THE PROCESS OF REGENERATION IN REPTILES AND PROSPECTS FOR APPLYING IT TO THE HUMAN BODY.

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ABSTRACT

In this article, the regeneration process observed in reptiles, its biological and molecular foundations, as well as the prospects of applying these mechanisms to the human body, are analyzed from a scientific perspective. The ability of reptiles to fully regenerate their tails and other body parts is explained by factors such as the formation of a blastema, cell differentiation, balanced activity of growth factors, and the controlled progression of inflammatory processes. Although the regenerative capacity in humans is limited due to evolutionary and genetic differences, modern gene therapy technologies offer opportunities to develop new medical approaches. The main goal is to enable scar-free tissue repair, organ regrowth, and effective wound treatment in humans in the future.

In nature, some animals possess an extremely well-developed ability to regenerate their organs. For example, reptiles—particularly lizards—are capable of regrowing their tails after losing them. In humans, however, regeneration is limited to certain tissues. For this reason, scientists have been studying the mechanisms of regeneration in animals for many years, seeking ways to apply them in humans.

The regeneration process in reptiles. When lizards lose their tail, a new mass of cells called a *blastema* forms. This process occurs alongside the regeneration of nerves and blood vessels. The genes that regulate this process include **Wnt, Fgf, and BMP**. Here, the **differentiation** of tissues occurs — cells transform into muscle, bone, nerve, and skin cells. The site where the tail is detached quickly becomes covered with a layer of cells, and a new structure resembling the original tail begins to form.

Human regenerative capacity.

The human body has the ability to regenerate certain parts. The skin continuously renews itself. The liver can regenerate even after a large portion is removed. Bones return to their normal state after a fracture, and blood cells are regularly renewed. However, complex

organs such as limbs and the nervous system do not possess significant regenerative abilities. For this reason, scientists are studying the genetic mechanisms found in reptiles and searching for ways to activate similar processes in human cells.

During the embryonic stage of human development, nerve and muscle cells form and multiply, but after the transition to the post-embryonic stage, they no longer regenerate. Only certain nerve cells can regenerate, and even then, to a limited extent.

Some carnivorous lizards share similarities with mammals—for example, in their skeletal structure, musculature, digestive, respiratory, excretory, and circulatory systems. Mammalian skin also has scale-like structures similar to reptiles (in humans, a comparable condition is observed in ichthyosis).

Current scientific research directions in this field fall into three major categories. However, such studies carry significant risks and ethical responsibilities when applied to humans. Therefore, experiments are usually conducted on organisms that are genetically and structurally closer to humans.

For example, humans have **46 chromosomes (23 pairs):** 44XY and 44XX. Chimpanzees have 48 chromosomes but share **98–99% genetic similarity** with humans; gorillas also have 48 chromosomes with about **98% similarity.** Nevertheless, most laboratory experiments are conducted on **white mice.**

Regeneration observed in reptiles—especially in lizards and certain amphibians—is considered a remarkable natural phenomenon. In-depth study of regenerative mechanisms in reptiles is inspiring new ideas for future technologies aimed at restoring human tissues and organs. The goal is not to turn humans into “mutants,” but to help them achieve complete health and full physiological function.

References:

1.Foundations of Cytology and Genetics, 9th Grade — A. Zirkayev, A. To‘xtayev, I. Azimov, N. Sonin
2.Zoology, 7th Grade — O. Mavlonov
3.General Biology — A. Qodirov, O. Xoliqov
4.Animal Anatomy and Physiology — R. Yaxshboev, A. Raximov
5.Foundations of Evolutionary Biology — B. Karimov