a percentage deviation from the resting value obtained in the period prior to the breathing of oxygen. Since similar results were obtained when computations were based on the period of breathing air after the administration of oxygen, it is clear that the results cannot be attributed to increased restlessness of the subjects during a prolonged experiment.

Results are shown in Table I. It may be seen that in all but 5 experiments in the total of 66 an increase in respiratory volume occurred with the inspiration of pure oxygen. The average increment was 13.4% for 66 experiments with 33 subjects. Statistical tests indicate that this average increment would occur by chance only once in 1×10^{-6} trials.

The cause of this increase in respiration is speculative but the following possibilities are suggested: (1) because of the increased oxygen tension in the blood, less oxyhemoglobin is reduced in the tissues, thus releasing less base for CO_2 transport from the tissues. In this way the CO_2 tension of the respiratory center itself may be increased with a resulting increase in respiratory volume;[4] (2) the increase in oxygen tension of the blood reduces cerebral blood flow[5] which may result in a local increase in CO_2 in the respiratory center; (3) an increase in oxygen tension in the respiratory center may increase the sensitivity of the center to the normal stimulus so that respiratory volume is increased although no rise in [H+] or pCO_2 occurs.[6]

Summary. Breathing pure oxygen causes a significant rise in the average resting respiratory volume in normal males.

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Thermo-coagulation in Destruction of Tissue in Cerebral Cortex of Small Animals.

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In order to overcome certain mechanical difficulties inherent in the trephining method when applied particularly to the removal of tissue in the none too accessible auditory areas of the rat's cerebral hemispheres, the technic about to be described was devised.

[4] Gesell, R., *Am. J. Physiol.*, 1923, **66**, 5.

[5] Lennox, W. G., and Gibbs, E. L., *J. Clin. Invest.*, 1932, **11**, 1155.

[6] Eastman, W. J., *International Clinics*, Series 46, 1936, **11**, 275.

Although Dennis and Bolton[1] suggested certain advantages of the thermo-coagulation method for the induction of lesions in the rat's brain, they made no attempt to describe in detail the procedures used to induce circumscribed lesions of varying magnitudes and depths in the brains of small animals frequently used in laboratories. The present technic, in brief, has involved the application of a heated platinum wire to a selected area of the exposed skull bone. This wire is left upon the skull for an interval, the magnitude of which depends upon the nature and purpose of the experiment. Microscopic study of the cerebral tissue, following sectioning and staining, indicates clearly that differential destruction of specific cortical layers may be effected by varying the duration of the application of the heated cautery wire to the external surface of the skull. Careful observation of other layers of the cerebrum indicates that the lesions so induced are clearcut and that adjacent cells are normal in appearance.

The data available have been accumulated from the study of the cerebral areas of 35 rats. These animals, all male albinos, were 3 months of age at the time that the cortical operations were performed. The results indicate that the application of the heated cautery tip to the skull for a period of 10 seconds effects the destruction of the outer or first cellular layer of the cortex within the auditory area.[2] If the wire is applied for 20 seconds all cortical layers within this region underlying the tip are destroyed. With an interval of 15 seconds the first five layers are destroyed. Twenty-five and 30-second intervals induce well delimited lesions which extend into the hippocampal regions. A detailed analysis of other areas and the intervals essential for the induction of cortical lesions of differing depths is in progress.

The cautery unit utilized for the induction of these brain lesions by thermo-coagulation has been devised for use in dentistry.* The heat obtained from this instrument is generated by alternating current. The unit is equipped with a dial which can be set for the regulation of the degree of heat generated by the electric current passing through the cautery tip acting as a resistance. A more accurate quantification of the power dissipated in the cautery tip has been made by means of the voltmeter-ammeter method. The calories of heat per second generated by the cautery tip have been determined for each dial reading.

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1 Dennis, W., and Bolton, C., *Science*, 1935, **81**, 297.

2 Pennington, L. A., *J. Comp. Neurol.*, 1937, **66**, 415.

* Cautery unit devised and patented by Burton Manufacturing Company, Chicago.

Additional comments concerning the behavioral data obtained from this study are relevant at this point. These data obtained from carefully controlled observations of the animals in an auditory discrimination apparatus[3] were in general agreement with those obtained from the observations of other animals operated upon by the extirpation method. Although these 2 sets of operative and behavioral data were not strictly comparable because of differential extents and depths of the lesions, it is clear that the method of thermo-coagulation results in postoperative disturbances in animal behavior similar in degree to those observed in animals of the other group.

That the values of this method are numerous seems clear. First, recovery of the animal is rapid. If the investigator wishes, the behavior of the animals may, in most instances, be studied from one to three days after operation. Rapid recovery makes possible a more detailed and complete collection of experimental data pertaining to the problem of the restitution of function following artificial injuries to the nervous system. Second, the procedure requires far less time for the actual performance of the operation, and, hence tends to reduce operative shock. This method does necessitate, however, the aid of an assistant who serves as a timekeeper. Third, the approach makes readily accessible, in the rat brain at least, certain cerebral areas, especially areas *j*, *k*, and *p* delimited earlier by Fortuyn.[4] Fourth, the method results in fewer cases of infection and thus reduces the mortality rate. Fifth, the thermo-coagulation technic is more readily controlled than is the trephine method in studies on small animals. It makes possible the induction of very small or of very large cerebral lesions with fewer technical difficulties than is ordinarily possible with the extirpation method currently in use.

[3] Hunter, W. A., and Pennington, L. A., *Science*, 1939, **89**, 87.

[4] Fortuyn, A. B. D., *Arch. Neurol. and Psychiat.*, London, 1914, **6**, 221.