THE DAMAGING EFFECTS OF t-BUTYLHYDROPEROXIDE ON THE HAIRLESS RAT SKIN

Hiroshi Tanaka and Takuo Tsuji
Department of Dermatology, Nagoya City University Medical School, Nagoya, Japan.

It has been considered that reactive oxygen and lipid peroxide may play an important role in immunity, aging, inflammation, carcinogenesis and so on, and that they are controlled by antioxidants. So excess oxygen stress leads to oxidative damage to the tissue. Since the skin is always in contact with oxygen in the presence of surface lipid and occasionally exposed to ultraviolet (UV) light, it is one of the best target organs of environmental oxidative damage. This study was undertaken to evaluate the effect of t-butylhydroperoxide (t-BH), a lipid peroxide, on the skin of two age groups of hairless rats.

MATERIALS AND METHODS

Two age groups of hairless rats (6-week- and 6-month-old) were used. Each animal was given 2 mg of t-BH by subcutaneous injection. Biopsy specimens were taken 24, 48, 120 and 192 hours after the injection. Some were processed for light microscopy and others for electron microscopy.

RESULTS

Light Microscopy

Skin changes were similar in both age groups, the degree being greater in the 6-month-old rats. The following are the findings for the 6-month-old rats. Twenty-four to 48 hours after t-BH injection inflammatory infiltration, edema and necrotic changes in some muscle, collagen and fat cells occurred in the deep dermis and subdermis. One hundred and twenty hours after the injection these changes subsided, being followed by new synthesis of collagen fibers.

Transmission Electron Microscopy

One hundred and twenty hours after the injection fine collagen fibers were seen grouped close to fibroblasts which contained well-developed rough surfaced endoplasmic reticulum.

DISCUSSION

A subcutaneous injection of t-BH gave rise to skin changes, including heavy
Fig. 1. The damaging effects of t-butylhydroperoxide on 6-month-old hairless rat skin. A, control; B, 2 days after injection.

inflammation and necrosis, followed by new synthesis of collagen fibers. It is probable that these changes are due to lipid peroxide in t-BH, since similar changes were reported previously after the application of some free radicals\(^1\).

The fact that the 6-month-old rats had more pronounced skin changes than the 6-week-old ones suggests that the function of antioxidants is reduced in old animals.

REFERENCE