Challenge to God: Where is humanity heading?

Skin cells are rejuvenated with medicine. Are the eyes a disease?

Immortality approaches

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“Rejuvenation” is a big challenge. Provided by Turn Bio technologies (U.S.)

When a drug is injected into irritated skin, the firmness returns to what it was when you were younger, and wrinkles disappear.

This is not cosmetic surgery that only improves appearance. Rewinding the “clock hands” of cells and improving the skin itself
It rejuvenates the body at the cellular level.

This science-fiction-like technology is developed by the American venture company Turn Biotechnologies.
Ru. The secret lies in the iPS cells discovered by Shinya Yamanaka, who won the Nobel Prize in Physiology or Medicine.
cormorant. How does it work?

iPS cells are made by adding a gene called ``Yamanaka factor'' to somatic cells such as blood or skin, and converting them into fertilized eggs before differentiation.
It is created by "initializing" it to return it to a state like .

Initialization can be stopped midway through by adjusting the working time of the Yamanaka factor to be shorter. In other words, thin
It becomes possible to appropriately rejuvenate the cells.

Tarn is applying this technology. The key is a known coronavirus vaccine.
Messenger (m)RNA.

Originally, mRNA functions as a ``messenger.'' Yamanaka factor is put on mRNA and fat is added.
They have established a technology that envelops it in a high-quality membrane and delivers it to the target cells.

Tern conducted experiments on mice that had been transplanted with human skin. When the developed drug is injected, it actually causes damage to the skin.
The texture, wrinkles, and water retention were improved, resulting in healthier skin. Clinical trials in humans will begin next year.
I plan on starting the exam.

The target is not just the skin. Arthritis treatment by rejuvenating cartilage tissue, blood cancer treatment by rejuvenating immunity
We are also developing drugs that are effective for treating glaucoma and rejuvenate the cornea.

Mice with human skin transplanted to confirm the safety and effectiveness of cell rejuvenation technology (provided by U.S. Turn Biotechnologies)

Co-founder Vittorio Ce, who developed the method
Basciano, associate professor at Stanford University, and
Anja Kramer, CEO
In an interview, he said, ``I have been using various cells for 10 years,
This method was suggested to be safe. Yamanaka
How can we adjust the working time of the factor to shorten it and make it more effective for cells?
The key is whether you can actually rejuvenate yourself.''
did.

The world is watching Tern's technology, and from 2022
Japan's Astellas Pharma will also invest. The two of them are “cells.”
If you use rejuvenation technology, you can no longer work due to aging.
You will no longer become weak or weak. potential
It is also possible to extend your lifespan. due to aging
It is possible to meet the treatment needs of a wide range of diseases that occur.
I can do it,” he said with confidence.

Yamanaka factor also extends lifespan

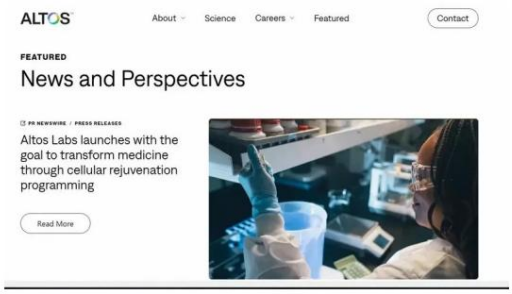
Cell reprogramming has many possibilities.

In 2016, a paper published by a team led by Professor Izpisua Belmonte of the Salk Institute for Biological Studies in the United States was published worldwide.
surprised me.

The team first prepared mice that had been genetically engineered to grow faster than normal. And 2 days a week
They were divided into a group that only used Yamanaka factor and a group that did nothing. Then, the group that worked

They lived up to 30% longer.

Belmonte joined Altos Lab, a US venture company founded in 2022 that aims to develop rejuvenation technology. Amazon.com founder Jeff Bezos and others invested approximately 450 billion yen. It was noted that it was the highest amount in biotech history.



American Altos Lab homepage

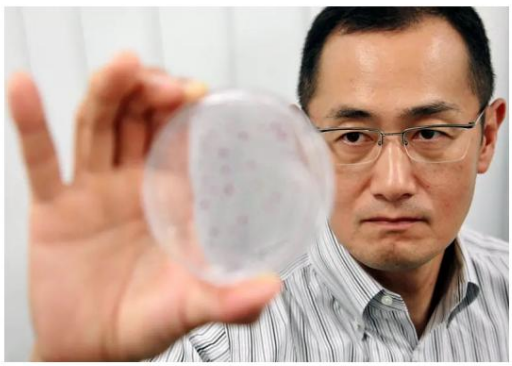
Plastic surgeon Masakazu Kurita has been working at Tokyo University Hospital for 23 years. He is a Japanese researcher who moved to Altos in the summer.

Mr. Kurita has used the Yamanaka factor and other factors to We are conducting research to regenerate new organs and tissues in mice. I've been working on it.

Cells are initialized to a fetal state and then differentiated. necrosis (e.g., Regenerates damaged skin and hair that can no longer grow. In 2023, a mouse hand was regenerated down to the bone marrow and used as a finger. I succeeded to the point where I was able to separate them.

Mr. Kurita, who agreed to an interview on the condition that he not reveal the details of his research at Altos, said, ``Most importantly, I want to change the world. "This is my goal for the remaining 20 years of my career as a researcher," he says enthusiastically.

However, the Yamanaka factor is also fraught with danger.



Professor Shinya Yamanaka looking at iPS cells in a petri dish = Photographed by Kentaro Ikushima on September 2, 2011 in Sakyo Ward, Kyoto City.

Yasuhiro Yamada, a professor at the University of Tokyo (molecular pathology) who developed a mouse that allows Yamanaka factor to work in vivo, said that Yasuhiro Yamada, a professor at the University of Tokyo (molecular pathology), injected Yamanaka factor into mice for one week. An American medical journal states that cells can become cancerous if used continuously. Announced to Cell.

Mr. Yamada said, ``Reprogramming is the two sides of the same coin between rejuvenation and canceration. There is an aspect to it. Part of Belmonte's research was reproduced However, in detail how in the mouse We don't understand the mechanism behind this." do.

On top of that, he said, ``Initialization has become popular, and many papers have been published, but there are not many papers that have confirmed reproducibility. There are concerns that there may be do.

Taro Toyoda, a lecturer (regenerative medicine) at the Kyoto University iPS Cell Research Institute, also said, ``For example, the definition of carbonization has been established for each organ. I haven't. Unless we investigate the mechanism of carbonization in detail, it will not be clear which state should be returned to during initialization. I won't."

New concept: “Heart can be treated”

First of all, why do living things grow? There is a mouse that provides one answer.

A room at the Keio University Research Center for Comprehensive Medical Sciences (Tokyo). Specially appointed lecturer Genji Hayano has 1-year-old twin mice.
I picked up the breeding case it came in. In human terms, he would be in his 30s.

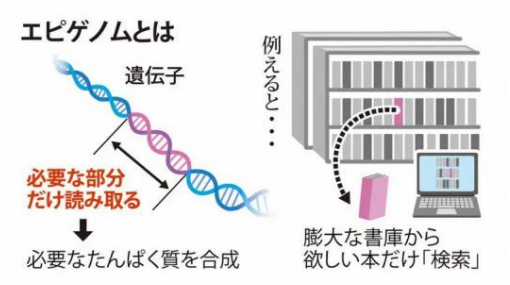
A mouse that matured faster than a normal mouse (left). The white color stands out in Shinjuku, Tokyo on February 15, 2024. Photo by Kentaro Ikushima

One has a beautiful, black color and is active. Toko
The other one has noticeable white hair and moves slowly, as if
It looks like a human. According to Hayano, the human age is nearly 80 years old.
It is said to be equivalent to

Actually, this white mouse has a special mechanism.
There is. Artificially disrupting a function called the “epigenome” in the body
That's what I'm doing.

What is the epigenome?

Living things read information from their genes (genomes), which are their blueprints, and make proteins based on that information.
and maintain the body and functions. However, the amount of information contained in genes is enormous. Read the whole thing
If you do, it would be extremely inefficient.



What is the epigenome?

For this reason, it takes a long time for the genes to make the necessary proteins.
Genes themselves have the ability to ``search'' to find out what to read.
This is the epigenome. For example, you can search for only the book
you want from the stacks of a huge library.
It's like giving out.

The epigenome is also involved in repairing damaged genes.
I'm awake. If this stops working, the wrong protein
Proteins are not produced or necessary proteins are not produced.
I end up becoming something like that.

This, he says, is one of the essences of "big."

David Sinclair, a professor of genetics at Harvard University, believes that size is not inevitable for life.
He introduced the concept that it was a disease. In other words, if we can control the epigenome, we can "cure" the disease.
It is said that

"One of the mouse twins had its epigenome forcibly disrupted for three weeks while it was young. Then, the epigenome was undisturbed.
Even if you stop, your senescence will accelerate. In other words, disturbances in the epigenome are remembered," Hayano says.

Genji Hayano, a specially appointed lecturer at Keio University, observes twin mice in the laboratory on February 15, 2024 in Shinjuku, Tokyo. Photo by Kentaro Ikushima.

According to Hayano, it affects the human epigenome.

In addition to aging, this is caused by ultraviolet rays, radiation, smoking, and excessive drinking.

The reasons include lack of food and lack of exercise. By these, genetic

As destruction progresses, the epigenome is disrupted, making it difficult to search.

It stops spinning.

Research into treating this condition using various methods is progressing

rapidly. Maintaining epigenome function even in old age

If a method is established, it is possible to extend the lifespan of humans.

This is because it is thought that it will become Noh.

Sinclair writes in his book that even on a very conservative estimate, the average human lifespan is 113 years.

claims.

Investment in immortality is heating up

The ``immortality'' that humankind has always dreamed of is getting closer to reality. Let's establish this technology and send it to the world.

Many venture companies have appeared in the United States. Investment is heating up.

For example, Retro Biosciences, which aims to extend the healthy life expectancy of humans by 10 years, received a $180 million

(approx.

27 billion yen).

Tomohiro Anzai, representative of Fast Track Initiative, which operates a venture capital fund

The partner said, ``While the investment market is deteriorating in the United States, we at Chika Research are investing in the order of $100 million per company.

Occurs sporadically. "In the West Coast of the United States, industrialization is attracting attention as the next investment

destination after IT." In particular, Altos has amassed a huge amount of funds and many top researchers, which is something that traditional academia c

It is said that a research system that was previously unavailable has been established.

Regarding the true intentions of investors, one human biochemistry researcher said, ``I don't think they have a sense that they are benefiting the

elderly of today.In the future, there will be an increase in the number of wealthy and energetic elderly people who can enjoy anticoagulant technology. As a result, new busine

I guess they are anticipating that a new model will be born."

Can “heaviness” really be overcome? Also, should it be done?

Suichi Yamagoku, a primatologist and director of the Institute for Global Environmental Studies, said, ``The alternation of generations, which is the principle of the biological world, has been broken.''

Mau. It is no longer possible to make investments without expecting a return on the next generation based on the premise that one will die, and this is called altruism.

We risk losing our sense of ethics. We need to create ethics in applying technology, and to do so we need to understand what it means to be human.

We need a philosophy that says, ``Is this true?'''' he warns.