

# Nasal Hot Spot Appearance as a Physiological Uptake Variation in Iodine-131 Scanning

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**Objective:** Physiological uptake sites and secretion of  $^{131}\text{I}$  are potential causes of misleading images. This case report demonstrates  $^{131}\text{I}$  accumulation in the nose as a hot spot.

**Methods:** A 40-year old woman with papillary thyroid carcinoma was scanned following the oral administration of 185 MBq  $^{131}\text{I}$ , 6 mo after surgery and  $^{131}\text{I}$  therapy.

**Results:** Whole-body and spot images of the head and neck revealed localized tracer uptake in the nasal region and in the thyroid bed due to residual thyroid tissue. The lateral view showed soft tissue accumulation in the distal portion of the nose. Static images were acquired after the patient scoured her nose and mouth of secretions. Marked decrement of the activity confirmed the presence of radioactive mucus.

**Conclusion:** Nasal secretion of  $^{131}\text{I}$  may cause nasal hot spot appearance that can lead to false positive interpretations in thyroid cancer patients. This case report emphasizes the importance of evaluation of physiological uptake sites.

**Key Words:** iodine-131 whole body scan; nasal secretion; thyroid cancer

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Iodine-131 is known to accumulate in metastatic foci of papillary or follicular carcinoma. As a screening test,  $^{131}\text{I}$  whole-body scanning often demonstrates unexpected metastases. False positive radioiodine uptake due to nonthyroidal tumors (e.g., primary lung adenocarcinoma), cysts (e.g., pleuropericardial cyst), pathologic transudates (e.g., scrotal hydrocele) and inflammations (e.g., inflammatory lung disease) have been reported (1-4). Possible artifacts and physiological uptake sites of  $^{131}\text{I}$  are well known. However, defining variations of normal uptake areas is still important to avoid false positive interpretations (5). We report a case of  $^{131}\text{I}$  accumulation in the nasal mucus after administration of 185 MBq  $^{131}\text{I}$  for a diagnostic whole-body scan.

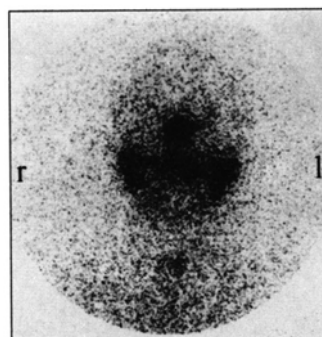
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## CASE REPORT

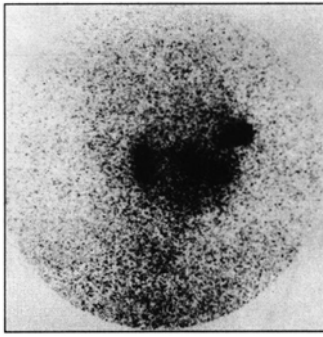
A 40-year old woman underwent bilateral subtotal thyroidectomy for removal of papillary thyroid carcinoma. The remaining gland was ablated with 3700 MBq  $^{131}\text{I}$ . Six months after the ablative therapy, the patient was reimaged with 185 MBq  $^{131}\text{I}$ . Forty-eight-hr anterior and lateral spot images of the head and neck were acquired for 10 min using a gamma camera (Starcam XC/T 4000i, General Electric, Milwaukee, WI) equipped with a medium-energy collimator. The photopeak was centered at 364 keV with a 20% symmetric energy window. The anterior view revealed  $^{131}\text{I}$  accumulation in the residual thyroid tissue and in the midline overlying the nasal area resembling an uptake in the facial bone or a possible nasopharyngeal metastasis (Fig. 1). A right lateral view of the head was obtained that showed exclusively nasal localization of the uptake (Fig. 2). A repeat lateral view obtained after nose and mouth cleaning, demonstrated significant decrement of the nasal activity (Fig. 3). This observation was confirmed by the presence of radioactive mucus.

## DISCUSSION

Normal areas of  $^{131}\text{I}$  uptake, which are routinely seen on  $^{131}\text{I}$  scans, include the nasopharynx, salivary glands, gastric mucosa, choroid plexus, mammary glands in females, urinary bladder, bowels (related to salivary and nasal secretions) and occasionally nasal mucosa (6-8). Iodine-131 uptake also may be seen after thyroidectomy anywhere along the thyroglossal duct tract

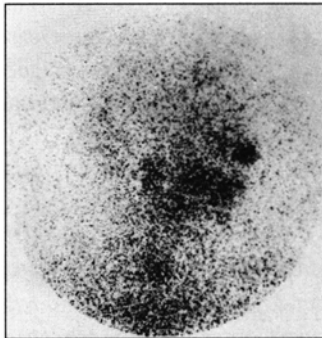


**FIGURE 1.** 48-hr anterior spot image showing  $^{131}\text{I}$  accumulation in the nasal area.



**FIGURE 2.** Right lateral view of the head confirming the nasal localization.

from the tongue to the pyramidal lobe. Artifacts due to saliva and sweat have been described already (6). The interpretation of physiological uptake of  $^{131}\text{I}$  in the nasopharynx and salivary glands in anterior scans can be troublesome in cases of atypical variations. Significant nasal secretion of  $^{131}\text{I}$  was demonstrated by Park and Wellman after a therapeutic dose of 3330 MBq (9). After the ingestion of a 185-MBq  $^{131}\text{I}$  capsule, this case showed the same finding under diagnostic imaging conditions. Thus, the intensity of nasal  $^{131}\text{I}$  secretions does not seem to be



**FIGURE 3.** Right lateral view of the head showing the activity decrement after nose cleaning.

a dose-dependent process. A handkerchief contaminated by a patient with nasal  $^{131}\text{I}$  secretion may also cause misleading hot spots (10).

In conclusion, nasal secretions of  $^{131}\text{I}$  may cause hot spot appearances on diagnostic scans. Lateral views of the head must be obtained in any case of unusual facial tracer uptake. We emphasize that nuclear medicine professionals must be familiar with the structures that normally concentrate  $^{131}\text{I}$  to prevent patients from unnecessary irradiation risks due to false-positive diagnostic scans.

## REFERENCES

1. Fernandez-Ulloa M, Maxon HR, Mehta S, et al. Iodine-131 uptake by primary lung adenocarcinoma. *JAMA* 1976;236:857-858.
2. Francesc C, Schlumberger M, Travagli JP, et al. Iodine-131 uptake in a pleuropericardial cyst: case report of a false-positive radioiodine total-body scan result in a patient with a thyroid cancer. *Eur J Nucl Med* 1991;18:779-80.
3. Greenler DP, Klein HA. The scope of false-positive  $^{131}\text{I}$  images for thyroid carcinoma. *Clin Nucl Med* 1989;14:111-117.
4. Hoschl R, Choy DH, Gandevia B. Iodine-131 uptake in inflammatory lung disease: a potential pitfall in treatment of thyroid carcinoma. *J Nucl Med* 1988;29:701-706.
5. Bakheet S, Hammami MM. False-positive thyroid cancer metastasis on whole-body radioiodine scanning due to retained radioactivity in the esophagus. *Eur J Nucl Med* 1993;20:415-419.
6. Bender JM, Dworkin HJ. Iodine-131 as an oncology agent. *J Nucl Med Technol* 1993;21:140-150.
7. Sarkar SD. In vivo thyroid studies. In: Gottschalk A, Hoffer PB, Potchen EJ, eds. *Diagnostic nuclear medicine*, 2nd ed. Baltimore, MD: Williams and Wilkins; 1988:756-768.
8. Charkes ND. Thyroid and whole-body imaging. In: Werner SC, Ingbar SH, Braverman LE, eds. *Werner's the thyroid: a fundamental and clinical text*, 5th ed. Philadelphia, PA: J.B. Lippincott Co. 1986:437-473.
9. Park HM, Wellman HN. Hot nose after  $^{131}\text{I}$ -sodium iodide thyroablation therapy. *Clin Nucl Med* 1992;17:130-131.
10. Boxen I, Zhang ZM. Nasal secretion of  $^{131}\text{I}$ . *Clin Nucl Med* 1990;15:610-611.