produced by trauma are inhibited as well as those originating from chemical stimuli(22). There is much evidence emphasizing that the substances released by the antigen-antibody reaction elicit the responses of the effector organs, tissues and cells. The influence of cortisone upon the release, transfer, distribution or action of these mediator substances will be of primary importance for future investigations designed to ascertain the mechanism of the antiphlogistic action of this hormone.

Summary. By investigation of experimentally induced allergic and traumatic inflammation in (a) adrenalectomized and (b) adrenalectomized and cortisone-treated animals, the role of the adrenals and of exogenous cortical hormone in the regulation of the cellular changes of the inflammatory process was evaluated. Adrenal cortical secretions and exogenous cortisone were demonstrated to inhibit allergic inflammation through an antiphlogistic action *sui generis*, rather than by interfering with the antigen-antibody union. It is suggested that this antiphlogistic action of cortisone accounts for the capacity of this hormone to minimize the consequences of a wide variety of unrelated inflammation producing stimuli.

22. Gross, F., *Schweiz, Med., Wchnschr.*, 1950, v80, 697.

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A Study of Elastic Arteries in Irradiated Mice of Different Ages.* (18369)

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In a recent paper(1), aging changes in the tunica media of the aorta of animals from newborn through old age were described. The present study is concerned with the effects of x-radiation on the media of elastic arteries of mice of different age groups. A review of previous work on the effects of irradiation on blood vessels has been presented by Rhoades (2). She reported that "the most constant and obvious effects of irradiation . . . were changes in collagen" and that these changes could be "considered characteristic of the treatment." Her discussion was concerned primarily with the tunica adventitia; however, since that portion of the arterial wall is poorly developed in the mouse, a study of the well developed media was considered more feasible.

Methods. Fifteen mice, 20 to 30 days of age, 15 mice, 80 to 100 days, and 15 as old as could be obtained from the Roscoe B. Jackson Memorial Laboratory were used in this investigation. X-ray of 250 kv filtered with 2 mm of copper and 1 mm of aluminum was used for total body external exposure. The animals were held in a plastic wire cage(3) and received single treatments of 410 r. The intensity of x-radiation was 31 r per minute. According to Murray(4), the dose lethal to 50% of the mice within 30 days has been determined by Hagen, Simmons and Sacher to be about 500 r. Mice from each age group were killed at 2,4,8,12,22,28,36,48,72,84,96, 117 hours and 6,7,8 days after x-radiation. The aortae of 58 mice studied for aging changes in the media from birth through 760 days of age were used as controls(1).

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1. Smith, C., Seitner, M., and Wang, H., *Anat. Rec.*, in press.

2. Rhoades, R. P., *Histopathology of irradiation.* Ed. by W. Bloom, McGraw-Hill Book Co., Inc., New York. 1948, 712-735.

3. Haber, A., *Science*, 1949, v109, 260.

4. Murray, R. G., *Histopathology of irradiation.* Ed. by W. Bloom, McGraw-Hill Book Co., Inc., New York, 1948, 446-501.

The region of the ventral mediastinum which included the thymus and sections of elastic arteries was fixed in ice-cold Rossman's fluid, embedded in paraffin and sectioned at 5 μ. Sections were treated with 0.5% aqueous toluidin blue, periodic acid-leucofuchsin(5), the Feulgen reagent for thymonucleic acid, resorcin fuchsin, orcein, hematoxylin and eosin, and Mallory's connective tissue stain. Sections impregnated with silver (Foot's modification of the Bielschowsky technique) were either unstained or stained in orcein or Mallory's connective tissue stain. Sections of elastic arteries were also mordanted in ferric chloride or copper sulfate and stained in Mallory's unoxidized hematoxylin for the demonstration of ground substance. This technic was not reliable and the observations were therefore not significant.

Results. The effects of x-radiation on the elastic membranes of the arteries were studied in sections stained in orcein, resorcin fuchsin, and periodic acid-leucofuchsin. In some arteries of animals in the 20 to 30 days old group, the deeply colored (in elastic stains), predominantly smooth membranes in certain regions of the wall were interrupted by ragged and frayed areas. This raggedness was not apparent in control animals of the same age group. Membranes of arteries from experimental and control animals exhibited a greyish ivory color after the periodic acid-leucofuchsin technic. In certain areas the membranes appeared to be Schiff positive due to heavy investment with reticular fibers. Membranes in sections digested by saliva were more intensely colored by the Schiff reagent. A positive reaction was obtained in both experimental and control elastic membranes tested by the Feulgen method for thymonucleic acid. Since the lamellae appeared colored in sections in which the previous hydrolysis in HCl had been omitted, the rosy purple was not due to the reaction of the Schiff reagent with thymonucleic acid. As in the aortae of the control animals, the elastic lamellae of all age groups were uncolored by toluidin blue. In contrast to the youngest group of animals, the elastic membranes in the arteries of the 80 to 100 days old irradiated mice were predominantly ragged with some smooth areas. Splitting of the membranes was observed in a few arteries. After the elastic stains, the periodic acid-leucofuchsin and the Feulgen technics, the membranes were paler than those of the youngest group. This decrease in depth of color was similar to that seen in the aortae of the control animals. The membranes of the old irradiated mice were decidedly ragged and frayed, and paler in orcein and the other dyes than in either of the two younger groups. The elastic lamellae were colorless in sections treated with periodic acid-leucofuchsin. In most arteries the membranes were a pale delicate purple after the Feulgen technic, but in a few instances they were colored by the counterstain, fast green. Since the structure and tinctorial reactions were the same in both control and experimental vessels, no effects of x-radiation were observed on the membranes of the old animals.

Interlamellar fibers and reticular sheaths of the membranes were studied in all preparations. The results obtained with silver impregnation were the same as those in the periodic acid-leucofuchsin technic; those fibers which precipitated silver recolored the Schiff reagent. The walls of the irradiated arteries of the two younger groups, because of more interlamellar elements, seemed denser than those of the controls. In the group 20 to 30 days old, the reticular sheaths of the elastic membranes varied in thickness from ¼ to ½ the width of the lamellae. Interlamellar fibers were generally fine and few in number. The thickness of the reticular sheaths was not measured but, as in the controls, appeared thicker under the inner elastic membrane. The interlamellar fibers were heavier and the sheaths varied from ½ to the whole width of the membranes in the group 80 to 100 days old. In some of these vessels there were regions in which the sheaths and interlamellar fibers were so dense that they resembled older arteries. The width of the fibrous sheath in the oldest group of experimental and control animals ranged from ½ to greater than the width of the membranes. After silver impregnation or after staining in periodic acid-leucofuchsin, the whole wall ap-

5. McManus, J. F. A., *Stain Tech.*, 1948, v23, 99.

peared more deeply colored due to the increased density of the interlamellar fibers as well as the heavier sheaths.

Fine and sometimes coarse elastic interlamellar fibers were observed in the 20 to 30 days old arteries stained in orcein and resorcin fuchsin. In contrast such fibers were not prominent until about 70 days of age in the control series. There was no conspicuous difference in density of these fibers in the arteries of the control and irradiated mice of the two older groups.

The effect of x-radiation on the ground substance was studied mainly in sections stained in toluidin blue. Metachromatic staining was found in focal areas of the walls of the 20 to 30 days old arteries where the colorless membranes were outlined by a narrow rose purple line and a fine mesh of the same color was seen between the lamellae. Metachromasia was stronger than in the aortae of control mice even though it was not found in all arteries and varied in intensity and extent. In general the strongest reactions were seen under the inner elastic membrane and/or in close association with the muscle cells. The cell membranes of the muscle cells in the arteries of all age groups in these preparations were so delicate that it was often impossible to distinguish them from the ground substance; however, where cell membranes were recognized, metachromatic granules outlining vacuoles were seen within some muscle cells as well as in the ground substance. In the arteries of the 80 to 100 days old mice, the metachromatic reaction was more intense and the localized regions more extensive than in the younger vessels and than in the controls. A more generalized and paler tint was seen throughout the walls. First noticeable at 8 hours after irradiation, the coloring was strong at 12 hours, more intense in most of the succeeding hours, and present in all the remaining arteries of the series. Metachromatic staining of the ground substance was observed in variable degree in arteries of the whole series of old animals; the color reactions were sometimes pale, and sometimes intense. As in the non-irradiated mice, the metachromasia was more striking in old arteries than it was in the younger vessels. Although the number of animals used was too few to study individual variations, these observations have indicated that the effect of x-radiation on the walls of elastic arteries in young animals was to produce premature aging changes. Evidences of these changes in mice 20 to 30 and 80 to 100 days old were the raggedness and fraying of the membranes, the increased amount of ground substance and the greater numbers of interlamellar fibers. X-radiation produced no detectable changes in elastic arteries of old mice.

Within each age group, the number of hours elapsing between irradiation and the sacrifice of the animal made no observable difference in the reactions of the arterial wall to most stains. With toluidin blue, however, there were indications that the metachromatic ground substance might be increased as the time interval between irradiation and sacrifice of the animal was lengthened. The small number of animals employed and individual variations may have masked any other patterns which might have been present.

Summary. Changes comparable to those of physiological aging were induced by x-radiation in the tunica media of elastic arteries of mice of different ages. In the elastic arteries of 20 to 30 days and 80 to 100 days old irradiated mice there were increased amounts of ground substance, increased numbers of interlamellar fibers, and premature raggedness and fraying of the elastic membranes. No changes attributable to irradiation were seen in the arteries of the old mice.

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