

(Section Title)

**Cosmetic dermatology: Perspective from the basic sciences.**

(Title of Article)

**Age related alteration in the cutaneous vasculature**

Arthur K. Balin, M.D., Ph.D.

Laboratory for Investigative Dermatology

The Rockefeller University

1230 York Avenue

New York, New York 10021

(212)-570-7536

Changes in the cutaneous vasculature occur with age, both as a consequence of the intrinsic aging process and due to chronic photodamage. An awareness of these changes is necessary to recognize and appropriately treat skin disease in the elderly, and these changes have considerable therapeutic implications for physicians interested in achieving cosmetic improvement in aged skin.<sup>1</sup>

The microcirculation of the dermis supplies nutrients to the epidermis, dermis and skin appendages, and is integrally involved in thermal regulation and wound healing. The cutaneous vasculature is responsible for clearing substances applied to, or injected into, the skin and contributes to skin coloration.

The microvasculature of the dermis regresses as we age. The dermal papillae are resorbed with flattening of the rete ridges.<sup>2</sup> As the rete ridges flatten, the capillary loops that were present in the dermal papilla disappear. In addition, the

small vessels about the cutaneous appendages decrease. This is especially prominent in actinic damage. Braverman, et al<sup>3,4</sup> has demonstrated that vessels in intrinsically aged sun protected skin become thinner and have a decrease (or absence) in the number of surrounding veil cells. The changes in the microvasculature of photodamaged skin differ from those found in intrinsically aged skin in that photodamaged skin manifests a marked thickening of the post capillary venular walls.

The decrease and the disorganization of the cutaneous vasculature that occurs during aging has profound clinical consequences. (Table 1) These include a decreased inflammatory response, decreased absorption, decreased clearance, decreased urticarial reactions, decreased sweating, delayed wound healing, impaired thermal regulation, easy bruisability, and a muted clinical presentation of many cutaneous diseases.

The superficial blood supply is particularly important for thermal regulation. The decreased vasculature can be observed in the pallor of aged skin. The temperature drop between the groin and the feet is greater in the aged. The aged quickly experience coldness when the temperature falls and the aged are predisposed to hypothermia and hyperthermia (see below, impaired sweating). Even a brief exposure to cold may lead to hypothermia. The hypothermia is due both to the inability to efficiently divert blood and a loss of insulating subcutaneous tissue. The young vasoconstrict more, shiver more and generate more metabolic heat. In addition, the old may fail to take corrective action when cold because of decreased pain perception. A comfortable temperature for the aged is 75 to 80 degrees, far above the recommended level for public institutions.

Because of the decreased microvasculature, it takes longer to absorb substances applied to the skin and it takes longer to clear substances injected into the skin. For example, Kligman has shown that it took twice as long for 65 year olds

to absorb radioactive testosterone rubbed on the skin or to resolve an intradermally injected saline wheal than it did for 30 year olds.<sup>2</sup> Lidocaine injected into the skin of the aged will last longer because of this decreased clearance. Consequently, not as much epinephrine is needed in injected local anesthetic to prevent bleeding and to decrease lidocaine absorption in the elderly.

Clinically, this decreased clearance can prolong cases of contact dermatitis. Probably more important, however, is that many skin diseases are distinctive because of their pattern or degree of inflammation. We can be seriously hampered in the ability to diagnose disease in the aged unless we recognize that some of the cardinal signs of inflammation, including redness, heat, and swelling may be absent in the aged patient. Cellulitis, for example, can be much more difficult to recognize without these signs. This can be particularly important in the older post surgical patient because a wound infection may present with only minimal (or sometimes no) signs of redness, warmth, swelling or elevation in temperature.

The decreased blood supply may also necessitate some modification in therapy. Fewer applications of a topical medication may be appropriate because of the decrease in clearance. Elderly women troubled by the paleness of their skin can enhance their appearance by applying a foundation with a rosey tint or by using a rosey colored liquid or blusher. Pink tones rather than the more peach or beige ones can add back some of the color lost by the decreased blood supply to the skin. Also, older women can avoid dyeing their hair too dark in order to minimize the degree of contrast between hair color and facial skin tone.

**TABLE 1**

**PHYSIOLOGIC CONSEQUENCES OF CHANGES  
IN THE VASCULATURE WITH AGING**

**Muted clinical presentation of cutaneous disease**

**Decreased inflammatory response**

**Decreased absorption**

**Decreased urticarial reactions**

**Decreased thermal regulation**

**Decreased sweating**

**Delayed wound healing**

**Ecchymoses and delayed resolution**

## REFERENCES

- 1 Balin, A.K., Kligman, A.(eds.): Aging and the Skin. Raven Press, NY, 1989.
- 2 Kligman, A.M., Grove, G.L., Balin, A.K.: Aging of Human skin, in Finch, C.E., Schneider, E.L., eds: Handbook of the biology of aging. New York, 1985, Van Nostrand Reinhold Co. Inc., pp. 820-841.
- 3 Braverman IM, Fonferko,E: Studies in cutaneous aging II. The microvasculature. J Invest. Derm. 78:444-448,1982
- 4 Braverman, IM, Sibley, J., Keh-Yen,A: A study of the veil cells around normal, diabetic and aged cutaneous microvessels. J.Invest Derm. 86:57-62, 1986.