

Preventive effects of enrichment of intracellular ascorbate on age-dependent telomeric DNA shortening and free radical injury in the skin

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Genuine degrees of cellular senescence of human skin are not necessarily in accordance with calendar ages, and were shown in the present study to be potently evaluated by measurement of length of telomeric DNA for a trace amount of human skin trash prepared with the ordered instrument rasp. Telomeric DNA was shortened in a manner dependent on calendar ages (0-72 years old, n=28) of donors as shown by Southern blot using epidermal DNA isolated from human skin. Prevention of age-dependent telomere shortening was achieved by pro-vitamin C, ascorbate-2-O-phosphate (Asc2P), but not by ascorbic acid (Asc) itself administered to human skin epidermal keratinocytes NHEK-F, which also acquired an elongated life span by 5.1 population doubling levels when administered with Asc2P but not Asc. UV-B induced cell mortality in human skin epidermal cells HaCaT was prevented by Asc2P but not Asc. Thus, Asc2P but not Asc is shown to protect human skin keratinocytes against telomere shortening, cellular senescence and UV-B injury.