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NORMAL WOUND HEALING

Partial-thickness wounds only involve the epidermis and superficial dermis and do not involve adnexal structures. Inflammation and granulation tissue formation are minimal, and reepithelialization, which occurs from the edges of the wound as well as from adnexal structures, results in complete and rapid healing with minimal or no scarring. Pigmentary changes may, however, still occur at the wound site. In contrast, full-thickness wounds require clot formation to halt bleeding from larger vessels in the deep dermis. Inflammation and granulation are important stages, and contraction is critical in facilitating reepithelialization by bringing the edges of the wound together. In deep wounds, reepithelialization occurs solely from the epithelial margins due to destruction of adnexal structures and, ultimately, scar tissue is formed to replace the tissue loss.

Wound healing involves three key, and often overlapping, phases: (i) inflammatory phase, (ii) proliferative phase, and (iii) remodeling phase. The inflammatory phase starts within the first 6 to 8 hours of wound formation and can last about 3 to 4 days. It begins with hematoma formation, and the first cells to the site of the wound are platelets. Clot formation arrests hemorrhage from ruptured vessels, provides a temporary barrier to exogenous pathogens, and creates a provisional matrix through which inflammatory cell migration occurs. Sequestered platelets degranulate and release several growth factors including transforming growth factor beta 1 (TGF- β 1), epidermal growth factor (EGF), insulin-like growth factor 1 (IGF-1), and platelet-derived growth factor (PDGF). These growth factors initiate signaling pathways leading to recruitment of inflammatory cells, extracellular matrix (ECM) formation, and neovascularization.

A diverse range of other molecules, such as by-products of fibrinolysis, serve as chemotactic signals and recruit neutrophils and monocytes to the wound site. These cells migrate from the circulation to the wound over the first 48 hours of wound formation by diapedesis through the endothelial lining of capillaries adjacent to the wound site. The chief role of neutrophils is phagocytosis and intracellular killing of microorganisms. They also express several proinflammatory cytokines that might serve as early signaling pathways to activate local