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The impact of age on wound healing progression

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Background. Increasing incidences of wound healing disorders represent a growing problem in our aging society. Although poor wound healing occurs more frequently in older individuals, the factor of age has often been neglected in previous in vivo models. **Methods.** For this study, 54 Wistar rats from 3 different age groups (11; 27; and 56 weeks) were divided into 3 subgroups (burns, full-thickness wounds, unwounded controls). Animals in each of the experimental groups had four 2b-3rd-degree contact burns or full-thickness excisional wounds placed. During the observation period of 7 days, regular wound documentation by laser speckle, thermography, and photography was performed, blood was drawn and daily food-intake and animal weights were recorded. Tissue biopsies obtained from the wounds and control areas on the final day (day 7) were analyzed at the histological and gene expression levels. Inflammatory markers (interleukins, TGFb, TNFa, etc.) and markers for tissue perfusion (VEGFa, HIF1a) were quantified by qPCR. **Results.** Measurements of skin thickness from the histologic sections revealed significantly reduced thickness of the epidermis but not the dermis in the old animals. In addition, the 14-month- and 7-month-old animals had significantly poorer tissue perfusion of the affected areas on the fourth day after burning than did the young animals. Local immune cell infiltration, especially by leukocytes, was also delayed in the aged animals. Nevertheless, there were no significant differences between the age groups in either wound sizes or weight loss after burns. **Conclusion.** Although there appear to be age-related differences in epidermal thickness, angiogenic potential, and immune response, these do not appear to have a significant effect on wound healing of small wounds. It is reasonable to assume that it is only an additional trigger, such as diabetes, that causes the often observed poorer wound healing in the elderly.