Humans lose the regenerative potential for wound repair early in embryonic life and following that wounds heal by scarring. Recently, regenerative medicine and tissue engineering has emerged with the hope of achieving healing by regeneration rather than repair and scarring.

Tissue engineering applies the principles of biology and engineering to the development of functional substitutes for damaged tissue. There are three main pillars of tissue engineering; a scaffold, cells and biological inducers that facilitate cellular migration and growth. Scaffolds are templates that are made of collagen or synthetic polymers and act as a framework for cellular growth. Most of the available skin substitutes are formed only of an acellular template that acts as a scaffold.

The majority of skin regenerative scaffolds are currently collagen based, however, there has been an emergence of new materials; natural and synthetic polymers. The techniques of producing scaffolds from these new materials has become very sophisticated, especially with the use of nanostructured materials. As the cost of current skin substitutes is prohibiting their wide clinical use, future generations of cheaper affordable skin substitutes is essential for the global benefit for our patients.

When skin substitutes were first introduced, FDA approval was only for life threatening acute burns. Since then the indications have widened to include post burns reconstructions, resurfacing following skin cancer excision, trauma chronic wounds and congenital giant naevi. They have their advantages: making reconstruction simpler especially for elderly patients, or where complex wound cover is needed as exposed bone, tendons or joints. Apart from the cost, other disadvantages includes, the complex after care and the lack of antimicrobial properties.

Currently available Skin substitutes are either acellular as alloderm, Intergra, Matriderm and Pelnac or cellular as Apligraft or Orcel. Cellular skin substitutes are extremely expensive (≈ € 100/cm²) while acellular skin substitutes costs ≈ € 35/cm².

Cheaper polymers that are characterized to be timely resorbed and replaced by native collagen are currently being developed. PCL, hydrogel and polyurethrane are among materials being investigated. Support for early phase clinical trial is paramount for evaluating these new innovations in burn care.