serves as a portable and realistic training tool. Additional evaluation with a greater sample size of medical students is needed to further compare the device’s ability to enhance the medical school suturing curriculum.

**Effect of Keratinocytes on Myofibroblasts in Hypertrophic Scars**

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**PURPOSE:** Scars instigate cosmetic problems and, importantly, lead to various complications including pain, itchiness, and motor impairment, caused by mismatch at the interface of the scar and normal tissues, and recurrence of the wound. Abnormal scarring, such as that in fibrosis, and keloid and hypertrophic scars, is a pathologic process, distinctive from the normal physiologic process of wound healing. During wound healing, myofibroblasts play a central role in matrix formation and wound contraction and, at the end of the healing, undergo apoptosis. Hypertrophic scarring is a pathologic condition in which myofibroblasts persist in the tissue. It has been hypothesized that abnormalities in epidermal-dermal crosstalk cause this pathology. Therefore, in this study, we investigated whether myofibroblasts are affected by keratinocytes.

**METHODS:** The present study was a prospective, single-center study. In this study, transforming growth factor-β1 treatment was used to establish experimental myofibroblast model, termed Imyo, from the patient-derived dermal fibroblasts. The Hmyo (hypertrophic myofibroblasts) cells are the myofibroblasts isolated from the existing hypertrophic scars from patients. Although both the Imyo and the Hmyo should represent characteristics of myofibroblasts, their physiologic state would be different. Transforming growth factor-β–induced myofibroblasts (Imyo) and myofibroblasts from hypertrophic scar tissue (Hmyo) were characterized by microarray. The analysis of microarray data using the fold change criteria revealed >600 upregulated genes in Imyo and Hmyo compared to control group among the 5,761 genes, from which 83 genes of significant increase were selected for further analysis. The changes in the genes expressed in Imyo, Hmyo, and normal fibroblast upon coculture with keratinocytes were quantitatively analyzed by quantitative polymerase chain reaction.

**RESULTS:** Based on the microarray data, among the selected pool of 83 genes with upregulated genes, 21 genes showed similar expression levels, which may indicate the genes of the stage-independent myofibroblasts. On the other hand, 62 genes whose expression levels with >2-fold difference between the Imyo and Hmyo may reflect the stage-specific difference in myofibroblasts. We found that many extracellular matrix- and smooth muscle cell–associated genes were upregulated in Imyo and Hmyo, respectively, suggesting that Hmyo are fully differentiated myofibroblasts and Imyo are less differentiated compared to Hmyo. Decreased collagen type 1 gene expression was shown in keratinocytes cocultured Imyo and Hmyo and a smooth muscle actin expression in Imyo increased in the presence of keratinocytes.

**CONCLUSION:** These observations strongly suggest that keratinocytes play a role in the development of pathologic fibrosis in hypertrophic scar by influencing the behavior of dermal fibroblasts and myofibroblasts. We speculate that keratinocytes inhibit abnormal scarring in the early stages of scarring, when fibroblasts differentiate into protomyofibroblasts, by reducing the expression of COL1A1 and α-SMA, and contribute to improving scars in the hypertrophic stage, when fibroblasts have already been differentiated, by reducing α-SMA expression. We believe that this study provides the basis for understanding the pathophysiology of hypertrophic scarring and uncover new therapeutic approaches for this dysfunction.

**A Tissue Expander-like Scaffold With Photothermal Tumor Ablation Property for Breast Tissue Engineering**

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**BACKGROUND:** Tissue engineering–based breast reconstruction after mastectomy is a promising alternative to traditional treatments. Nevertheless, it could so far neither prevent the potential breast cancer recurrence nor solve the problem of covered skin shortage.

**PURPOSE:** Here we reported the construction of a novel breast tissue engineering scaffold. Benefiting from the photothermal effect of graphene, it can ablate breast cancer cells and recover its shape in a tissue expander-like manner.