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Effect of Carbon Arc Radiation on the Cardiac Output of Hypertensives.

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Irradiation with the carbon arc lowers the blood pressure of man, particularly in those in whom it is abnormally high.¹ To produce a lowering it is necessary to give a dose of radiation which causes a marked and lasting peripheral vasodilatation.

As part of a study of the influence of carbon arc radiation, it was decided to investigate the cardiac output by the Grollman² method.

A total of 16 irradiations was given to a group of 5 normal controls (medical students and instructors). In every case but one the exposure was followed by an increase in the cardiac output, which reached its peak as a rule on the second or third day, and then returned to normal by the fifth or sixth day. The increase ranged from 12 to 31% and averaged 20%. This is in agreement with the work of Lindhard,³ who found a significant increase in 4 out of 7 subjects after ultraviolet irradiation. The blood pressures for the control group showed an average drop of 6 mm. for the systolic and 8 mm. for the diastolic.

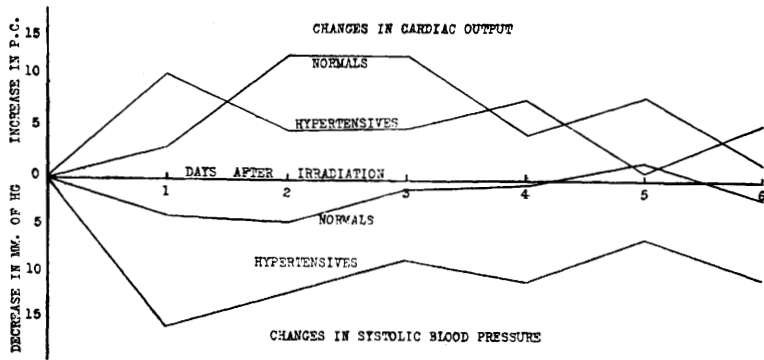
The hypertensive group, with basal blood pressures ranging from 191 to 128 mm. systolic, and 121 to 74 mm. diastolic, was made up of 9 patients with essential hypertension and one with interstitial nephritis. They were given a total of 28 irradiations, and in every case but one there was a fall in blood pressure, the average drop being 19 mm. for the systolic and 10 mm. for the diastolic. The cardiac output increased in 16 instances by an average of 34%, decreased in 8 by an average of 22%, and showed no change in 4.

The figure shows changes in the systolic blood pressure and cardiac output for both groups for several days following a single irradiation. Each point on the curves is determined by the arithmetical average of the changes occurring on that particular day, and is made up from data on all the separate experiments. The greatest response in the hypertensive group occurs on the first day following an irra-

¹ Laurens, H., *The Physiological Effects of Radiant Energy*, 1933, 168.

² Grollman, Arthur, *Am. J. Physiol.*, 1929, **88**, 432.

³ Lindhard, J., *Skand. Arch. f. Physiol.*, 1913, **30**, 73.



diation, while in the normals it is not manifest until the second or third day. In both types of individuals the first and foremost reaction to the irradiation is a widespread peripheral vasodilatation. In normal individuals this is compensated almost entirely by an increase in the cardiac output, the blood pressure remaining practically unchanged. In the hypertensives, on the other hand, there is nearly always a significant depression of the blood pressure, but the cardiac output, as above stated, may in individual cases increase, decrease, or remain unchanged. The prevailing response, however, is an increase, as in the normals, as shown by both its more frequent occurrence and its greater degree of magnitude.

These changes are quite temporary as a rule, and do not outlast the erythema to any extent. In a few cases the depression of blood pressure in the hypertensives has persisted for 10 to 12 days following the last irradiation.

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Effect of Light and of Darkness on Thyroid Gland.

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That darkness or the absence of ultraviolet radiation, particularly of the antirachitic portion, leads to an hyperplasia of the thyroid gland has been suggested by some investigators¹ and denied by

¹ See review by Levine, H., and Remington, R. E., *J. Chem. Ed.*, 1933, **10**, 649.