

Case Report

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# Watch Out” for Unexpected Radioiodine Uptake on Post-therapy Thyroid Cancer Imaging

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## Abstract

Unexpected radioiodine distributions may be encountered on post-therapy I-131 thyroid cancer scans due to a range of benign physiological processes, causing diagnostic dilemma and potentially mimicking metastatic disease. We present two cases of intense focal uptake related to concentration of radioiodine activity on wrist-watches by differing mechanisms, which should be confirmed by clinical history and not be mistaken for metastatic disease.

**Keywords:** Radioiodine; Thyroid cancer; Thyroidectomy; Paratracheal

## Case 1

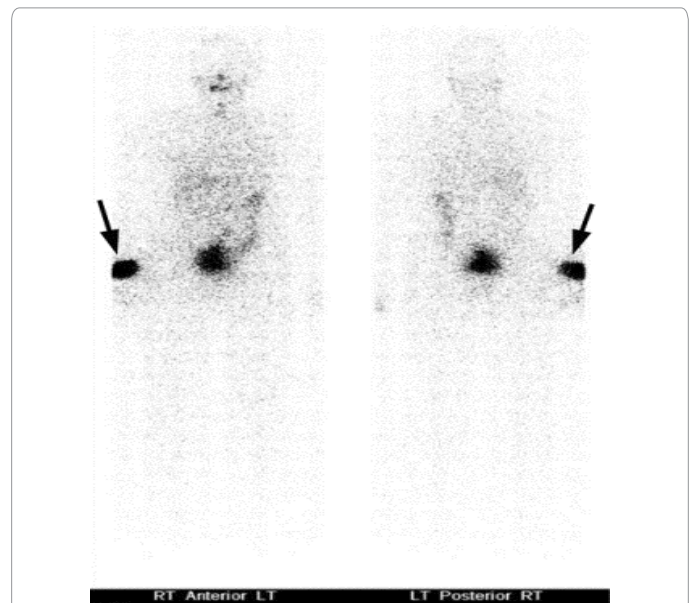
A 32 year-old woman with papillary thyroid cancer was referred to our clinic for radioiodine treatment following total thyroidectomy. Diagnostic 2mCi (74 MBq) I-131 thyroid cancer imaging scan was performed which showed focal neck uptake corresponding to remnant thyroid tissue and a small iodine-avid paratracheal neck lymph node (not shown). She had T2 N1 M0, stage I disease. She received 182 mCi of I-131 and a post-therapy scan was obtained at day 5 which demonstrated intense uptake at her right wrist, subsequently determined to relate to her wrist-watch (Figures 1 and 2). This case demonstrates an unusual site of contamination due to the leather band of a wrist-watch that was absorbing and concentrating radioiodine activity within sweat. She was an avid fitness fanatic and was performing exercise routines at home in the period immediately following radioiodine therapy. The watch surface had a 2 mR/hr radioactivity count on survey. For radiation safety concerns we kept the watch in our department to ensure spontaneous decay of the radioiodine uptake, and the patient decline to retrieve it.

## Case 2

A 63 year-old male patient with a history of Hürthle cell variant of follicular thyroid cancer underwent a right thyroid hemi-lobectomy with resection of a 4.5 x 3 x 3 cm thyroid cancer with vascular invasion and microscopic capsule invasion. He underwent completion thyroidectomy and had pT3 Nx, stage III disease. He received 145 mCi I-131 for remnant ablation and treatment. A year later a follow-up recombinant human TSH (rhTSH, Thyrogen) -stimulated whole body I-131 scan showed persistent uptake in the neck consistent with remnant thyroid tissue and iodine-avid disease (not shown). His stimulated thyroglobulin after Thyrogen administration was elevated to 4.1 ng/mL suggesting persistent disease. F-18 fluorodeoxyglucose PET/CT with Thyrogen showed no metabolic evidence of residual or recurrent disease, although the stimulated thyroglobulin remained elevated at 3.8 ng/mL. The multidisciplinary tumor board recommended I-131 therapy administered under hypothyroidism. The patient returned for post-therapy imaging at 19 days after administration of 156 mCi I-131. The later than usual imaging point was related to the patient's travel circumstances. The scan revealed unexpected uptake at his left wrist (Figure 3). On questioning it was determined that this radioactivity was related to salivary contamination of the patient's wrist-watch, which occurred as the patient was in the habit of cleaning the glass surface of the watch with his spit and this has accumulated over time. It was recommended that he clean the surface of his watch.

## Discussion

Whole body diagnostic or post-therapy imaging with radioiodine is performed to detect iodine-avid thyroid cancer metastases. Knowledge of potential causes of unusual distributions of radioiodine is important to avoid misinterpretation and false-positive reports.



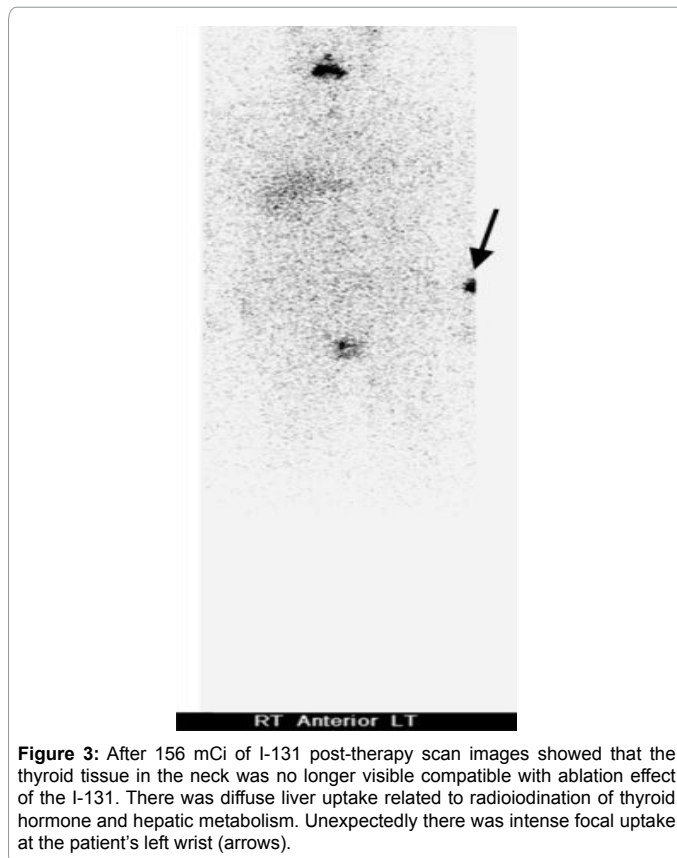
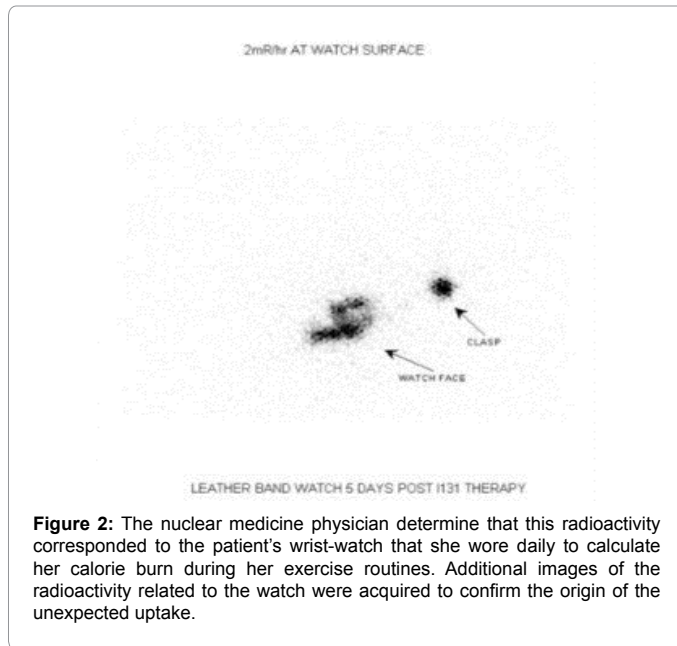
**Figure 1:** After 182 mCi of I-131 post-therapy scan anterior and posterior whole body images (A) redemonstrated the previously seen focal neck uptake and expected radioiodine distribution within physiological structures including the nasal mucosa, nose, oral cavity, salivary glands, stomach, liver, bowel and bladder. However, there was abnormal intense radioiodine accumulation projecting over her right wrist (arrows) not seen on the diagnostic scan.

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These two cases demonstrate benign causes of unexpected radioactivity distribution related to wrist-watches by differing mechanisms, namely concentration of radioiodine in sweat and salivary contaminations respectively. Radioiodine contamination in secretions has been well documented to occur in saliva, sweat, tears, nasal secretions, breast milk, vomitus and from gastrointestinal and genitourinary excretory pathways [1]. Radioiodine in salivary secretions may pool in the oral cavity, be retained in the esophagus, or appear at external sites above the waist (hair, skin, clothing, handkerchiefs, tissue paper, etc.) [1-6]. Increased radioiodine activity in sweat has also been reported [7]. On occasion external metallic objects may become contaminated with secretions including an artificial eye, nose-rings, watches and necklaces, to name a few [1,8-10]. These cases have implications for radiation safety advice to patient's to avoid possible exposure to members of the public as they show that radioactive iodine can accumulate to a greater extent than expected due to concentration over time.

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