Cellular and Molecular Biology of Skin Aging

Essay

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Dermatology & Venereology

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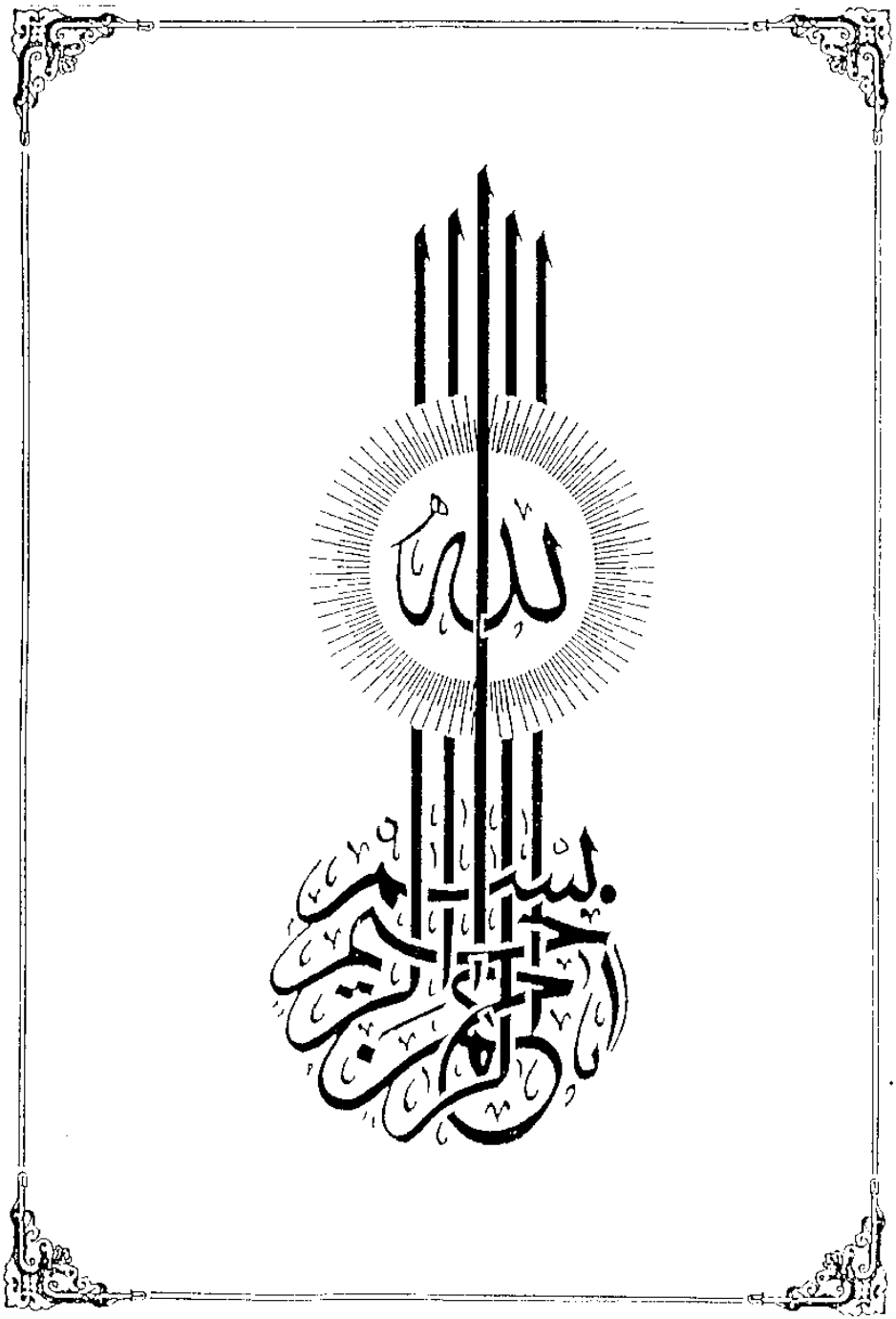

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The rapid growth in the aged sector of the population is changing the practice of dermatology, as this will result in a marked increase in age-related dermatologic disease in the coming decades and highlights the need for an improved understanding of the fundamental molecular mechanisms of skin aging **(Morris & Hopewell, 1990)**.

Cutaneous aging presents as an insidious and progressive degenerative process, inevitable in course and predictable in outcome. On a macroscopic level, the changes include the following: dermal atrophy, wrinkling and loss of elasticity and subcutaneous fat. In particular, senescent dermal fibroblasts over express metalloproteinase activities that may explain age related atrophy of extracellular matrix **(Michael, 1994)**.

The discovery of a structural change in the telomeric region of the genome with cellular aging and new insights into DNA damage checkpoint mechanisms offer new opportunities to uncover the molecular mechanisms regulating cellular aging **(Harley, 1990)**.

The **aim of this study** is to highlight the changes that occur during aging of the skin at the molecular level in order to manipulate these events for a therapeutic effect.

Review of Literature

AGING

Aging can be defined as an irreversible progressive loss of homeostatic capacity ultimately incompatible with life **(Gilchrest, 1989)**. Interest in cutaneous aging and age associated biologic process has increased rapidly during the past few years, as nearly 12% of the population is 65 years or older, and this figure is estimated to reach 20% in the next century **(Uitto et al., 1989)**.

There are many theories concerning the basic mechanism of aging but all theories fall into one of two groups: (1) the "extrinsic hypothesis", suggests that aging process results from the contingencies of living, e.g. progressive wear and tear, accumulation of waste products; (2) the "fundamental hypothesis", suggests that aging is genetically programmed **(Rook & Burton, 1986)**.

Cutaneous aging represents two independent biologically divergent processes **(Uitto, 1986)**. Chronological aging, "the biologic clock", affects the skin in a manner similar to other organs of the body. Superimposed on this innate aging process, sun-exposed skin is subjected to degenerative changes resulting from actinic irradiation, called extrinsic aging **(Kligman, 1986)**. The intrinsic and the extrinsic components, have different cellular, biologic, biochemical and molecular mechanisms and some different clinical manifestations **(Gilchrest et al., 1994)**.

Intrinsic Aging

It is observed on sun protected skin as morphologic changes, which are relatively subtle and consist primarily of laxity, fine wrinkling, and a variety of benign neoplasms, atrophy of the dermis and reduction of adipose subcutaneous tissue **(Uitto et al., 1989)**.