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# REDUCTION OF THE HARMFUL EFFECT OF X-RAYS ON THE SKIN OF RABBITS WHEN IRRADIATION IS CARRIED OUT THROUGH A LEAD LATTICE

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In roentgenological investigations carried out on various test objects including hydra (1), turbellaria (Planaria) (2), the worm Ritchelmis (3), and principally the axolotl (4, 5, 6, 7, 8), it was found that the irradiated part of the organism which has lost the capacity for regeneration recovers that capacity after growing together or being transplanted in such a manner that a close contact with nonirradiated, healthy tissue is established. These observations are in agreement with still rather meager data in the medical literature to the effect that erythema of the human skin is produced at higher doses of X-ray radiation when the skin is protected by a metal lattice (9, 10). Interaction between the nonirradiated and irradiated tissue apparently also exerts an influence here, as it does in the experiments mentioned above. An investigation of this effect would contribute to a knowledge of the mechanism involved in the action of short-wave radiation of biological objects as well as clarify the nature of the desensibilization of the skin achieved by the use of a grating in connection with the X-ray treatment of malignant tumors (9).

In the present communication are reported the results of an investigation carried out on rabbits by irradiating chemically depilated 25 sq cm skin patches (in the region of the sacrum) directly on one side of the body and through a lead lattice on the other side and then comparing the injurious effects. The irradiation was carried out under feeding to the X-ray tube of a current of 90 kv and 4 ma. The distance from the anticathode to the object was 23 cm and an aluminum filter 1 mm thick was used. Ninety roentgens per minute were applied. The lattice consisted of lead strips 0.5 mm thick and 3 mm wide with a spacing of 4.5 mm between them. The lattice was covered with paraffin, so that it stuck to the skin and did not move during the experiment. In all experiments the irradiation was carried out continuously during a single period.



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The criteria used in comparing the extent of injury were development of hyperemia of the skin, scaling, falling out of hair which grew after depilation, and ulceration. We also evaluated the disappearance of these symptoms in the course of regeneration. Our results show that interaction between nonirradiated and irradiated sections of the skin, in cases where a lattice is applied, considerably lowers the extent of injury caused by irradiation of the skin. There are reasons to assume that the reduction of the adverse reaction is brought about by a more rapid regeneration of tissue rather than a weakened initial irritation.

In another series of experiments we excised 4 sq cm of skin in the center of the irradiated patch 10-15 days after the irradiation, thus exposing the fascia, and then observed the process of healing of the resulting wounds. Our results show that the rate of healing of wounds was much greater after irradiation through a lattice than the rate observed upon irradiation without a lattice, although the amount of radiation energy which reached the skin was the same in both cases. In four experiments a 3 to 4 times larger amount of energy was supplied through the lattice than in experiments without a lattice. Nevertheless, the wounds healed within approximately the same time in both cases. This means that the suppression of restorative capacity (of the rate of regeneration) was the same in both cases. The result obtained here leads to the conclusion that with the use of a lattice one may considerably increase the penetration of X-rays in depth by strengthening the dosis and still not increase the amount of skin injury. Under the circumstances it is advisable to develop methods of deep X-ray therapy with the use of a lattice.

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