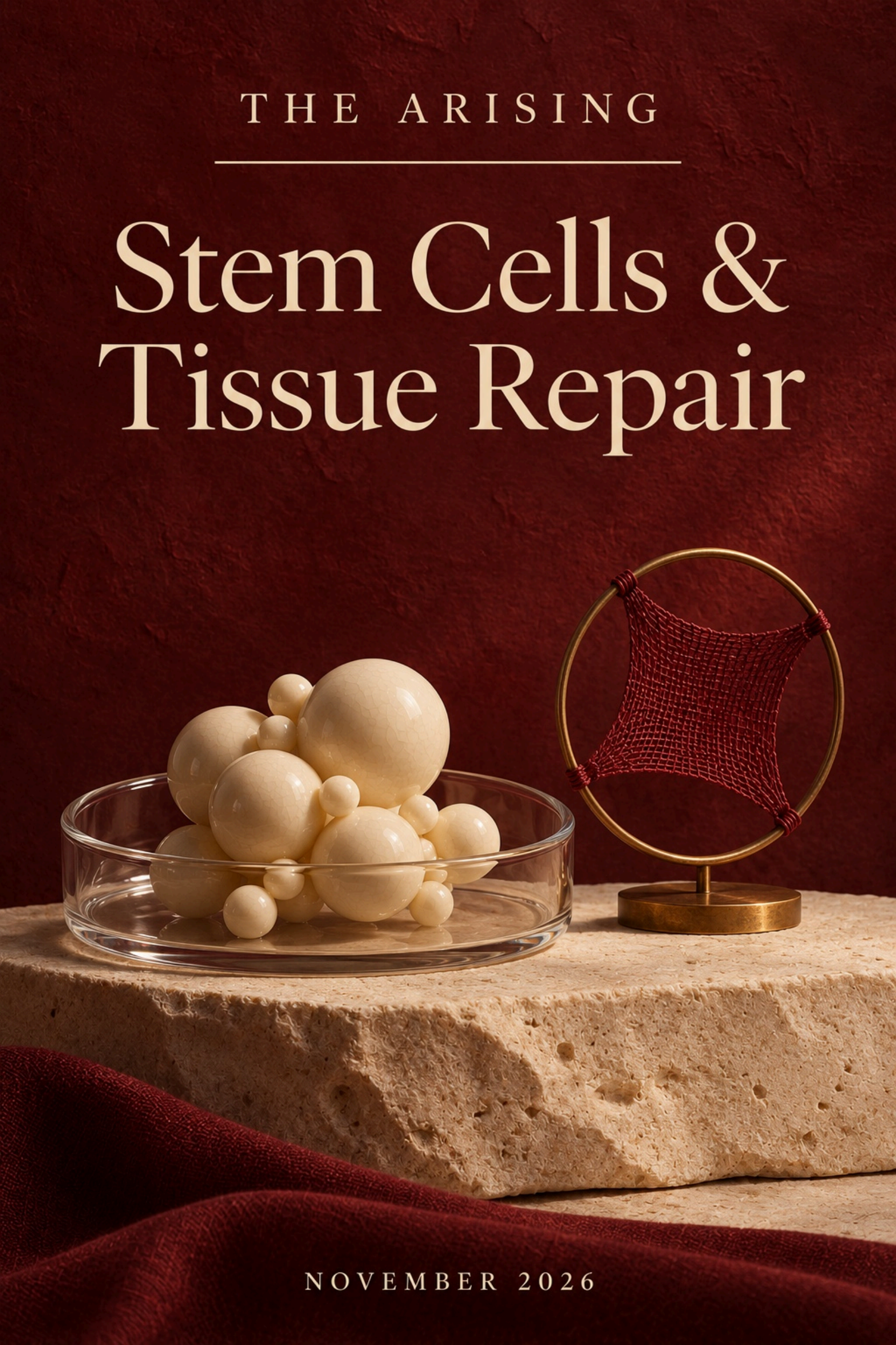
THE ARISING

Stem Cells & Tissue Repair



NOVEMBER 2026

Stem Cells & Tissue Repair

Stem cells, living function, and the path from promise to care

The Arising · Stem cells · November 2026 · John Griffin, MD

The most important thing about a new cell is the job it can do.

For a person living with type 1 diabetes, that job might be producing insulin in response to the body's needs. For someone following research on the brain, it might be the possibility of replacing a lost function one day. The hope is concrete: less daily burden, more independence, a capability restored.

The phrase “stem cells” can make those possibilities sound like parts of one treatment. They are not. A cell grown in a laboratory, a product delivered to a patient and a service advertised by a clinic may share the vocabulary while differing in almost everything that determines benefit and risk.

Two studies show why those differences matter. One reports human outcomes after an experimental therapy using insulin-producing cells. The other explores how blood-derived cells change identity in the laboratory, including changes in DNA-based age estimates. One asks whether new cells can perform a living function in people. The other helps researchers study how a cellular transformation unfolds. [1,2]

Both are worth understanding. Neither is a general promise that stem cells reverse human aging.

What Stem-Cell Treatments Aim to Restore

Stem cells can give rise to more specialized cells. That ability creates possibilities, but the useful question comes afterward: what kind of cell was made, and can it do the work that is needed?

An insulin-producing cell has a different job from a cell intended for the nervous system. Its identity, purity, behavior and surrounding environment matter. So do the method used to make it, where it is delivered and what other treatment is needed to support it.

A therapy therefore involves more than a vial of cells. Manufacturing, testing, administration, follow-up and management of complications are part of the same intervention.

The clearest evidence connects a specific cell product to a specific function in a defined group of people. That is the starting point for the first study.

New insulin-producing cells in people

A 2025 report in the New England Journal of Medicine described zimislecel, an experimental therapy made from stem-cell-derived islet cells, the kind of cells involved in producing pancreatic hormones including insulin. The cells were allogeneic: they came from a source other than the person receiving them. [1]

The report was an early phase 1-2 study. These stages examine safety and begin investigating how a treatment works in people; they are not the same as a large comparison designed to settle how it performs against established care.

Fourteen participants had at least 12 months of follow-up at the time of the analysis. Two had received a half dose, and 12 had received the full dose evaluated in the main efficacy analysis. Keeping those groups separate matters when reading the results. The efficacy cohort was all White and had an average age of 42.7 years, ranging from 24 to 60. Eligibility was restricted to adults with recurrent severe low-blood-sugar events and reduced awareness of them. These details limit how broadly the findings apply. [1]

Did the cells begin doing their job?

Before treatment, C-peptide was undetectable in the participants. C-peptide is released when the body makes insulin, so its later detection offered evidence that the infused cells had established themselves and were functioning. This is a biological sign that the new cells were doing something relevant, rather than simply being present. [1]

Among the 12 full-dose participants, all were free of severe low-blood-sugar events during the assessed period from day 90 through one year, and all had HbA1c below 7%. HbA1c is a blood measurement reflecting average blood sugar over recent months. Ten of the 12 were not using externally supplied insulin at day 365. [1]

That is a meaningful functional observation. Producing insulin and reducing the need to supply it from outside the body can matter enormously to a person living with diabetes.

It is also a result from a small, selected group at a particular point in follow-up. Ten of 12 does not mean that 10 of every 12 people with type 1 diabetes would have the same outcome. It does not establish that the effect lasts indefinitely or that every aspect of the disease has been cured.

The analyses were interim, meaning the study was still developing, and were not specified in advance. There was no randomized comparison group. Those limitations affect how confidently the result can be generalized. [1]

Immune-Suppressing Treatment and Stem-Cell Safety

All participants received medicines that suppress the immune system. That requirement is central, not an extra detail after the benefit. The cells and the treatment needed to support them form the complete clinical intervention. [1]

Suppressing immune activity can help protect transplanted cells, but it also changes the burden and risks of care. A description that says only “new insulin-producing cells” leaves out part of what the person experiences.

The study reported serious events. Three participants had serious neutropenia, a shortage of a type of white blood cell important for fighting infection, and two had acute kidney injury, a sudden decline in kidney function. Two deaths were reported later than the one-year efficacy window: one at about 19.5 months from cryptococcal meningitis, a fungal infection affecting the tissues around the brain and spinal cord, and one at about 30 months in the setting of progression of pre-existing neurocognitive impairment, with severe dementia and agitation. [1]

The investigator considered the meningitis related to immune-suppressing medication. That participant had also undergone complicated sinus surgery and received prolonged high-dose steroids that were prohibited by the study protocol. No serious adverse events were attributed to the cell product itself, but that does not make the whole treatment regimen harmless. The distinction between the cells and the medicines supporting them matters to understanding the risk. [1]

These events belong beside the functional results. A short account of an event does not, by itself, settle whether every part of it was caused by the cells, another part of treatment, the person's existing illness or a combination of factors. It would be wrong either to assign causation casually or to dismiss serious events because the functional outcome was encouraging.

The next questions concern durability and the complete balance of benefit and burden. How long does cell function last? What complications occur over time? Which people are most likely to benefit? What happens to daily life as well as laboratory results?

A one-year result can be an important step while still leaving those questions open. Vertex supported the study and was involved in its design, data collection and analysis. That role belongs in the account readers use to judge the evidence. [1]

A different kind of change: blood cells becoming neural stem cells

The second study did not give a cell therapy to patients. It changed cells in laboratory culture. [2]

The donor cohort included 15 people ranging from newborns to 101 years old. The wide age range is striking, but it is not evidence that 15 people received a rejuvenating treatment. Their cells were studied. The donors' bodies were not made younger by the experiment. Some of the detailed time-course experiments used cells from only three donors. [2]

Researchers used two gene-regulating factors, SOX2 and cMYC, to guide erythroid progenitors, immature cells in the red-blood-cell lineage, toward a neural stem-cell state. Neural stem cells can give rise to specialized cells of the nervous system. The direct conversion was designed to avoid a pluripotent stage, the broad state from which cells can develop into many different tissue types. The authors still call for more detailed single-cell work to examine whether some cells approach an earlier, partly reprogrammed state. [2]

The experiment offered a way to study two changes unfolding together: what kind of cell it was becoming and how some molecular measurements associated with age changed along the way.

What a younger clock reading meant here

The investigators used an epigenetic clock, a model that uses patterns of chemical marks on DNA to produce an age-related estimate. This is a measurement of cells, not a direct reading of a person's remaining lifespan. [2]

For cells from older donors, the reported estimates were about 13% of the donors' chronological ages at earlier passages and about 5% at later passages. A passage is a stage in continuing to grow and transfer cells in culture. These percentages compare a model's estimate for the changing cells with the donors' ages. They do not mean that 87% or 95% of aging was reversed in a person's body. [2]

That distinction matters because both cell identity and the measured molecular patterns were changing. A younger-looking score is one part of describing the transition. It is not proof that the cells will function safely in a patient, restore memory or extend life.

The authors note that neural cells can receive younger clock readings than blood cells. They also lack a truly aged neural-stem-cell reference for comparison, and changes in oxygen conditions during culture may influence the findings. These limits make it difficult to separate a change in cell identity from a change interpreted as age. [2]

The result is still scientifically interesting. It gives researchers a process they can examine over time, rather than a single before-and-after picture.

Why a slow transformation can be useful

The conversion continued over several weeks. Age-related differences in gene activity between cells from younger and older donors diminished over time. The acquisition of a more complete neural stem-cell pattern continued beyond the appearance of an early marker. Changes also continued under conditions that inhibited proliferation, or the cells' multiplication. [2]

An early marker is a clue about what a cell may be becoming. It is not a complete guarantee of mature identity or useful function. Following several measurements over time helps researchers ask which parts of the transition happen first, which occur together and which may be necessary for later behavior.

That is the value of a research model. It allows a complicated process to be studied in more detail. Seeing the process is different from knowing how to control it safely inside a person.

Before a cell-conversion approach could become a therapy, questions about identity, consistency, unwanted growth, delivery and behavior after administration would need answers. A youthful molecular signature does not establish that those risks have been solved.

This study did not demonstrate repaired memory, restored nerves or longer life in the donors. Its contribution was a way to investigate a cellular transition. The paper discloses relationships involving bioinformatics, epigenetic testing and life-science companies. Such interests are context for evaluating the work, not proof that its conclusions are right or wrong. [2]

Stem-Cell Evidence: Laboratory Findings and Human Trials

The two studies sit at different points on the path from idea to care.

In the islet-cell study, people received an intervention, and researchers observed cell function, insulin use and serious events. In the blood-cell study, researchers changed cells in culture and followed their identity and molecular patterns. Evidence from one cannot fill the gaps in the other.

C-peptide, insulin independence, a neural stem-cell marker and an epigenetic-age estimate are not interchangeable outcomes. Each tells us something different.

A helpful way to read a stem-cell claim is to ask which step has actually been reached:

• **Making the cells:** Were the intended cells produced consistently?

• **Showing a function:** Did they perform the relevant job in a laboratory model, an animal or a person?

• **Understanding harms:** What unwanted behavior or treatment complications occurred, and how carefully were they sought?

• **Keeping the benefit:** How long did the function last, and what support was needed?

• **Improving life:** Did the intervention reduce illness or burden, or restore a capability the person values?

A promising answer at one step is a reason to investigate the next. It is not permission to skip it.

What to ask about a treatment claim

If someone is considering a cell-based intervention, the name of the cells is only the beginning of the conversation.

Ask for the exact product or procedure, the condition it is intended to treat, and the human evidence supporting that use. What comparison was made? How many people were treated, and for how long were they followed? Which harms occurred? What other medicines or procedures were required?

Also ask how the proposed intervention relates to the study being cited. Cells from a different source, made differently or given in another location are not automatically the same treatment because the advertisement uses the words “stem cells.”

The two studies here do not endorse a commercial stem-cell service or establish that any reader is eligible for the experimental therapy described. Individual decisions need specialist assessment and current information about the exact intervention.

Good questions are not a rejection of an ambitious technology. They are how the promise becomes specific enough to evaluate.

Three everyday situations

A person with type 1 diabetes reads that trial participants stopped using insulin. The result is understandable grounds for hope. Looking further, they see that 10 of 12 full-dose participants were not using external insulin at one year, that immune-suppressing treatment was required, and that serious events occurred. Those details help them discuss the research with their clinical team. The study is not a reason to change their current insulin treatment on their own.

A headline says cells from a 101-year-old were made young. The reader separates the donor from the experiment. Cells changed in culture; clock estimates shifted while cell identity changed. That is a research finding, not a report that the donor was rejuvenated or that the cells are ready to repair an aging brain.

A clinic cites stem-cell research to support an unrelated procedure. The reader asks whether the offered cells, preparation, delivery route and condition match the study. A legitimate result for one product does not validate another simply because they share a broad label. The most important information may be what the cited study did not test.

These examples are illustrative, not reports of actual patients. They show how hope and careful questions can belong in the same conversation.

Restoration made concrete

The promise of regenerative medicine becomes clearest when the goal is specific. A cell makes insulin. A function returns. A person experiences less burden, with risks that are understood well enough to judge.

The path may involve striking laboratory discoveries and cautious clinical steps. Both have a role. The work is to connect them without confusing one for the other.

New cells are a beginning. What they can safely do for a life is the result worth pursuing.

Sources and further reading

[1] Trevor W. Reichman and colleagues. Stem Cell-Derived, Fully Differentiated Islets for Type 1 Diabetes. New England Journal of Medicine. 2025;393:858-868. Primary publication record. Full text.

[2] Lea Jessica Berg and colleagues. Protracted Fate Acquisition and Epigenetic De-Aging During Induced Neural Stem Cell Conversion of Human Blood Cells. Aging Cell. 2026;25(10):e70751. Primary publication record. Full text.

Continue exploring

Read Regenerative frontiers, Biological-age clocks and Brain health, or explore the magazine collection.