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## Case Report

# Tattoo pigment mimicking axillary lymph node calcifications on mammography

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## ABSTRACT

Axillary lymph nodes can appear abnormal on mammography due to uptake of tattoo pigment and a malignant cause must be excluded through diagnostic workup. Furthermore, tattoo pigment can mimic malignant pathology at surgery or confound appropriate staging of breast cancer. We present the case of a 47-year-old female with left axillary lymph nodes demonstrating new coarse densities suspicious for malignant calcifications on screening mammogram. Stereotactic guided biopsy was performed which demonstrated pigment from a recent tattoo located on the patient's back and/or flank. Awareness of current or prior tattoos in a patient is helpful to properly manage such cases.

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## Introduction

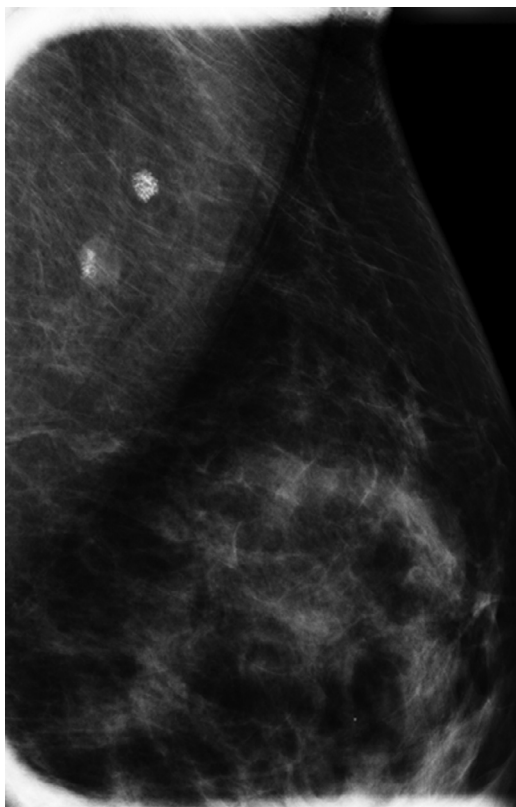
Abnormal appearing axillary lymph nodes identified on routine screening mammograms warrant further workup in part because diagnosis of metastatic disease is one of the most important prognostic parameters for breast cancer. Uptake of tattoo pigment is an uncommon reason for abnormal appearance of an axillary lymph node, however given the increasing frequency that younger cohorts are getting tattoos, the prevalence of this finding has the potential to increase in the coming years.

## Case report

A 47-year-old female presented for screening mammogram which demonstrated coarse densities within 2 left axillary lymph nodes but no abnormal findings within either breast or the right axilla. This was not seen on the most recent mammogram performed 3 years prior. Magnification views confirmed the appearance of coarse heterogeneous calcifications (Fig. 1). Targeted left axillary ultrasound demonstrated a normal appearing lymph node with no hyperechogenicity or shadowing to suggest calcifications. Upon questioning, the patient

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**Fig. 1** – Left medial lateral oblique magnification view of the left axilla demonstrates coarse hyperdensities in 2 axillary lymph nodes, not seen on mammogram performed 3 years prior. No abnormalities were seen in either breast or in the right axilla on the mammogram. Normal appearing lymph nodes were seen in the left axilla on ultrasound (not shown).

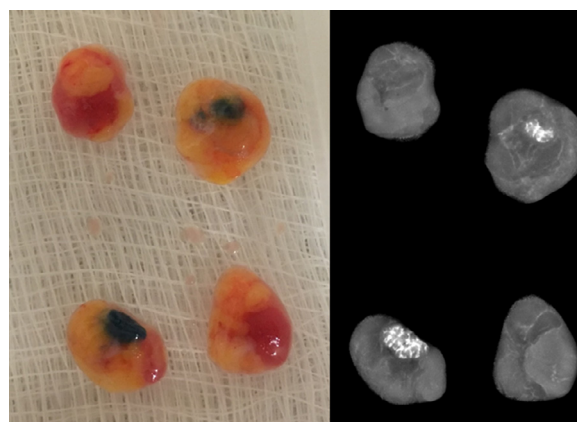
reported multiple tattoos including one of a blue hippopotamus on her left flank and back 2 years prior (Fig. 2). Stereotactic guided biopsy was performed. Photograph of the specimens demonstrated blue tattoo ink corresponding to the areas of hyperdensities on specimen radiograph (Fig. 3). Histology demonstrated a lymph node with pigment-laden sinus histiocytosis without evidence of malignancy.

## Discussion

Tattoos have become more mainstream in the United States over the past few decades. This change is being driven by younger age cohorts with 38% of millennials having at least 1 tattoo compared to 32% of Gen X and 15% of Baby Boomers [1]. The prevalence of tattoos is also increasing with women specifically; 15% of women reporting at least 1 tattoo in 2003 compared to 31% in 2016. The same poll showed that half of women aged 30-39 had a tattoo in 2016 [2]. As these younger women reach the age of 40 and start obtaining screening mammograms, the percentage of patients with tattoos routinely seen by breast imagers will continue to increase.



**Fig. 2** – Photograph of the patient's blue hippopotamus tattoo on her left flank and back which she obtained 2 years prior. This tattoo measured approximately 12 cm by 10 cm and no other tattoos were present on the left side of her body or on either side of her torso.



**Fig. 3** – Photograph of the specimens from stereotactic guided biopsy demonstrated blue tattoo ink corresponding to areas of hyperdensities on specimen radiograph.

Tattoos are created by repeated piercing the skin with a small needle and injecting a small amount of ink into the dermis. The ink consists of a pigment as well as a carrier such as ethanol or water that allows uniform distribution. Tattoo pigments consist of metal oxides, herbal tinctures, or synthetic molecules which vary depending on the color desired [3]. These metal oxides are radiopaque and can appear similar to calcifications on imaging [4]. The body responds to this injected material by removing the smaller pigment molecules through passive transport along lymphatic vessels and active transport via phagocytosis within days of exposure [5,6]. Tattoo pigment travels systemically via the bloodstream to deposit in the liver [7] and regionally to lymph nodes where it remains even if the original tattoo is removed by laser surgery or dermabrasion [8]. Pigment from a tattoo located on the lower flank and/or back, as in our patient, would drain to the ipsilateral axilla in approximately 90% of cases, but lymphatic

drainage is highly variable and this area may drain to the groin, triangular intermuscular space, and even through the body wall to retroperitoneal areas [9].

Migration of tattoo pigment particles from the dermis to lymph nodes can mimic other disease processes at surgery and on imaging. Gross black appearance of a sentinel lymph node is highly suggestive of metastatic disease when lymph node dissection is performed for melanoma treatment. Therefore, tattoo pigment mimicking melanoma metastases can result in unnecessary complete nodal dissection rather than termination of the dissection [8]. During breast surgery, a superficially located pigmented axillary lymph node may mimic a sentinel node with blue dye on visual inspection and be incorrectly removed while the true sentinel is left behind, potentially understaging the patient [10]. Thus immunohistological studies should be performed on lymph nodes for melanoma treatment [11] and dual tracer technique for breast cancer lymph node mapping may be necessary to correctly evaluate lymph nodes in patients with tattoos.

Axillary lymph nodes in patients with tattoos can appear abnormal both due to their size and/or density. Lymph nodes which have taken up tattoo pigment undergo hyperplasia, particularly those in the axilla and groin [6], and can appear similar to enlarged lymph nodes due to metastatic disease. In addition, lymph nodes containing the various metal oxides in tattoo pigment can appear as hyperdense and mimic calcifications [12]. Density within lymph nodes such as this may also be due to benign or malignant causes such as tuberculosis [13], fat necrosis [14], gold deposition after chrysotherapy [15], primary breast malignancy [16], and other malignancies such as ovarian carcinoma [17]. Therefore, clinical history of prior tattoos and physical exam of the patient is necessary to guide management. If biopsy is warranted to confirm the specific diagnosis, suspicion of tattoo pigment laden lymph nodes should be shared with the pathologist.

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