ON SINGLE 'HOT' NODULES OF THE THYROID GLAND

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Apparently single nodules of the thyroid gland, often described, and often incorrectly, as single 'adenomata', are frequently encountered. Such nodules may be separated into 'hot' nodules, in which the uptake of radioactive iodine is greater than in the surrounding gland, 'cold' ones, in which no uptake is found, and 'neutral' ones, in which the contours of radioactivity appear to be unaffected by the presence of the nodules.

Greene (1957) advanced the view that 'hot' and 'neutral' nodules were usually due to hyperplasia of single thyroid lobules produced by stimulation by thyroid-stimulating hormone (TSH) secreted in excess because of a tendency to hypothyroidism. He confirmed the earlier work of Greer & Astwood (1953) and Astwood (1956) that many 'hot' nodules become smaller and may even disappear during treatment with thyroid or thyroxine.

This view has been disputed, notably by Sheline & McCormack (1960) and by Fellinger, Hofler, Egert & Vetter (1961), who showed that the 'hot' nodules investigated by them were autonomous. The number of cases described was small, but, despite this, their work established that in some cases at least the views advanced by Greene were incorrect. The present investigation was carried out in an effort to discover whether all single 'hot' nodules are autonomous or whether some are autonomous and some dependent on pituitary stimulation. It seemed probable that response to treatment with thyroxine would be found to be linked with the latter characteristic. Ex hypothesi it seemed likely that the overall function of the thyroid in patients with dependent 'hot' nodules would be lower than in those with autonomous 'hot' nodules.

We have studied 46 non-toxic patients with apparently single 'hot' nodules for at least 3 months since 1955. All patients were investigated by directional scanning after the administration of $^{131}$I and their level of overall thyroid function was estimated by the method of Fraser, Hobson, Arnott & Emery (1953) and expressed as the 'T' value (normal range 3–13). They were treated with L-thyroxine sodium, 0.2 or 0.3 mg. daily. Their glands were palpated at intervals of 1–4 weeks. In those patients whose nodules became smaller, treatment was continued. Most patients whose nodules failed to respond in from 3 to 6 months were subjected to partial thyroidectomy, treatment with thyroxine being continued thereafter if indicated. All glands removed were examined histologically. In some of the more recent patients, ten in number, the scan of the neck was repeated after treatment with thyroxine for at least 2 months.

Sixteen patients responded to treatment. Those who responded had initially a lower thyroid function than those who did not. Of the ten patients who were sub-
jected to directional scanning before and after treatment with thyroxine, five patients responded to treatment. Suppression by thyroxine of the uptake of iodine by the nodule was associated with a diminution in size of the nodule.

The mean $T$ value in group (a) (4.4) was significantly lower than in group (b) (6.1) and group (c) (7.1). The value of $T$ in group (d) was lower than in group (e) (Fig. 1).

![Graph showing values for $T$](image)

Fig. 1. Values for $T$ in: (a) patients whose single nodules diminished under treatment; (b) those whose single nodules did not diminish; (c) those whose thyroids were found at operation to be multinodular; (d) those in whom the nodular uptake of iodine was suppressed by thyroxine; (e) those in whom the nodular uptake was not suppressed. ×, response to thyroxine; ○, no response. The arrows show the mean values.

It would therefore appear that there are two types of hot nodule. (1) Autonomously active nodules whose uptake of iodine is not suppressed and whose size is not diminished by thyroxine. The overall thyroid function of the patient is normal. (2) Pituitary-dependent nodules whose uptake of iodine is suppressed and whose size is diminished by thyroxine. The overall thyroid function in this group is lower than in group 1.

**REFERENCES**