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Roentgen ray therapy in rheumatic heart disease.

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In the course of rheumatic fever, cardiac involvement is frequent and constitutes the chief menace of the disease. No method is known whereby affection of the heart may be effectually prevented. Nor has it been possible significantly to modify the progressive character of the lesions initiated in the structures of the heart by the rheumatic process. These lesions are of two kinds: (1) exudative, representing the reaction to acute infection or intoxication and appearing characteristically in the myocardium as Aschoff bodies; (2) proliferative, the latter denoting attempts at healing, with the formation of scar tissue.

There are reasons for believing that roentgen rays, in suitable doses, might be expected to exercise an effect upon rheumatic lesions in the heart. Radiotherapy has been successfully employed in the treatment of certain low-grade infections and is now standard practice in the management of tuberculous lymphadenitis and acne. Even more acute inflammatory conditions, such as carbuncles and furuncles, are usually favorably influenced. The result of the treatment appears to be an increase in the local resistance to the invading organisms, but the mechanism by which this is brought about is not understood.

Another well-known effect of roentgen therapy is its action upon scar tissue. Cicatrices of the skin become softer and more flexible after irradiation and keloids may be greatly reduced in size. Hence, the possibility was considered that the physical condition of thickened, stiff valve leaflets might be altered. However, the dose necessary to modify cicatricial tissue is greater than that used in the treatment of infections and the time required for the change to appear is much longer. It is probable that this effect played no rôle in the results now reported. It is a problem which we propose to investigate.

In presenting this preliminary report, it is realized that the

number of observations is small. The findings are described without any attempt at their interpretation at this time.

Six cases of rheumatic heart disease have received radiotherapy, two of them having been followed for 9 months. In addition to noting changes in clinical condition, frequent electrocardiograms and numerous teleroentgenograms have been made. The radiation was given over the precordium, the size of the field depending upon the size of the heart. It was usually 15x15 cm. The formula was as follows: 200 K. V. peak; 50 cm. target skin distance; 4 ma.; 0.5 mm. copper and 2.0 mm. aluminum filter. The thickness of the left side of the chest was measured with a pelymimeter and the dose determined with the aid of anatomical and isodosis charts. It was calculated to yield about 10 per cent of the theoretical erythema dose in the region of the mitral valve. This dosage is relatively small, but it was necessary to avoid any possibility of cardiac injury.

In three cases, definite and marked clinical improvement has been observed coincident with changes in the form of the electrocardiogram. In one patient, a girl of 13, with large heart and mitral disease, all the usual therapeutic procedures, including several transfusions, were unavailing during a 9 months hospital stay. Fever and tachycardia continued, although there were negligible joint manifestations. The association of betterment with radiotherapy seemed inescapable. A boy of 16 with mitral and aortic disease and greatly enlarged heart had been bed-ridden for many months because of severe attacks of precordial pain accompanied by a rise in blood pressure, resembling the so-called "angina" of more advanced years. Suffering was so intense that he was transferred from another hospital for cervical sympathectomy. Again, radiotherapy proved strikingly effective, but only after 3 treatments had been given. In a third patient whose progress has been unusually satisfactory, the relationship to radiotherapy is less definite. But the electrocardiographic changes afford presumptive evidence that the lesions in the myocardium have been influenced. Three of the cases have thus far received insufficient treatment to warrant a report.

The alterations in the form of the electrocardiograms following radiotherapy have been of three main types: (1) alteration in the form and direction of the T waves; (2) change in the form, direction and notching of Q. R. S.; (3) change in the duration of P-R time, when this was prolonged. In two instances

occasional ventricular premature beats appeared following exposure to the rays. The irregularity was transitory but was regarded as noteworthy in that it was not observed in many other records. No other disturbances in rhythm were noted.

The form changes are not to be regarded as specific but rather as denoting alteration in the course of the excitation wave through the tissues of the heart. The significant fact is their direct relationship to radiotherapy and their association with clinical improvement. Changes of a similar order are frequently observed in rheumatic fever. Cohn and Swift, who have described them in detail, believe that they are indicative of myocardial involvement. The modification of the form of the electrocardiogram apparently associated with roentgen ray therapy suggests that an influence, presumably favorable, has been brought to bear upon the lesions in the heart muscle.

A limited number of roentgen ray treatments has been given to two patients with *Streptococcus viridans* endocarditis without evident effect either on the course of the disease or on the electrocardiogram.

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Changes in biological value of cereal proteins due to heat treatment.

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(Introduced by Carl L. A. Schmidt).

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Young rats taken at weaning were fed diets constituted as follows:

Cereal, 95 per cent.

Salt mixture, 3 per cent (Osborne & Mendel).

Agar, 2 per cent.

Cod liver oil, 25 mg. daily fed separately.

Dry yeast, 0.5 gram daily fed separately.

This mixture should support normal growth provided the