

NEW MODALITIES IN MANAGEMENT OF CHRONIC WOUNDS

Essay

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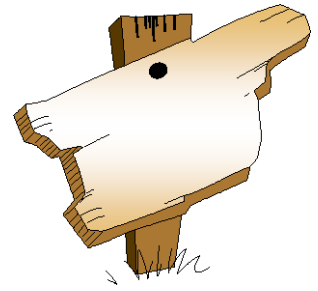
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Thank to Allah



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LIST OF ABBREVIATION

ACTH	:	Adrenocorticotrophin
CBC	:	Complete blood count
CK	:	creatine kinase
ECM	:	extracellular matrix
ESR	:	erythrocyte sedimentation rate
FANA	:	fluorescent antinuclear antibody test
FDA	:	Food and drug association
FGF	:	fibroblast growth factor
GF	:	growth factors
HBO	:	Hyperbaric oxygen
HIF	:	hypoxia inducible factor
IFN	:	Interferon
ILs	:	Interleukins
MMPs	:	Metalloproteinases
MRSA	:	methicillin-resistant <i>Staphylococcus aureus</i>
MSH	:	Melanocyte stimulating hormone
NPWT	:	Negative-pressure wound therapy
PAD	:	Peripheral arterial disease
PDGF	:	platelet derived growth factor
PPD	:	purified protein derivative
PSI	:	per square inch
ROS	:	Reactive Oxygen Species
RSTL	:	Relaxed skin tension lines
TcPO₂	:	transcutaneous oxygen tension
TGF	:	transforming growth factor
TIBC	:	total iron-binding capacity

TIMPs	:	tissue inhibitors of metalloproteinases
TNF	:	Tumor necrosis factor
U V	:	Ultra violet
VDRL	:	Venereal Disease Research Laboratory

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INTRODUCTION

The skin covers the entire external surface of the human body and is the principal site of interaction with the surrounding world. It serves as a protective barrier that prevents internal tissues from exposure to trauma, ultraviolet (UV) radiation, temperature extremes, toxins, and bacteria. Other important functions include sensory perception, immunologic surveillance, thermoregulation, and control of insensible fluid loss. The skin consists of 2 mutually dependent layers, the epidermis and dermis, which rest on a fatty subcutaneous layer. The epidermis is derived primarily from surface ectoderm but is colonized by pigment-containing melanocytes of neural crest origin, antigen-processing Langerhans cells of bone marrow origin, and pressure-sensing Merkel cells of neural crest origin. The dermis is derived primarily from mesoderm and contains collagen, elastic fibers, blood vessels, sensory structures, and fibroblasts. **(Carlson, 1994)**

As the populations of developed countries age and become more sedentary, the incidence of diabetes and obesity increases, along with a dramatic increase in the incidence of chronic nonhealing wounds. In most medical communities, surgeons are considered the local experts in the care of wounds and are

expected to manage cases that do not respond to typical treatments recommended by primary care clinicians. (**Bartus, 2004**) .

A chronic wound is a wound that does not heal in an orderly set of stages and in a predictable amount of time the way most wounds do; wounds that do not heal within three months are often considered chronic. Chronic wounds seem to be detained in one or more of the phases of wound healing. For example, chronic wounds often remain in the inflammatory stage for too long. In acute wounds, there is a precise balance between production and degradation of molecules such as collagen; in chronic wounds this balance is lost and degradation plays too large a role. (**Mustoe, 2005**).

Healing of acute wounds normally proceeds through well-defined phases of hemostasis, inflammation, proliferation, and remodeling. (**Diegelmann, 2004**).

In addition to poor circulation, neuropathy, and difficulty moving, factors that contribute to chronic wounds include systemic illnesses, age, and repeated trauma. Comorbid ailments that may contribute to the formation of chronic wounds include vasculitis, immune suppression, and diseases

that cause ischemia. Emotional stress can also negatively affect the healing of a wound, possibly by raising blood pressure and levels of cortisol, which lowers immunity. **(Snyder and Robert, 2005).**

The most common etiologic factors in nonhealing limb ulcers are chronic venous insufficiency, arterial occlusive disease, and diabetic neuropathy. Most reports suggest that the most common cause is venous insufficiency, but patients with arterial insufficiency and diabetic neuropathy are at the highest risk of limb loss. Accurate identification and treatment of these underlying disorders is the most important determinant of ulcer healing. **(Jeffcoate, 2003) .**

Chronic wounds may affect only the epidermis and dermis, or they may affect tissues all the way to the fascia. They may be formed originally by the same things that cause acute ones, such as surgery or accidental trauma, or they may form as the result of systemic infection, vascular, immune, or nerve insufficiency, or comorbidities such as neoplasias or metabolic disorders. **(Moreo and Kathleen, 2005).**

Treatment of the different chronic wound types varies slightly, appropriate treatment seeks to address the problems at

the root of chronic wounds, including ischemia, bacterial load, and imbalance of proteases. Various methods exist to ameliorate these problems, including antibiotic and antibacterial use, debridement, irrigation, vacuum-assisted closure, warming, oxygenation, moist wound healing, removing mechanical stress, and adding cells or other materials to secrete or enhance levels of healing factors **(Velandar and Patrik, 2004)**.

A wide variety of advanced treatment for nonhealing wound, such as Topical growth factors, Bioengineered skin grafts(BATs), VAC(Vacuum Assisted Closure) Therapy, and hyperbaric oxygen therapy(HBOT), have shown some evidence of improved wound healing compared to standard wound care. **(Stone, 2010)**.

AIM OF THE WORK

The purpose of this study is to present current information on theories of etiology, different types of chronic wound with stress on new modalities of management of chronic wounds.

Anatomy of the skin

The skin covers the entire external surface of the human body and is the principal site of interaction with the surrounding world. It serves as a protective barrier that prevents internal tissues from exposure to trauma, ultraviolet (UV) radiation, temperature extremes, toxins, and bacteria. Other important functions include sensory perception, immunologic surveillance, thermoregulation, and control of insensible fluid loss. (*Malden, 2004*)

Skin is derived from both ectoderm and mesoderm. The epithelial layers are formed from the ectoderm. The various skin appendages including the pilosebaceous glands, sweat glands, and hair follicles are ectodermal in origin. Specialized cells including melanocytes and neural elements are derived from the neuroectoderm. The cells of the dermal layers that include the fibroblasts, mast cells, blood vessels, lymphatic channels, and the adipocytes are derivatives of the mesoderm. Macrophages, Langerhan's cells, and Merkel cells are also derived from the mesoderm as are the components of the dermal layer. (*Gartner and Hiatt, 2007*)

The skin consists of 2 mutually dependent layers, the epidermis and dermis, which rest on a fatty subcutaneous layer,

the panniculus adiposus (figure 1). The epidermis is derived primarily from surface ectoderm but is colonized by pigment-containing melanocytes of neural crest origin, antigen-processing Langerhans cells of bone marrow origin, and pressure-sensing Merkel cells of neural crest origin. The dermis is derived primarily from mesoderm and contains collagen, elastic fibers, blood vessels, sensory structures, and fibroblasts. (Marks, 2006)

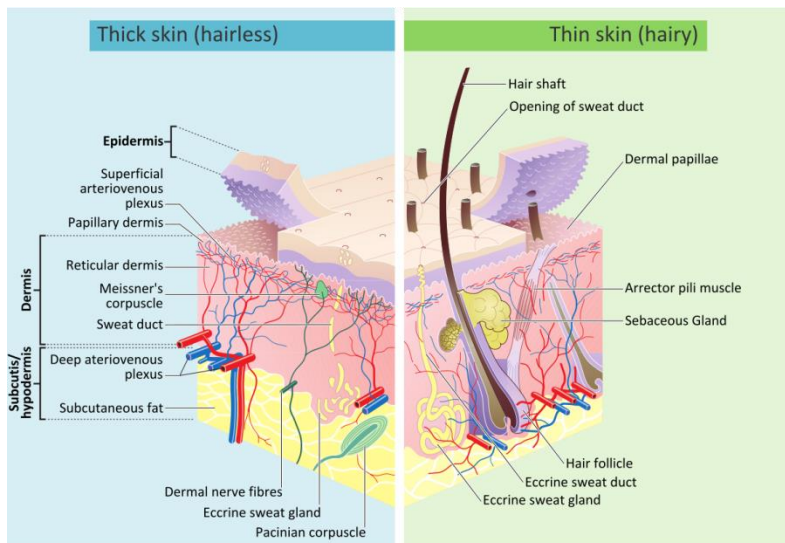


Figure (1): layers of the skin (Marks, 2006)

Male skin is characteristically thicker than female skin in all anatomic locations. Children have relatively thin skin, which progressively thickens until the fourth or fifth decade of life when it begins to thin. This thinning is also primarily a dermal