Synthetic Skin

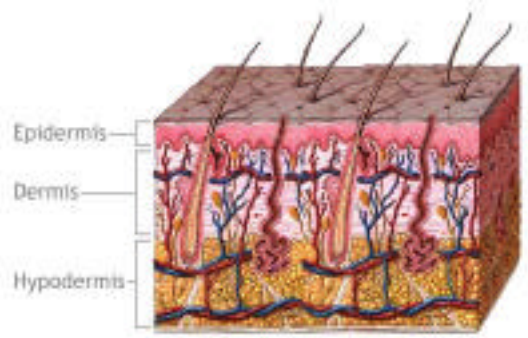
The human skin is responsible for several vital biological functions. The simplest of these is to keep the outside (and it's deadly pathogens) out and the insides in. This function can, in the short term, be easily duplicated by the transplant of cadaver skin or the use of wrappings as has been done for centuries. However these solutions are highly temporary.

Modern advances in synthetic skin have aimed to duplicate its functions over the long term. None have directly succeeded. Reactions we take for granted have proved impossible to reproduce with mechanical means. Worse, the immune response to such efforts is exceedingly aggressive. Instead, biotechnologists have turned to a different solution.

The best possible substitute for a lost organ would be the original organ itself. While this is a totally useless insight when dealing with most internal organs, the skin has some exceptional properties that make such a replacement actually possible.

The skin is extremely large – larger than the body it covers. Because of this, it is possible to transplant skin from one are of the body to another. This unfortunately leaves scarring and is occasionally not possible at all in extreme burn cases.

Another property of the skin distinguishes it from all other vital organs. The skin is exposed to constant wear and damage throughout the life of the body. The simple upper layer, the epidermis, is capable of phenomenal rates of regeneration to deal with this. As long as the underlying dermis lives, it will be replaced in a very short time. However, if the dermis also is killed, the result is a scar: a section where only a rough, overbuilt epidermis is regenerated.



Human Dermis cells, left to themselves, will normally regenerate at a slow or non-existent rate. However, the human body routinely replaces aging cells in healthy areas of skin. The varieties of synthetic skin developed in the early '80s and late nineties have taken advantage of this fact to trick the human body into repairing itself.

The immune response of the skin is so strong that no transplant has ever been successful. However some man-made materials are able to avoid triggering this response. One such is the silicon/collagen mix that makes up the Integra patch. While the silicon acts as a temporary replacement for the epidermis, the body treats the collagen mesh it is attached to as a part of itself. Blood vessels migrate into the empty space as if it were merely a damaged section of intact skin. They are soon followed by the entire list of cells that make up a healthy patch of skin.

Other new patches are even more ambitious. The Apligraf and Dermagraf patches contain human cells. While they carry some risk of rejection, they work on chronic problems such as ulcers in a way Integra does not.

All of these "synthetic skins" are designed to ultimately decay, leaving behind a healthy layer of the patients own skin. This temporary nature is their most valuable feature, making them the only artifical organ that ultimately is just as good as the real thing