Abstract

The effects of caloric restriction (CR) have been studied in numerous experimental models in relation to biological aging and cancer. CR has been established as a metabolic intervention that extends average life span in diverse species including several lower and higher vertebrates, the human and non-human primate, and extends or normal life span in the worm C. elegans. Furthermore, studies involving CR and ad libitum (AL) feeding in non-human primates and rodents show extension of the lifespan and delayed onset of age-related diseases. CR has been shown to affect the following: 1) gene expression, 2) cell proliferation, 3) DNA repair, 4) inflammation, 5) vascular function, and 6) immune function. A recent study of CR mediated by decreased cell proliferation may render cells less susceptible to DNA damage and age-related diseases.

Materials & Methods

CR and AL Fischer 344 rats were obtained from the National Institute of Aging. Animals were housed individually in wire-bottomed cages and fed ad libitum or CR (20% of AL) diets from 1 to 24 months of age. Tissue sections were counterstained lightly with hematoxylin to accentuate the contrast between the nuclei and cytoplasm. Sections were immunostained with a polyclonal antibody against the proliferating cell nuclear antigen (PCNA) and a monoclonal antibody against the cell nuclear antigen (PCNA). The proliferation index (PCNA-I) was used for immunohistochemical staining of proliferating epidermal nuclei to determine changes in epidermal thickness in these aging-related rats.

Results

A significant effect of age was noticed in the two parameters, i.e., DS PCNA-I (F 3.96, P .011), FP epidermal width (F 3.37, P .021) and FP PCNA-I (F 9.0, P .005). A significant correlation effect was noted between DS width and PCNA-I (r .497, significant at the 0.01 level).

Conclusions

This study of epidermal width measurement shows higher values in the dorsal skin in normal aging rats as compared to CR rats. A significant difference was noted in the foot plate measurement (Figs. 1-8). Epidermal width is increasing lower in aging CR rats. The trend seen in the dorsal skin is better illustrated in the foot plate measurement. The dorsal skin is more responsive to age-mediated diseases and intrinsic aging.

References