

C H A P T E R - I X
STUDIES ON THE FUNCTION OF THYROID GLAND DURING
HYPOTHERMIA USING RADIOACTIVE IODINE(I-131)

In the last chapter effects of triiodothyronine (T_3) on the electrocardiographic changes, blood pressure and heart rate produced during hypothermia have been presented. The effect of T_3 had been remarkable due to the fact that it could revert most of the significant electrocardiographic changes produced during hypothermia into insignificant correlation following its administration. This prompted the author to investigate into the functional status of the thyroid gland during hypothermia. The present chapter has been devoted to study the manner in which the thyroid gland handles a tracer dose of radioactive iodine during cold.

Materials and Methods

Nine adult cats of both sexes and of weights varying from 2 - 3 Kg were anaesthetised with nembutal (50 mgm/Kg. body weight) given intraperitoneally. Of the nine cats, five were used as control at body temperature, three for thyroid function study after induction of hypothermia, while

one died during the course of the experiment. The animals after anaesthesia were placed in a supine position on the operating table and fixed in position. A wooden block was placed below so as to hyperextend the neck. A centigrade thermometer was inserted 6 - 8 cms per rectum and the rectal temperature was recorded. A scintillation counter with a suitable collimator was then focussed over the thyroid gland and kept at a fixed distance of 10 cms so as to include the whole of the gland. The channel level and the window of the medical spectrometer (Electronics Corporation, Hyderabad, India. Model No. MDS 26) were selected for the iodine peak of 364 kev at full gain using a counter voltage of 1400 volts. With the above adjustments of the spectrometer, the background count was recorded for five minutes.

Twenty microcuries of I-131 supplied by BARC, Trombay was injected intraperitoneally into the animal after anaesthesia. Counts were taken over the thyroid gland at 2, 4 and 6 hours intervals. A standard phantom containing 20 microcuries of I-131 having similar size and shape was prepared and counted using the same geometrical condition as for the gland. After the experiment the percentage of administered I-131 taken up by the gland was then calculated.

Similar measurements were carried out in hypothermic cats. Cats having similar body weight were cooled to 27°C by

the method of surface cooling, and after the appearance of the 'J' wave in the electrocardiogram, the percentage uptake of radioactive I-131 was estimated in the same way as for the control group.

After 48 hours , PBI (131) was estimated in both the groups using trichloroacetic acid and sodium hydroxide and counting in a well type w scintillation counter (S.H. 639 W). Percentage of administered dose per litre of plasma was calculated by comparing it with a standard , counted under the same geometrical condition.

R e s u l t s

The uptake of radiiodine at 2, 4 and 6 hours were found to be lower in the hypothermic group as compared to the normal controls. The concentration of PBI-131 in the plasma , on the other hand, was found to be higher in cats during hypothermia than those of the controls at normal body temperature. The detailed results have been presented in Tables XV A & B .

C o m m e n t s

The mean percentage uptake of radiiodine at 2, 4 and 6 hours were 13.62 ± 1.32 , 12.99 ± 1.60 and 14.30 ± 1.92 respectively for the cats in the control group, and those for the hypothermic group were 1.06 ± 0.08 , 1.10 ± 0.06 and 1.01 ± 0.05 respectively.

This reduction in the percentage uptake in the hypothermic group was significant ($p < 0.001$). The protein bound iodine as estimated in the present study had a mean value of 0.246 ± 0.112 and 0.398 ± 0.026 for the control and the hypothermic group respectively. In contrast to uptake, PBI-131 in the hypothermic group increased significantly ($p < 0.05$) compared to the control group. The above observations are in agreement with those observed by Brown Grant (1956) , Blair (1969) & Ermans and Camus(1966). The increase in plasma PBI-131 in cats in cold in presence of a low uptake perhaps indicate a low peripheral utilization of the thyroid hormone in cold.