

Human skin yields stem cell-like cells

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Researchers from the UCLA School of Dentistry investigating how stem cells can be used to regenerate dental tissue have discovered a way to produce cells with stem cell-like characteristics from the most common type of human skin cell in the epidermis.

These skin cells, called keratinocytes, form the outermost layer of skin and can be cultured from discarded skin tissues or biopsy specimens.

The findings, published in the Nov. 4 edition of the peer-reviewed [Journal of Biological Chemistry](#), may be beneficial for individuals with limited sources of endogenous stem cells.

The gene known as $\Delta Np63\alpha$ is highly synthesized in regenerating cells of various tissues. The UCLA researchers found that introducing $\Delta Np63\alpha$ into skin keratinocytes makes them lose their skin-cell characteristics and de-differentiate to resemble mesenchymal stem cells (MSCs), undifferentiated cells that can self-renew and differentiate to yield specialized cells of various [tissue](#) types.

MSCs may serve as an internal repair system by replenishing cells needed for tissue regeneration and homeostasis and are currently being investigated for a number of regenerative therapeutics.

The conversion of keratinocytes into mesenchymal-like cells involves a process known as epithelial-mesenchymal transition. This is the first study to show that the gene $\Delta Np63\alpha$ triggers this process in [human skin](#) keratinocytes and that the transformed cells acquire multipotent stem

cell characteristics.

Since the [skin cells](#) transformed by $\Delta Np63\alpha$ are induced to acquire the mesenchymal and stem cell characteristics, the research team named them "induced mesenchymal stem cells," or iMSCs. Specifically, the researchers demonstrated that iMSCs can be triggered to form bone-like tissues or become fat tissues in a laboratory setting.

Dr. Mo K. Kang, the Jack A. Weichman Chair of Endodontics at the UCLA School of Dentistry and a member of the research team, said the finding had great significance for human health.

"Since iMSCs may be obtained by taking a small punch-biopsy of skin tissues from patients, these cells are an easily accessible, patient-specific source of stem cells, which can be used for regenerative purposes," Kang said.

Stem cell-based therapies are currently being developed to treat degenerative conditions such as heart disease, diabetes, neuronal disorders and liver diseases. Many of these diseases are strongly associated with aging. Endogenous MSCs found in various tissues, such as bone marrow, fat tissues and, in certain cases, dental tissues such as dental pulp, lose their regenerative potential during the aging process.

"It is possible that iMSCs retain their stem-cell characteristics even when derived from aged patients," Kang said. "In such cases, this new approach may be useful, especially for geriatric patients or individuals with limited therapeutic value of their endogenous stem cells."

"The UCLA School of Dentistry is very proud to be at the forefront of this research inquiry, which may facilitate future advances in regenerative dentistry and medicine," said Dr. No-Hee Park, dean of the UCLA School of Dentistry and one of the study's co-authors. "While the

focus of this study was on the use of adult [stem cells](#) to regenerate dental tissue, including dental pulp and periodontal ligament, these findings could lead to further development of a variety of cell-based therapies."

Provided by University of California

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