Stem-cell and gene therapies are often considered to be the future of medicine, but there are many barriers to putting these approaches into practice. Indeed, there are only few examples of truly useful human stem-cell therapies. Hirsch et al. (Nature, November 2017) describe a success in this area — stem cell-gene therapy to correct the cells of a child with a devastating genetic disease associated with skin blistering. The transgenic skin graft treatment prevented the normal early death, and produced a largely normal epidermis. This paper also points toward a central role for stem cells in epidermis regeneration and homeostasis.