A 54-year-old Caucasian male had a witnessed collapse on the street. He was transported to the emergency department and subsequently pronounced dead. An unlimited autopsy examination was conducted under authorization of the coroner. Medical record review later revealed that the decedent had a history of alcohol abuse, chronic obstructive pulmonary disease, congestive heart failure, and chronic osteomyelitis treated by minocycline 100 mg twice daily. Autopsy revealed the cause of death to be ruptured gastroesophageal varices with nearly one liter of recent hemorrhage in the stomach and gastrointestinal tract. Other findings compatible with a history of alcoholism included hepatosplenomegaly, hepatic steatosis, and early bridging fibrosis. The decedent’s thyroid was multinodular and enlarged at 50 gm. The thyroid gland, in its entirety, is shown below with serial sections made longitudinally through the gland capsule to reveal the underlying parenchyma.

**Figure 1:** Gross image of the thyroid gland eviscerated at autopsy, serially sectioned longitudinally, that shows charcoal black pigmentation of the gland parenchyma extending full thickness from the capsular surface.

What is the diagnosis in this thyroid gland and what is the likely cause?
Minocycline-induced black thyroid (MIBT) is a rare condition that was first described in 1967 by Benitz et al. in the thyroidal tissues of laboratory animals. It was not documented in the thyroid glands of humans until nearly 10 years later when Attwood et al. reported a single case at autopsy in a man with bronchiectasis and emphysema treated antemortem with twice daily minocycline for one year. A tetracycline-derived, semisynthetic broad-spectrum antibiotic, minocycline was first used clinically in 1967. It is used most commonly to treat long-term acne vulgaris but also can be used to treat other bacterial infections such as pneumonia, urinary tract infections, skin infections, and methicillin-resistant Staphylococcus aureus infections as may be seen in osteomyelitis. Pigmentation as a side effect of minocycline therapy has not only been seen in the thyroid gland but has also been documented in the skin, oral mucosa, bone, nail beds, heart valves, and teeth. Since the original MIBT publication, the literature cites approximately 60 total cases, some following minocycline exposures as short as 12 days in duration.

Pathologic examination of a MIBT reveals characteristic gross features, including the eponymous charcoal black coloring in a full-thickness distribution from the capsular layer throughout the entire thyroid parenchyma. Neither gland enlargement (goiter) nor nodularity of the thyroid is specifically associated with the pigment deposition. Histology reveals intracytoplasmic accumulation of “dust like” granules most often within follicular epithelial cells or tissue macrophages. The differential diagnosis includes iron and ochronotic pigment depositions. Iron accumulation within the thyroid can be seen in patients with hemosiderosis either due to primary or secondary hemochromatosis. Iron, however, typically manifests grossly as a ruddy or maroon discoloration and will stain positively with iron stains such as Prussian blue. Ochronotic pigment is a black-appearing pigment that accumulates in tissue in association with the autosomal recessive condition of ochronosis. Histology was characteristic, and iron stains were negative. There was sometimes known as a Melanosis thyroidii. Histology was characteristic, and iron stains were negative. There was no evidence of malignancy on multiple histologic sections submitted. The diagnosis was made incidentally at the time of autopsy. There is currently an additional need for case reporting of MIBT in order to establish any causal link between pigmentation and the development of malignancy. A longtime believed harmless phenomenon, MIBT should be reconsidered by clinicians across disciplines as further mechanisms of possible carcinogenesis are explored. In the meantime, the current literature supports a more thorough pathologic examination of these surgical specimens than once previously recommended.

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