

Liv.52 Protection Against Radiation-Induced Lesions in Mammalian Liver

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SUMMARY

Effect of Liv.52 on mammalian liver was studied after whole-body exposure to 5.5 Gy of Cobalt-60 gamma radiation. It was found that the drug protected the organ against radiation-induced changes. The protective effect was manifested in the form of early recovery as indicated by the absence of pathological changes like cytoplasmic degranulation, loss of nuclei from many cells and abnormal architecture at 10 days and restoration of normal structure by 4 weeks. Liv.52 may neutralize the peroxides formed from water molecules after irradiation, which are toxic and cause the damage to the organ. Thus it seems that the drug may act as detoxicating agent.

Key words: Radiation protection, Liv.52, pathological changes, swiss albino mice

INTRODUCTION

The discovery of radioprotectors for the first time seemed to be very promising in radiotherapy and has attracted the increasing interest of a number of radiobiologists. Thereafter many chemical compounds were tested against radiation death^{1,3}. Unfortunately, however, their clinical application has been almost negligible until recently because of the high toxicity. Recently we have observed the radioprotective effect of Liv.52 (an indigenous preparation) in mice.

The drug is claimed to be completely non-toxic and very effective, the higher the doses (10g/kg b.wt.), the greater is the efficacy. The Liv.52 is a detoxicating agent and being used in man in various hepatic disorders⁴⁻¹⁰. The present experiment is an attempt to find out the protective effect of Liv.52 against radiation-induced lesions in the liver of Swiss albino mice.

MATERIAL AND METHODS

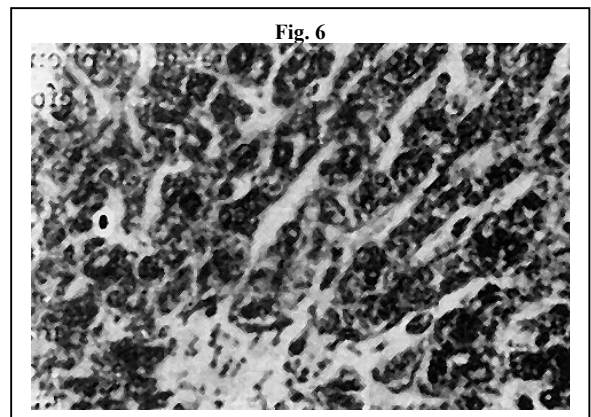
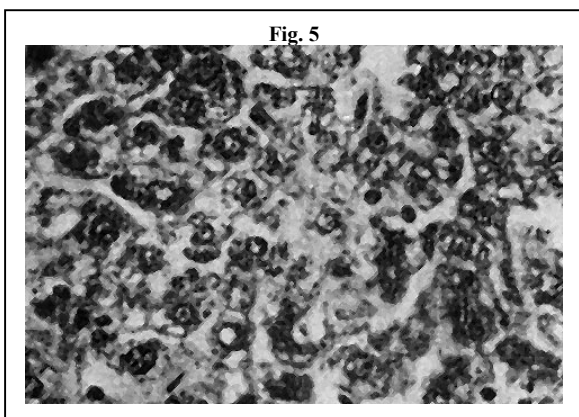
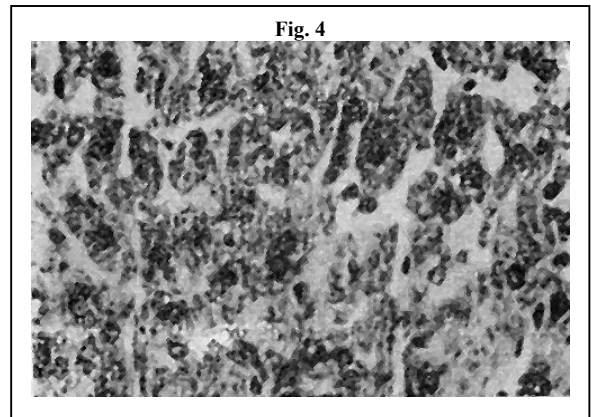
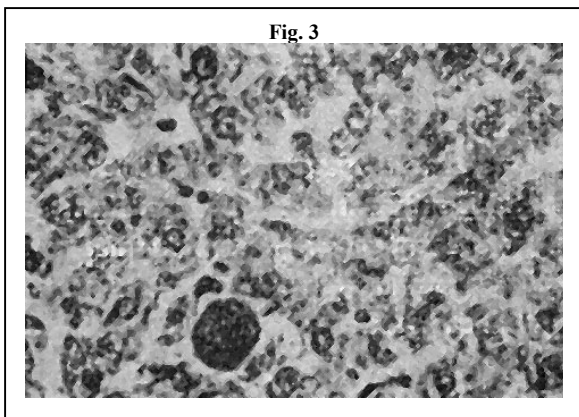
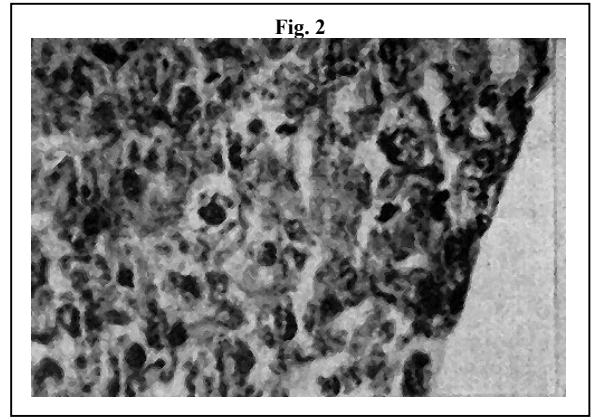
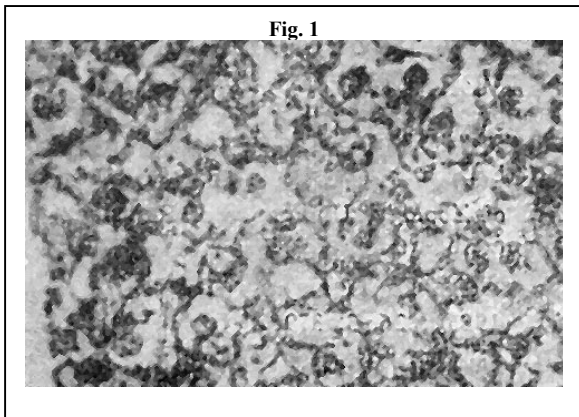
Male Swiss albino mice 6-7 weeks old weighing 22-26 g were selected from an inbred colony. Liv.52 (received from the Himalaya Drug Co., Bombay, India, in the form of drops) was orally administered daily at the dose of 0.05 ml/animal 15 days prior and 5 days post irradiation in the experimental animals and control animals were given an equal volume of tap water in the similar manner. After 15 days of the treatment, the animals were irradiated with 5.5 Gy at the dose rate of 0.8 Gy/m. A minimum of 5 animals were sacrificed by cervical dislocation at 5, 10, 18 and 28 days after exposure and small pieces of liver were fixed in Bouin's fluid. The paraffin sections were cut at 5 μ and stained with Harris hematoxylin and eosin for histopathological study.

OBSERVATIONS

Control: Hepatocytes have shown cytoplasmic degranulation, extreme vacuolization, shrinkage and crenation of the nuclei at 5 days after exposure. The arrangement of hepatic cords got distorted (Fig.1). At 10 days nucleus disappeared from several hepatic cells. The cytoplasmic degranulation

was also seen in the mild form (Fig.2). At 18 days after exposure, nuclear shape was distorted. A giant hepatocyte was observed in large cytoplasmic mass. Severe lymphocytic infiltration was also evident at cytic infiltration was still observed (Fig.4).

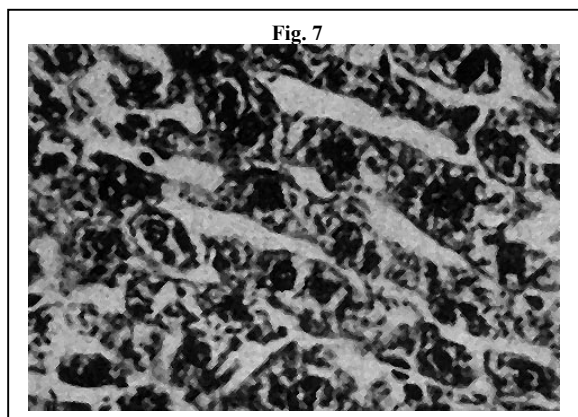
Experimental: At 5 days after exposure mild cytoplasmic vacuolization and severe lymphocytic infiltration were observed, but the nuclear structure was normal (Fig.5). There was a progressive recovery with restoration of cord like arrangement of hepatic cells at 10 days. Similar structure was also observed by 18 days (Fig.6). The organ exhibited normal structure at 28 days (Fig. 7).



DISCUSSION

In the control animals of the present study, the maximum damage was seen at 5 days [Fig.1]. Although there was an indication of recovery from 18 days on, the normal structure was not restored even at 4 weeks. The damage in the hepatic cells after irradiation with gamma rays is not of any specific type and might have been induced by toxemia brought about by the exposure¹¹.

Dettmer *et al.*¹² stated that the severity of damage depends upon the condition of hepatocytes at the time of irradiation. The effects of radiation were less severe in the experimental animals as compared to the control group at 5 days (Fig.5). Thus, Liv.52 provided ample protection to the organ. The protective effect was manifested in the form of early recovery as indicated by the absence of pathological changes like cytoplasmic degranulation, loss of nuclei from many cells and abnormal architecture at 10 days and restoration of normal structure by 4 weeks.



The radiation induced giant hepatocytes were totally absent in the drug treated group, which were observed in the non-drug treated animals at 18 days after exposure. *Montgomery*¹³ stated that multinucleated giant cell formation is the result of fusion of two cells. The giant cell formation is an irreversible phenomenon and it seems to be a step before degeneration and cell death¹⁴.

It can be concluded from these findings that Liv.52 imparts protection to the organ. The mechanism of the drug in imparting protection against radiation is still unclarified but it appears that Liv.52 may neutralize the peroxides formed from water molecules after irradiation, which are toxic and cause the damage to the organ. Further, *Saini et al.*¹¹ stated that the damage in the hepatocytes after irradiation is not of any specific type and might have been induced by toxemia brought about by the exposure. Thus, it seems that the drug acts as a detoxicating agent.