Keratinocytes are the predominant cell type in the epidermis, which is the outermost layer of the skin. These cells play a crucial role in maintaining the structural integrity and protective function of the skin. Here are key features and functions of keratinocytes:

1. Location: Keratinocytes are primarily found in the epidermis, the outer layer of the skin. The epidermis consists of several layers, and keratinocytes undergo a process called keratinization as they move from the basal layer to the surface.

2. Function:

Barrier Formation: Keratinocytes are vital for forming the skin barrier, which protects the body from external environmental factors, pathogens, and dehydration. Waterproofing: As keratinocytes mature, they produce a tough, fibrous protein called keratin, which contributes to the waterproofing of the skin. 3. Keratinization Process:

Keratinocytes originate in the basal layer of the epidermis and undergo a process called keratinization as they move toward the skin's surface. During keratinization, keratinocytes undergo structural and chemical changes, ultimately leading to their transformation into tough, flattened, and dead cells that form the outermost layer of the skin. 4. Cell Turnover:

Keratinocytes have a relatively short lifespan, typically around 2 to 4 weeks. They continuously divide and replace older cells as part of the skin's natural renewal process. The constant turnover of keratinocytes helps maintain the integrity and functionality of the skin barrier. 5. Role in Immune Response:

Keratinocytes contribute to the skin's immune defense by producing various cytokines and antimicrobial peptides. They play a role in the initiation of immune responses against pathogens that breach the skin barrier. 6. Response to Injuries:

In response to injuries or wounds, keratinocytes at the wound site undergo migration and proliferation to facilitate wound healing. The regeneration of keratinocytes is crucial for the restoration of the skin barrier after injury. 7. Sensory Functions:

Keratinocytes express certain sensory receptors that can respond to mechanical, thermal, and chemical stimuli. They contribute to the skin's ability to sense and respond to the environment. 8. Associated Skin Conditions:

Disorders affecting keratinocytes can lead to various skin conditions, including dermatitis, psoriasis, and certain types of skin cancer. Understanding the functions and characteristics of keratinocytes is essential for comprehending the biology of the skin and the mechanisms involved in maintaining skin health and responding to various challenges.

Skin wounds significantly impact the global health care system and represent a significant burden on the economy and society due to their complicated dynamic healing processes, wherein a series of immune events are required to coordinate normal and sequential healing phases, involving multiple immunoregulatory cells such as neutrophils, macrophages, keratinocytes, and fibroblasts, since dysfunction of these cells may impede skin wound healing presenting persisting inflammation, impaired vascularization, and excessive collagen deposition. Therefore, cellular target-based immunomodulation is promising to promote wound healing as cells are the smallest unit of life in immune response. Recently, immunomodulatory hydrogels have become an attractive avenue to

promote skin wound healing. However, a detailed and comprehensive review of cellular targets and related hydrogel design strategies remains lacking.

He et al. reviewed, the roles of the main immunoregulatory cells participating in skin wound healing are first discussed, and then we highlight the cellular targets and state-of-the-art design strategies for immunomodulatory hydrogels based on immunoregulatory cells that cover defect, infected, diabetic, burn and tumor wounds and related scar healing. Finally, they discuss the barriers that need to be addressed and future prospects to boost the development and prosperity of immunomodulatory hydrogels [1)]

1)
He Y, Cen Y, Tian M. Immunomodulatory hydrogels for skin wound healing: cellular targets and design strategy. J Mater Chem B. 2024 Jan 29. doi: 10.1039/d3tb02626d. Epub ahead of print. PMID: 38284157.