

Hair Follicle Regeneration: What Has Been Demonstrated, and What Has Not

A plain-language account of the current scientific position, based on written responses provided to Hair of Istanbul by OrganTech, Inc. (Tokyo) on 8 September 2026.

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SCIENTIFIC REVIEW

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What this document is — and is not

- **It is** an explanation of where laboratory research into growing new hair follicles currently stands, written for people experiencing hair loss.
- **It is not** a description of a treatment that anyone can receive today. OrganTech's technology is under research and development. It is not an approved treatment and is not available at Hair of Istanbul or at any other clinic.
- **Hair of Istanbul has no commercial or clinical relationship with OrganTech.** We have no access to, licence for, or ability to provide any treatment based on OrganTech's technology. OrganTech contributed written answers to our questions for patient education purposes only.
- **Most of the evidence described here comes from animal studies.** Whether the same results can be achieved in humans has not yet been established.

At a glance

- In February 2026, OrganTech reported that fully regenerated hair follicles capable of producing hair shafts were generated in the laboratory using three cell populations taken from *adult mouse* hair follicles.
- The decisive addition was a newly identified population OrganTech calls *hair follicle regeneration-supporting cells* — the "third cell". Without it, laboratory-built follicle germs formed a bulb but never

entered the growth phase.

- OrganTech has since identified a *candidate* corresponding cell population in human hair follicles. Characterising it, and building the culture, manufacturing and safety systems around it, is ongoing.
- Two distinct therapies are in development, and they are frequently confused: one aims to *reactivate follicles you still have*; the other aims to *increase the number of follicles* by growing new ones.
- OrganTech states that its cells can already be expanded roughly **100-fold** in the laboratory — so in principle about 100 donor follicles could supply the starting material for around 10,000.
- OrganTech's position is that progress in this field is more meaningfully judged by scientific and technological milestones than by projected dates.
- *Hair of Istanbul's own reading of the development sequence described above — not a statement by OrganTech*: no human clinical study has yet been registered or published.
- OrganTech considers "*hair follicle regeneration*" the accurate term, and regards "*hair cloning*" and "*stem-cell hair transplant*" as inaccurate descriptions of its technology.

How this document was produced

In August 2026 Hair of Istanbul wrote to OrganTech, Inc. and asked whether its research team would answer questions for our patient education material. OrganTech asked to see the questions in writing first. We submitted twelve questions on 31 August 2026, covering what the research has and has not shown, the biology, the manufacturing and safety requirements, which conditions might be addressed, how progress should be judged, and which terminology is accurate.

OrganTech returned written answers to all twelve questions on 8 September 2026. The scientific content of this document is drawn from those answers. Passages shown in quotation marks are OrganTech's own words. Other scientific content is our plain-language summary of OrganTech's responses, written for a non-specialist reader; where we have simplified, we have tried not to make a claim stronger than the one OrganTech made. Any commentary or patient-oriented guidance added independently by Hair of Istanbul is expressly identified as such and remains solely the editorial responsibility of Hair of Istanbul.

We have added no clinical claims of our own, and no claim about Hair of Istanbul's services, to the scientific sections of this document.

What the February 2026 study showed

OrganTech's work rests on a method it developed in 2007, the *organ germ method*, in which two kinds of stem cell — epithelial and mesenchymal — are packed together at high density to reconstruct the seed of an organ.

In 2012, using that principle, OrganTech reported in animal studies that transplanting bioengineered hair follicle germs could regenerate hair that went through normal hair cycles.

The February 2026 study added the missing piece. Using three cell populations taken from adult mouse hair follicles — epithelial stem cells, dermal papilla cells, and the newly identified third population — OrganTech reported generating fully regenerated hair follicles *in vitro* that entered the growth (anagen) phase and produced hair shafts.

"These findings were obtained in animal studies. From a scientific perspective, however, the fundamental biological principles underlying hair follicle development and regeneration are considered to be broadly conserved in humans. We have also found a candidate cell population in human hair follicles that appears to correspond to the third cell population identified in our animal studies."

OrganTech, Inc., written response, 8 September 2026

Why the third cell mattered

Follicle germs built from only two cell populations did form a hair bulb — but they stopped there. They did not progress into the growth phase, and they did not become complete, hair-producing follicles. OrganTech reasoned that something was missing, and reports that adding the third population enabled, for the first time, the generation of fully regenerated hair follicles in the laboratory.

What has been shown — and where

FINDING	SHOWN IN ANIMALS	SHOWN IN HUMANS
Bioengineered follicle germs regenerate hair that cycles normally	Yes (2012)	Not yet
Fully regenerated follicles produced in vitro from three cell populations	Yes (2026)	Not yet
Regenerated follicles integrate with arrector pili muscles and nerves	Yes	Not yet
Repeated hair cycles across the animal's lifetime	Yes	Not yet
Position and density controllable by where germs are placed	Yes	Not yet
A corresponding third-cell population exists	Yes	Candidate identified; characterisation ongoing
Shaft diameter, pigmentation and curl pattern reproduced predictably	Not yet fully established; the dermal papilla is considered to play an important role in determining hair characteristics.	To be evaluated
Regulator-authorised human clinical study	—	Not yet begun

OrganTech is explicit about the boundary:

"We are currently advancing the translational development required to apply these scientific principles to humans. However, these approaches have not yet reached clinical treatment or practical application in humans."

OrganTech, Inc., written response, 8 September 2026

Two different therapies, often confused

This is the distinction most often lost in public discussion, and OrganTech draws it sharply. The two approaches do different things, and they suit different patients.

1. Cell transplantation therapy

What it does: introduces the third cell population into thinning areas to reactivate hair follicles the patient *still has*, encouraging them to move from the resting (telogen) phase into the growth (anagen) phase, and supporting the environment around the follicle.

Requires: existing follicles that remain in the scalp.

Does not: create new follicles. OrganTech states this "is not an organ-regeneration approach".

Being investigated particularly for: female pattern hair loss, where resting-phase mechanisms are thought to play an important role.

2. Hair follicle organ regeneration therapy

What it does: isolates cells from the patient's own follicles, expands them in the laboratory, and builds bioengineered hair follicle germs that are transplanted into areas of hair loss. A later variant would grow those germs into complete follicles first, then transplant them much as hair is transplanted today.

Requires: a small donor sample — not existing follicles in the treated area.

Does: increase the total number of follicles.

OrganTech's analogy: the first transplants the "seed" of a follicle; the second grows it to the "seedling" stage before transplanting.

The one-sentence difference, in OrganTech's words: "one approach seeks to reactivate follicles that are already present, while the other seeks to regenerate and increase the number of follicles themselves."

Why this differs from a hair transplant today

A conventional hair transplant moves existing follicles from the back of the scalp to areas of loss. It redistributes; it cannot add. The total number of follicles a person has does not change.

Organ regeneration therapy is intended to change that number. OrganTech envisages an *autologous* approach — the patient's own cells, taken from occipital follicles at the back of the scalp, which are the same follicles used in conventional transplantation because they resist androgenetic alopecia.

"We have already developed technology that allows hair follicle-regenerating stem cells to be expanded approximately 100-fold in vitro. In principle, therefore, if 10,000 hair follicles were required, approximately 100 donor follicles could provide the starting cellular material needed to generate them."

OrganTech, Inc., written response, 8 September 2026

Two challenges stand in the way, and OrganTech names both: keeping the cells' regenerative capacity stable while they are being multiplied, and building the technology to produce large numbers of *uniform* follicle germs.

What a regenerated follicle would have to do

Producing a hair shaft is not sufficient. A follicle has to behave like a follicle. In animal studies OrganTech reports that regenerated follicles cycled normally throughout the animal's life and connected to the surrounding structures, including the arrector pili muscles and nerves — which suggests the natural direction and flow of hair could be reproduced.

The character of the hair itself — its calibre, colour and curl — is determined to a significant extent by the dermal papilla, so OrganTech expects follicles regenerated from occipital cells to retain the fundamental characteristics of the donor hair. Position and density, meanwhile, could be controlled by adjusting where and how many germs are placed.

All of this, OrganTech is careful to note, comes from animal work. Hair direction and angle, functional integration with surrounding tissue, shaft diameter, pigmentation and curl pattern — and how much each owes to the donor cells rather than the recipient scalp — remain to be evaluated in humans.

From the laboratory to the clinic: what still has to be built

Before any human study, OrganTech states that a reproducible manufacturing process must exist — one that can culture and expand the cells while holding safety and quality steady. Specifically, it must be possible to confirm:

- the identity and purity of the cultured and expanded cells;
- that they retain their hair follicle-regenerative capacity;
- that no undesirable genetic or cellular changes have arisen during culture;
- that the risk of unintended tissue formation has been addressed;
- that each finished germ has consistent quality and the required functional properties.

There is also a problem of scale that is easy to overlook. A bioengineered hair follicle germ is roughly **0.4 mm across**, and several cell populations have to be compartmentalised inside it at high density.

"At present, this process is performed manually. An important technical challenge is therefore to automate the process so that large numbers of bioengineered hair follicle germs can be manufactured consistently, while also establishing efficient methods for culturing them in vitro."

OrganTech, Inc., written response, 8 September 2026

OrganTech declined to disclose its specific manufacturing conditions and quality-control criteria, as these relate directly to its ongoing development programme.

Which kinds of hair loss might be addressed

Different forms of hair loss have fundamentally different causes, and OrganTech does not expect one regenerative treatment to fit them all.

CONDITION	ORGANTECH'S POSITION
Androgenetic alopecia male pattern hair loss	Mechanisms relatively well understood. Because occipital follicles resist it and would be the cell source, AGA is described as "one of the scientifically plausible indications" for organ regeneration therapy. Which patients would be appropriate for first clinical evaluation still has to be determined.
Female pattern hair loss	Causes remain incompletely understood. It is the focus of hope for the <i>cell transplantation</i> approach, because resting-phase mechanisms are thought to matter — but that approach requires follicles still to be present.
Alopecia areata Cicatricial (scarring) alopecias	Different disease mechanisms. OrganTech states plainly that it would be "premature to suggest that our therapeutic approaches will necessarily be applicable to these conditions."

How to judge real progress

Asked which publicly verifiable milestones would show genuine movement toward clinical use, OrganTech preferred milestones over projected dates: progress is better measured by asking whether specific scientific and technical problems have actually been solved.

MILESTONE	STATUS
Development of the organ germ method	Achieved
Functional regeneration of hair follicle organs in animal models	Achieved
In vitro expansion of the stem cells required for regeneration	Achieved
Discovery of the third cell population	Achieved
Fully regenerated follicles in vitro using three cell populations	Achieved
Candidate corresponding cell population confirmed in human follicles	Achieved
Culture and expansion technology using human-derived cells	Remaining
Stable, standardised, scalable manufacturing	Remaining
Safety and quality-control systems	Remaining
Clinically feasible transplantation or cell administration methods	Remaining
Ethical and regulatory procedures completed	Remaining
Human clinical studies conducted	Remaining
Findings scientifically evaluated and published	Remaining

HAIR OF ISTANBUL COMMENTARY — NOT PART OF ORGANTECH'S WRITTEN RESPONSES

How to read a headline. If a news item or a clinic does not tell you which of the remaining milestones has been passed, it has not told you anything new. The first genuinely new thing to watch for is confirmation of regenerative function using *human-derived* cells.

Language: what is accurate, and what is not

OrganTech was direct about terminology, and this matters, because the loosest words travel furthest.

TERM	ORGANTECH'S ASSESSMENT
"Hair follicle regeneration" or, broadly, "hair regeneration"	Considered the most appropriate general terms for the technology.
"Cell transplantation therapy using the third cell population"	Accurate name for the first approach.
"Hair follicle organ regeneration therapy" using bioengineered germs or regenerated follicles	Accurate name for the second approach.
"Hair cloning"	Intuitive to the public, but the technology "does not simply involve making copies of existing hairs."
"Stem-cell hair transplant"	"Does not necessarily describe the actual therapeutic process accurately."
Any wording implying availability	To be avoided: it must not be suggested that technologies still in research and development are established or clinically available treatments.

What this means if you are losing hair today

Asked for the single most important message for someone experiencing hair loss, OrganTech opened with a sentence worth quoting in full — and then immediately qualified it.

"Hair regeneration is no longer simply a scientific aspiration."

OrganTech, Inc., written response, 8 September 2026

After roughly two decades of work, OrganTech describes a foundation that now exists: the organ germ method, functional regeneration in animals, expansion of the necessary stem cells, the discovery of the third cell population, and fully regenerated follicles grown in the laboratory. Its stated objective is not to relocate a limited number of existing follicles, as conventional transplantation does, but ultimately to use a patient's own cells to increase the number of follicles and regenerate them where they are needed.

"However, much of the evidence established to date has been obtained through animal studies, and these approaches have not yet been put into practical clinical use in humans... translating that potential into actual medical treatment requires rigorous confirmation of safety, quality, and reproducibility, together with careful and scientifically sound clinical development."

OrganTech, Inc., written response, 8 September 2026

Both halves of that are the message. The science has moved, genuinely and substantially. It has not yet become a treatment, and nobody can offer it as one.

Practically, for a patient today: decisions about hair loss still have to be made using the options that actually exist — medical treatment of ongoing loss, and hair transplantation, which redistributes the follicles you have. Because organ regeneration therapy would draw on cells from the occipital donor area, the donor area retains its importance in either future. A plan that exhausts it today does not become less costly because regenerative medicine may arrive later.

Limitations of this document

- This is a patient information document, not a scientific review. It has not been peer reviewed.
- The scientific content is drawn from a single source: OrganTech's written responses of 8 September 2026. We have not independently verified the underlying research, and we have not sought comment from other groups working in the field.
- OrganTech answered our questions at the level of detail it considered appropriate, and expressly declined to disclose specific manufacturing conditions and quality-control criteria.
- The position described here is current as of September 2026 and will date. Progress should be checked against the milestone table rather than against this document's publication date.
- Where we have simplified technical language for a general reader, nuance has necessarily been lost. OrganTech's original wording governs.

Disclosure

- Hair of Istanbul has **no commercial, clinical, licensing or research relationship** with OrganTech, Inc.
- Hair of Istanbul has **no access to OrganTech's technology** and does not offer, and cannot offer, any treatment based on it.
- No payment was made or received by either party in connection with this document.
- OrganTech, Inc. provided written answers to questions submitted by Hair of Istanbul, for patient education purposes, and reviewed this document for scientific and attribution accuracy prior to publication. Editorial responsibility for the non-quoted text rests with Hair of Istanbul.
- OrganTech has previously issued a public notice concerning misleading claims by a clinic suggesting that it offered treatment using OrganTech's technology. Hair of Istanbul makes no such claim, and nothing in this document should be read as implying any association beyond the scientific correspondence described above.

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