

Skin Regeneration Using Tissue Engineering: From Laboratory Research to Clinical Applications

Ani Kiria

e-mail: Ani.kiria114@ens.tsu.edu.ge

Department of Biology, Faculty of Exact and Natural Sciences

Ivane Javakhishvili Tbilisi State University

1, Ilia Chavchavadze Avenue, 0179 Tbilisi, Georgia

The skin is the largest and vital organ of the human body. Disruption of its integrity can cause the formation of acute or chronic wounds. In case of minor skin injuries, the epidermis has the ability to self-regenerate. However, in case of severe injuries such as deep wounds and burns, surgical interventions are required and in some cases, amputation is necessary. Surgical interventions have several disadvantages and often are ineffective. A significant problem is the lack of donor tissues, as well as the risks of immune responses and infections. Also, the treatment process is often long and not personalized. Overcoming these abovementioned problems is a challenging task for doctors and researchers.

Scientists are actively working to develop new approaches for clinical applications. A promising alternative to traditional methods of treating severe wounds and burns is the use of tissue-engineered skin substitutes. In recent decades, skin substitutes have been developed and marketed, performing barrier functions, reducing pain, and stimulating tissue regeneration to promote wound healing. However, it has not yet been possible to create an ideal substitute. Therefore, further clinical research is needed to use skin substitutes for personalized treatment of chronic wounds.

In addition to clinical use, tissue-engineered skin substitutes have the potential to replace animal models in scientific research. This is important for studying the effects of various chemical substances, their action mechanisms, and the development of pathologies.

This work discusses the possibilities of using tissue-engineered skin substitutes, as well as their role and significance in clinical practice, both in the treatment of chronic wounds and in replacing animal models.