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PRODUCTS

The Healing Properties of Aloe Vera

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Aloe vera contains Glucomannan, a special complex polysaccharide composed largely of the sugar mannose. It interacts with special cell-surface receptors on those cells which repair damaged tissues, called fibroblasts, stimulating them, activating their faster growth and replication. Plant hormones in Aloe, called gibberellins, also accelerate healing by stimulating cell replication. These combined actions make Aloe a uniquely potent healing Herb.

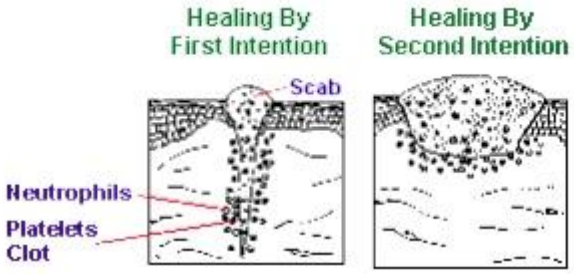

Figure 1: The illustrations show the immediate effects of a trauma which penetrates the skin. Where there is a sharp cut producing a narrow incision, this is called “healing by first intention” (left). Where the injury has much more width, the healing which follows is called “healing by second intention” (right). The penetrated epidermis is shown (top layer), the trauma to the substratum of tissues beneath and the migration of white cells, especially neutrophils, to the site.

Processes Which Heal Damaged Tissues

Wounding does not just cause trauma to one cell type. Whichever part of the body is wounded, the skin is broken and it is also likely that sub-dermal connective tissues are damaged. Such damage make it inevitable that blood vessels will have been cut through, spilling some blood within the wound, which then clots. Therefore, even if the wound is quite superficial, so long as the skin itself is penetrated, at least three tissue types are involved. Obviously, much deeper wounds are likely to involve muscle tissue. I do not address here the question of very serious injury involving bone, nerves and internal organs.

Within a few hours of wounding, a single layer of epidermal cells starts to migrate from the skin edges to form a delicate covering over the raw area beneath. The chief feature of this process, at least at first, is the movement of already existing epidermal cells over the wound surface, though it is very likely backed up by some cell multiplication. Some 36 to 72 hours after wounding, the predominant

cell-type in the inflammation fluid is seen to be macrophages. Whilst these cells are well known as phagocytes there is good evidence that they do more than just phagocytose. The microphage infiltration is followed a day or two later by a proliferation of fibroblasts, cells which produce fibres of collagen and also produce other tissue proteins. By the sixth day thick fibres are present which show the staining reactions of collagen and these tend to be orientated parallel to the skin surface and across the axis of the wound, giving the repair some strength. At the same time, the fibroblasts are producing “proteoglycans” (macro-molecules which combine polysaccharide and protein elements), and these form the underlying matrix for the new
connective tissue which is being formed.

Both macrophage infiltration and fibroblast proliferation are accompanied by ingrowth into the wound of small capillary buds which are derived from intact small blood vessels of the dermis (i.e. the skin layer beneath the outer epidermis) near the wound edges. Initially these buds consist of solid ingrowths of endothelial cells, but they soon acquire a lumen. At first these new blood vessels are rudimentary in structure and, compared with normal vessels, they are very leaky. The newly vascularized, collagen-producing tissue is called “granulation tissue” because it appears granular on its surface due to the little knots of delicate bloods vessels which show there.

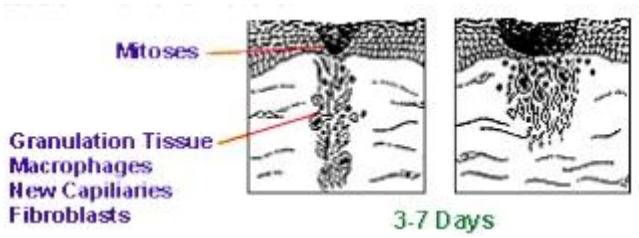

Figure 2: The illustrations show the same two lesions as in Figure 1 but after 3-7 days, showing the laying down of “granulation tissue” and new blood vessels.

Another process important in wound-healing is wound contraction. In the case of larger open wounds, after two or three days the wound area starts to contract. This is a real movement of the wound margins and is independent of the rate at which covering by new epithelium takes place. This does not seem to be related to the formation of collagen in the wound either and, indeed, appears to happen before very much collagen has been laid down. The effect is ascribed to a different type of cell having a mixture of the properties of fibroblasts and smooth muscle cells and consequently called “myofibroblasts.” These cells do, in fact, contain actin, the contractile protein of muscle and it appears to be this protein which shortens in order to produce contraction of the wound area.

Various controlling influences are at work in the process of healing, several of them involving chemical messengers that provide communication between cells and hence directing the onward flow of events. For example, in the case of the migration and multiplication of epithelial cells, the loss of cell-cell contact by the cells at the edge of the wound may well be a factor which starts their migration. On the other hand, there are thought to be substances which normally inhibit the migration of epithelial cells, called “chalones.” It may be the lack of these chalones which initiates the migration into the wound, or alternatively there may be yet other chemical messengers which give these cells a positive stimulus. Relatively little is known about this or about the causes of the migration of the blood vessels. However, there is a little more information about the fibroblasts. These do appear to be subject to stimulation by external chemical messengers. It is most likely that these cells are stimulated, or their functions modified by, cell messengers from the damaged tissues, possibly by glycoproteins of the type called “fibronectins.” If these particular substances do not actually stimulate multiplication, they certainly do affect other aspects of fibroblast function. They are very much concerned with the laying down of collagen fibres. In response to injury of tissue, fibroblasts are stimulated to migrate, to multiply and to accelerate their production of both collagen and proteoglycan matrix. The fact that these substances are of a glycoprotein nature may well be important in relation to the way in which Aloe influences these same cells.