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Effectiveness of Liv.52 against Radiation Sickness and Dermatitis

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ABSTRACT
Radiation sickness and dermatitis were studied in two groups of adult Swiss albino mice after whole-body exposure to 3 different doses (8.0, 9.0 or 10.0 Gy) or Co Gamma radiation in the presence and absence of Liv.52 and results from both the groups were compared. It was found that the symptoms of sickness, which were noticed in the control animals, were not present in the experimental group. In the former the epithelium showed hyperplasia and atypical changes in the cells. The skin appendages were also completely absent. However, in the Liv.52 treated animals the epithelial structure was normal and skin appendages were preserved.

Key words: Skin appendages, Liv.52, Radiation sickness, Dermatitis.

INTRODUCTION
The discovery of radiation protection for the first time seemed to be very promising in radiotherapy and stimulated a number of radiobiologists to undertake screening of different types of chemical agents for radiation protection including human tolerance tests for some of the sulphydryl, which were found to be effective radioprotectors in mammals. A few of the radioprotective agents were also tested against radiation sickness or radiation induced leukopenia in cancer patients undergoing radiotherapy as reviewed in detail by Mozzhin and Rachinsky[1]. But these chemicals did not find wide application in human beings, probably because of their high toxicity.

Liv.52 has been shown to be effective in man for various hepatic disorders[2-8] and is claimed to be completely non-toxic and very effective. It is also being used as a detoxicating agent[3,6].

The skin being the outermost covering of the body is exposed first to radiation and so manifests early the deleterious effects of radiation. Skin glands play a significant role in hyperhidrosis and acne. Therefore the present study was undertaken to evaluate the role of Liv.52 in modifying the radiation induced changes in the skin and its glands in Swiss albino mice.

PATIENTS AND METHODS
Male Swiss albino mice of 6-8 weeks weighing 25-28 g. were selected from an inbred colony maintained on standard mice feed (procured from the Hindustran Lever Ltd., New Delhi) and water *ad libitum*.

One hundred and eighty animals were divided into two groups. One group of the animals was orally administered daily Liv.52 at the dose of 0.05 ml/animal starting 15 days pre and upto 15 days post-

irradiation. This group served as the experimental one while a second group of animals was administered an equal volume of tap water in similar manner and served as control. After 15 days of the treatment of the animals were exposed to different doses viz. 8.0, 9.0 and 10 Gy of 60 Co gamma radiation, in well ventilated plastic box. Each dose was administered to 60 animals (30 control and 30 experimental) and a total of 240 animals were used for the experiment. Liv.52 was received from The Himalaya Drug Co., Bombay in the form of drops. Each ml. Of Liv.52 drops, which is an indigenous preparation, contains *Capparis spinosa* (17 mg), *Cichorium intybus* (17 mg), *Solanum nigrum* (8 mg), *Achillea millefolium* (4 mg), *Tamarix gallica* (4 mg), *Cassia occidentalis* (4 mg) and *Terminalia arjuna* (8 mg). Radiation sickness and skin reaction were regularly observed in all the animals and surviving animals were sacrificed on day 50. The skin from the animals was removed from the lumber region and fixed in Bouin's fluid. Five micron thick paraffin sections were prepared for routine histological examination.

RESULTS

(a) Radiation sickness and skin reaction:

Control group: Animals showed shivering from the first day after 9.0 and 10.0 Gy exposures. Ruffling of hair, epilation and diarrhoea were severe 5 days post-irradiation. Immediately after the onset of diarrhoea, the animals became lethargic and intake of water and food was markedly reduced. The animals thereafter became extremely lethargic and their response to external stimuli became poor. Frequently excessive watering of eyes and facial edema were observed (Fig.1). "Duncing" behaviour was observed where animals sit for a long time facing the walls of the cage with a bowed head, rocking sideways. Mortality occurred up to 16 days. Severe erythema was noticed from the first two days after the exposure to all three doses. This was followed by ruffling of hair and severe epilation especially on the dorsal region. After 30 days of irradiation acute reaction occurred in the form of large bullae containing serum. Later on secondary infection supervened which resulted in the development of ulcers (Fig.2).

Fig. 1: Showing facial edema in control animals

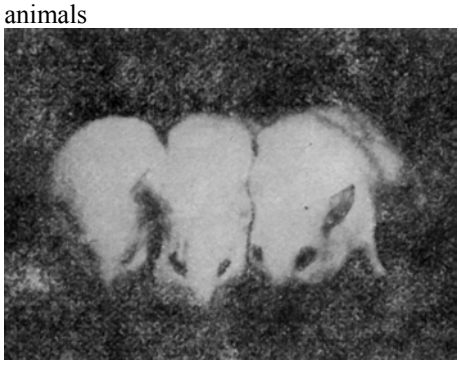
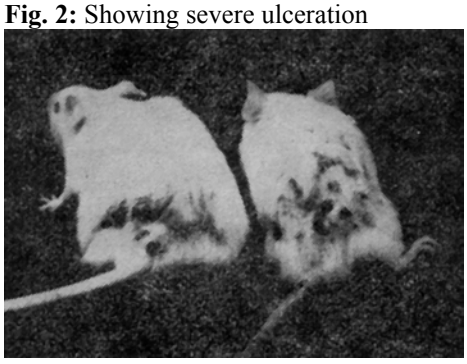
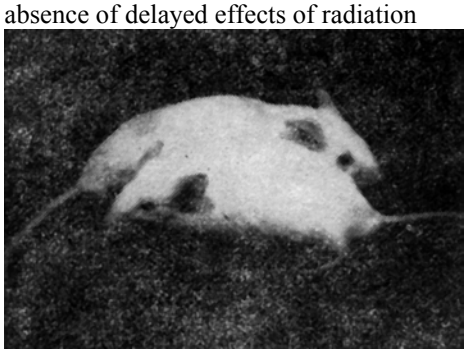


Fig. 2: Showing severe ulceration



Experimental group: Symptoms of radiation sickness noticed in this group even at the highest dose used were only mild erythema, ruffling of hair, epilation and facial edema. Diarrhoea, watering from the eyes and apathy towards food intake were observed in 10% of the animals. The most important difference from the control group was the absence of mortality after 10 days. Delayed effects seen in the control group were completely absent (Fig. 3).

Fig. 3: With Liv.52, note the complete absence of delayed effects of radiation



(b) Histopathology:

In the control animals after exposure to 8.0, 9.0 and 10.0 Gy the epithelium showed hyperplasia and atypical changes in the cells like prominent nucleoli, thickened nuclear membrane and variation in nuclear size. Necrosis of the connective tissues destroyed the epithelial elements of the skin. The sweat glands and sebaceous glands together with epidermis and hair follicles were almost destroyed (Fig. 4). Dermis showed focal collection of chronic inflammatory cells (Fig. 5). Very few hair follicles noticed and these showed severe vacuolation and complete cessation of mitoses with slight infiltration of polymorphonuclear cells (Fig. 6). In the experimental animals' mild erythema and slight atrophy of the epithelium was noticed only in the 10.0 Gy irradiated animals. There was no collection of chronic inflammatory cells in the dermal region. Sweat glands, sebaceous glands and hair follicles remained preserved. The structure of blood vessels was normal and most of the hair follicles showed mitotic figures (Figs. 7-9). No pathological changes were seen in the animals irradiated with 8.0 and 9.0 Gy.

Fig. 4: V.S. of skin of control animals showing absence of skin appendages x 100

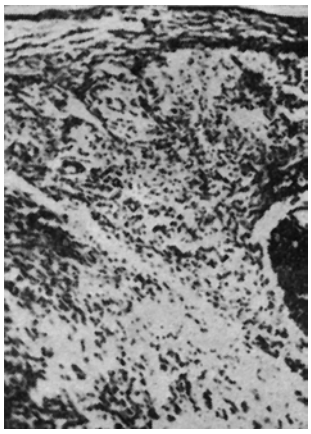


Fig. 5: Skin V.S. of control mice exhibiting collection of inflammatory cells in the dermal region x 35

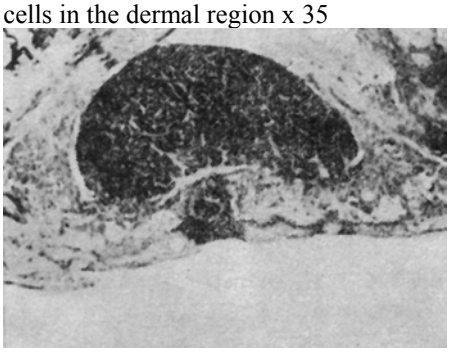


Fig. 6: Skin V.S. of mice showing infiltration of polymorphonuclear cells in control groups x 750

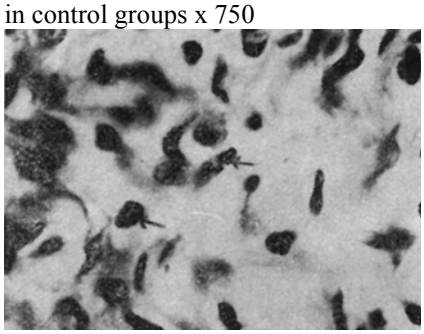


Fig. 7: Skin V.S. of Liv.52 treated mice showing the presence of normal skin appendages (sweat glands, sebaceous glands and hair follicles) x 100

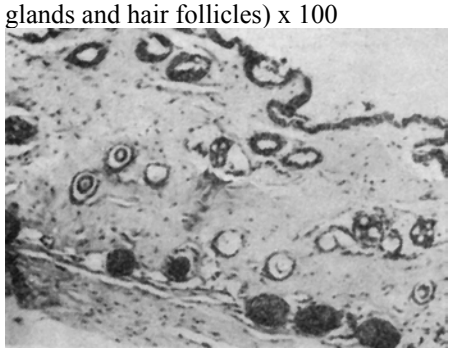


Fig. 8: Hair follicle of experimental mice on Liv.52 showing mitotic figure x 950

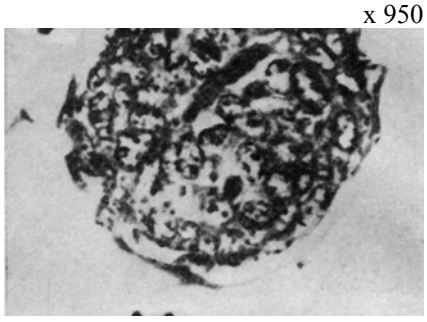
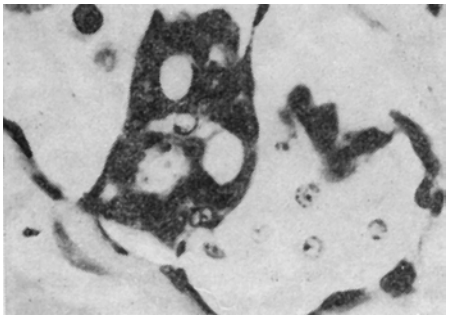


Fig. 9: Sweat gland of experimental animal on Liv.52 revealing normal structure x 950



DISCUSSION

Our findings in 8.0, 9.0 and 10.0 Gy irradiated control animals are in conformation with those of various other works[9-12] who observed that radiation causes erythema, epilation, desquamation, bullous lesions, ulceration, atrophy and diminution of hair follicles and sebaceous glands. In the present experiment, sebaceous glands, sweat glands and hair follicles were also completely

destroyed in the control animals, whereas in the Liv.52 treated group, skin appendages were preserved. The presence of mitotic figure in the hair follicle of Liv.52 treated group revealed that the regenerative power of hair follicles remained preserved (Fig. 8). There were no changes in the structure of the blood vessels in these animals.

Preservation of skin appendages and other structures in the Liv.52 treated group may be due to the protection afforded by Liv.52 from both elective and nutritive injuries (radiation causes severe damages to be blood vessels[9,10] manifested in the form of obliteration of vascular lumen and thrombosis which results in the nutritional injury).

It is an established fact that the liver plays an important role in general metabolism performing numerous functions like detoxification, manufacture of blood proteins and bile salts, reticuloendothelial phagocytosis etc. Disturbed liver function and resultant metabolism caused by ionizing radiation may increase the sensitivity of the skin to various damages. Recently Behl[13] treated cases of chronic dermatoses, which were resistant to anti-histaminics corticosteroids and antibiotics with Liv.52 and claimed that the drug was a fairly useful adjunct in the treatment of various skin disorders.

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