

AMSER Case of the Month

October 2026

63 y/o female presents for routine screening
mammogram

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Patient Presentation

- HPI

- 63-year-old asymptomatic female presenting for routine screening mammography

- Past Medical History

- **Cutaneous & Vascular:** Episodic digital cyanosis (Raynaud phenomenon), diffuse subcutaneous skin lesions (digits, forearms, shins), and skin thickening
 - **Cardiopulmonary:** WHO Group 1 pulmonary arterial hypertension (PAH) with chronic pericardial effusion
 - **Gastrointestinal:** GERD managed with a PPI

Pertinent Exams and Labs

- **Surgical history:**

- Multiple surgical excisions of hard calcified skin lesions
- Pericardial window for recurrent pericardial effusions
- RLE arterial bypass surgery due to cyanosis and occlusions

- **Family history:**

- No family history of breast or other cancers in immediate and extended family

- **Physical Exam:**

- Chest: Edematous, ulcerated lesions with leaking yellow serous fluid
- L thigh: 6 x 3cm oval, palpable, hard deposit in the dermis of the skin with expressible milky exudate when palpated
- LLE: Mild warmth, edema, and redness
- RLE: Scabbed lesions, no pus, mild edema

- **Lab Values:**

- | | |
|----------------------------------|----------------------------------|
| • Calcium: 8.7 mg/dL | Reference Range (8.5-10.2 mg/dL) |
| • Phosphate: 4.6 mg/dL | Reference Range (2.7-4.6 mg/dL) |
| • 25-Hydroxy Vitamin D: 21 ng/dL | Reference Range (30-100 ng/dL) |

What Imaging Should We Order?

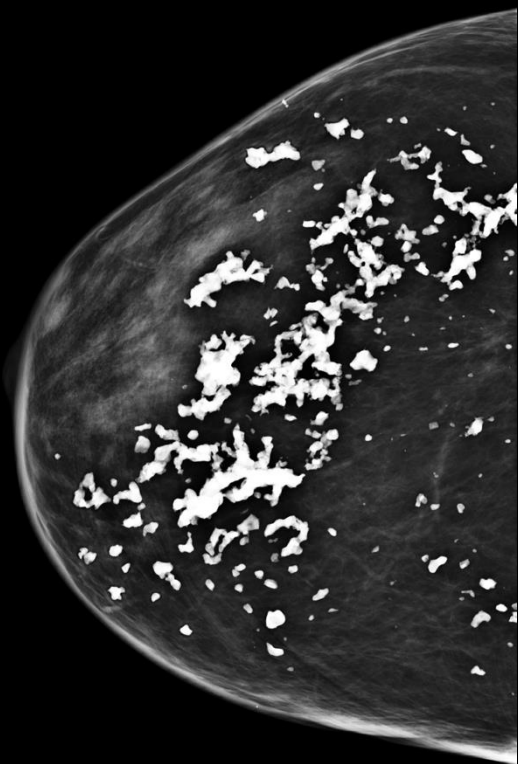
Select the applicable ACR Appropriateness Criteria

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
This imaging modality was ordered per standard screening guidelines Breast cancer screening, average risk	3197134	● Digital breast tomosynthesis screening	0.1-1mSv ☢☢		Usually appropriate
		● Mammography screening	0.1-1mSv ☢☢		Usually appropriate
		● US breast	0 mSv ○	0 mSv [ped] ○	May be appropriate
		● MRI breast without and with IV contrast	0 mSv ○	0 mSv [ped] ○	May be appropriate
		● MRI breast without and with IV contrast abbreviated	0 mSv ○	0 mSv [ped] ○	May be appropriate
		● Mammography with IV contrast	0.1-1mSv ☢☢		Usually not appropriate
		● MRI breast without IV contrast	0 mSv ○	0 mSv [ped] ○	Usually not appropriate
		● MRI breast without IV contrast abbreviated	0 mSv ○	0 mSv [ped] ○	Usually not appropriate
		● Sestamibi MBI	1-10 mSv ☢☢☢		Usually not appropriate

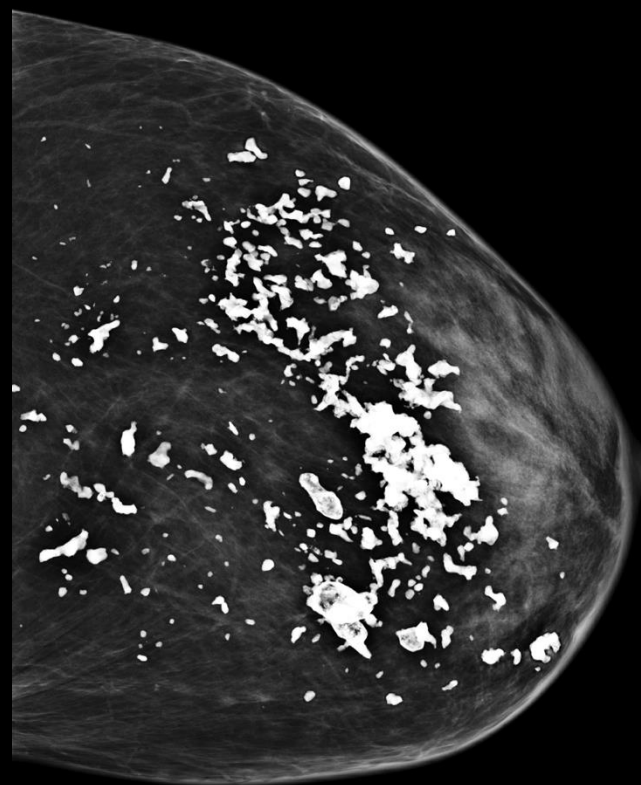
Select the applicable ACR Appropriateness Criteria

- Given the systemic nature of her symptoms and the wide array of modalities that can be used to address each of them, the ACR Criteria for her breast cancer screening was chosen as the focus
- Each of the non-breast scans that are presented within this presentation has their own set of ACR appropriateness criteria
- The breast cancer screening is labeled as the primary findings
- Associated systemic findings are labeled as associated findings

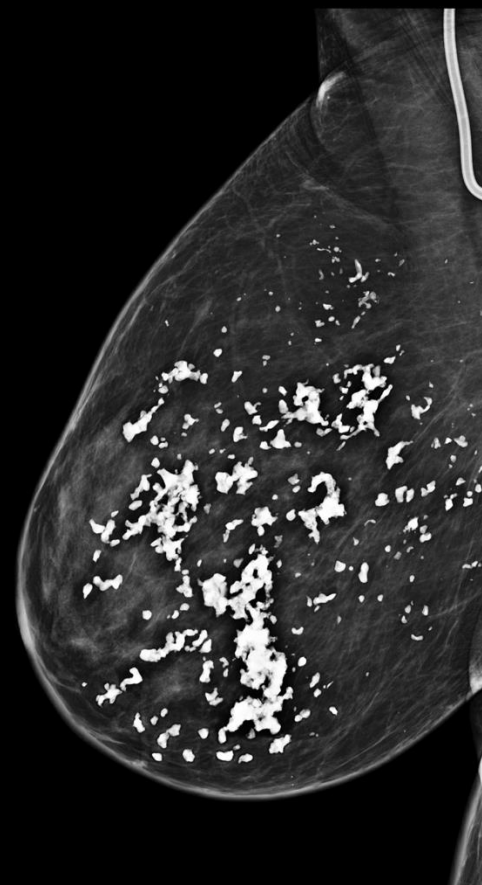
Primary Findings (Unlabeled)



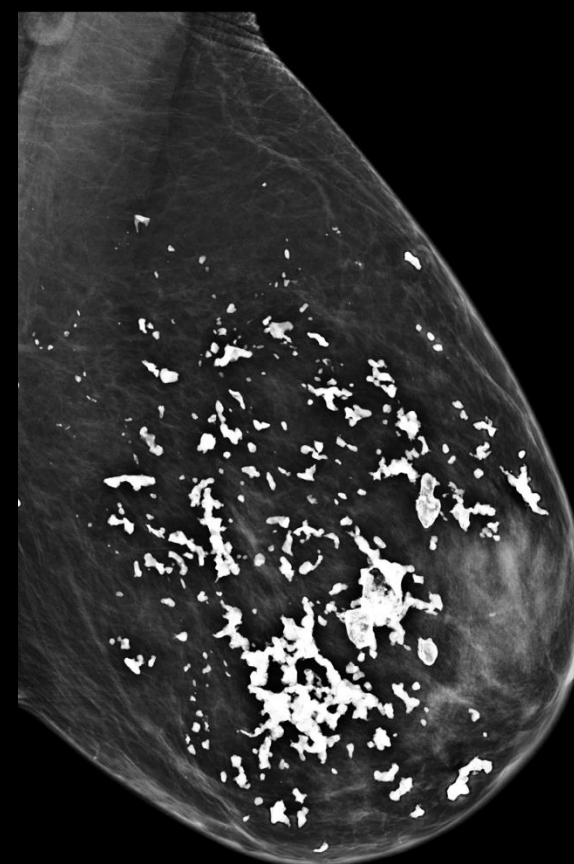
Mammogram R CC (2026)



Mammogram L CC (2026)

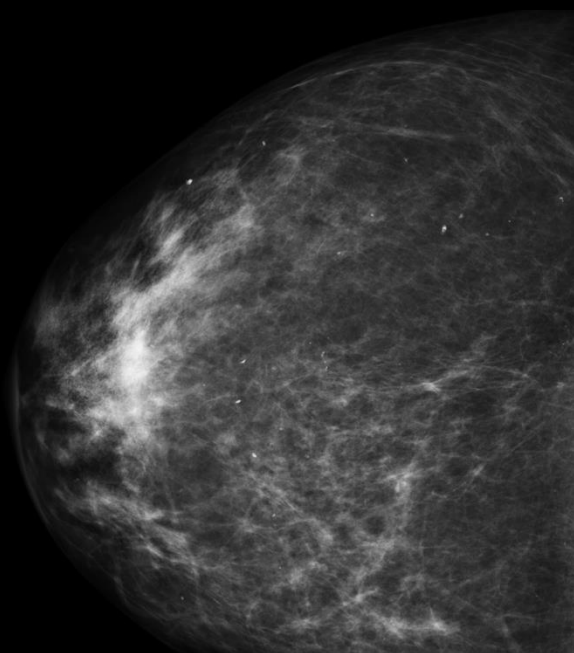


Mammogram R MLO (2026)



Mammogram L MLO (2026)

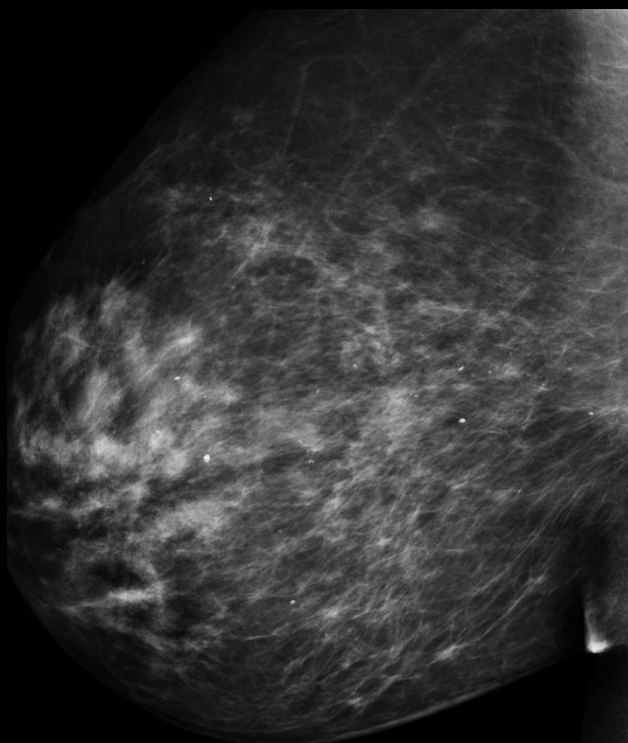
Primary Findings (Unlabeled)



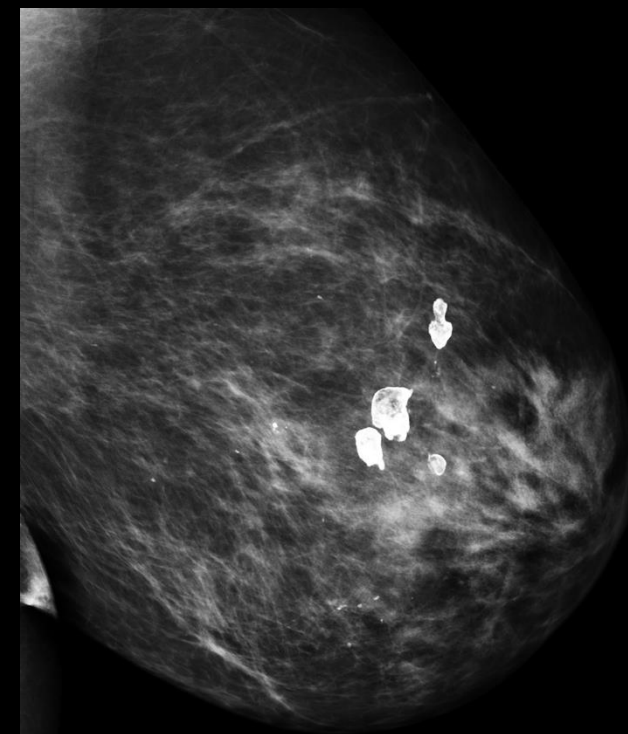
Mammogram R CC (2010)



Mammogram L CC (2010)



Mammogram R MLO (2010)

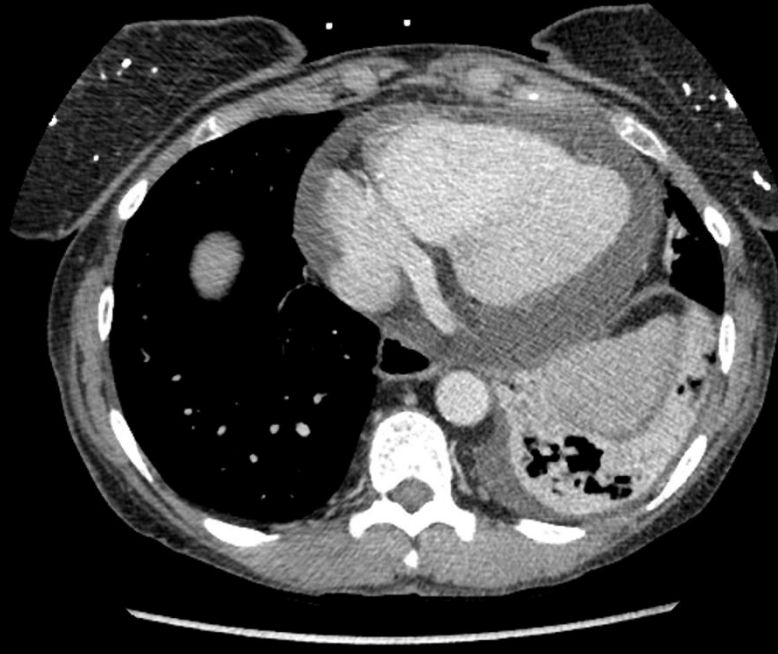


Mammogram L MLO (2010)

Associated Findings (Unlabeled)



Axial Contrast-Enhanced CT Chest
(Level of pulmonary arteries)

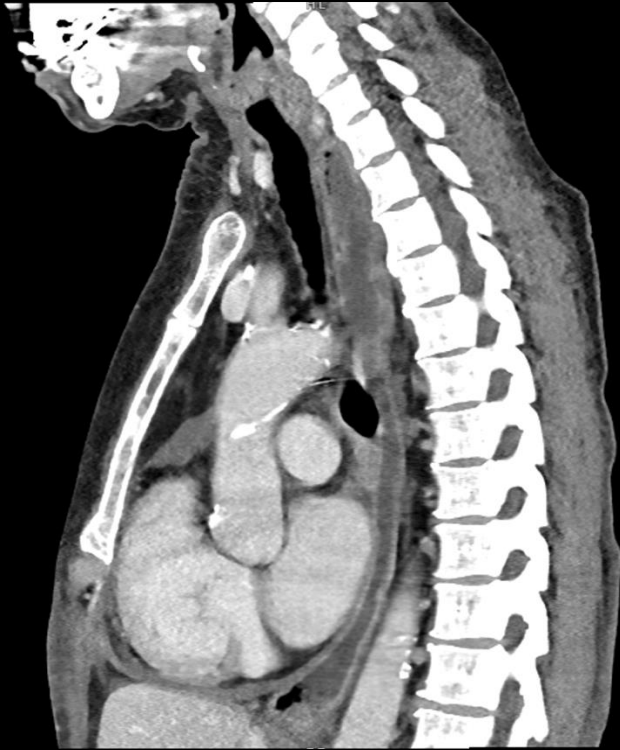


Axial Contrast-Enhanced CT Chest
(Level of heart ventricles)

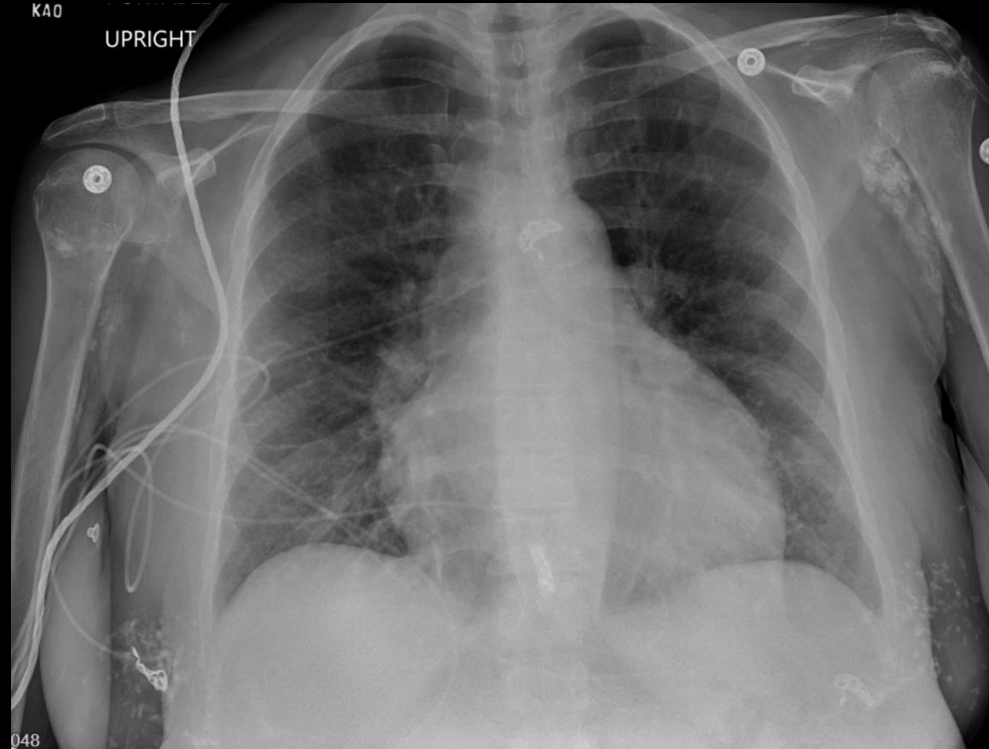


Axial Contrast-Enhanced CT Chest
(Level of diaphragm)

Associated Findings (Unlabeled)



Sagittal Contrast-Enhanced
CT Chest



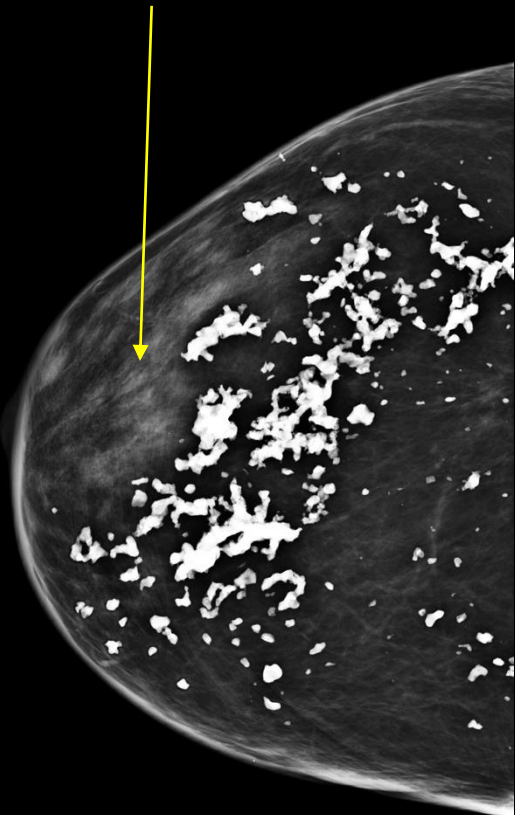
Upright AP Chest Radiograph



PA Radiograph Left Hand

Primary Findings (Labeled)

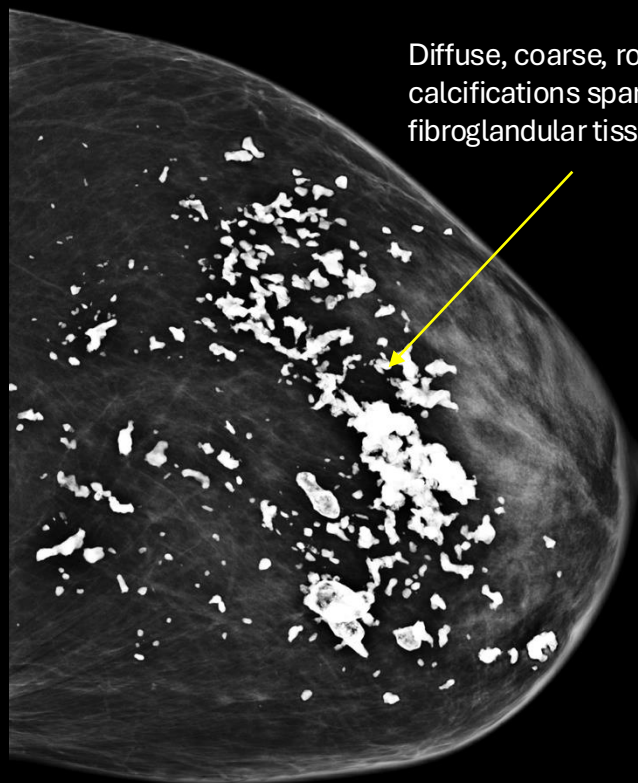
Fibroglandular Tissue



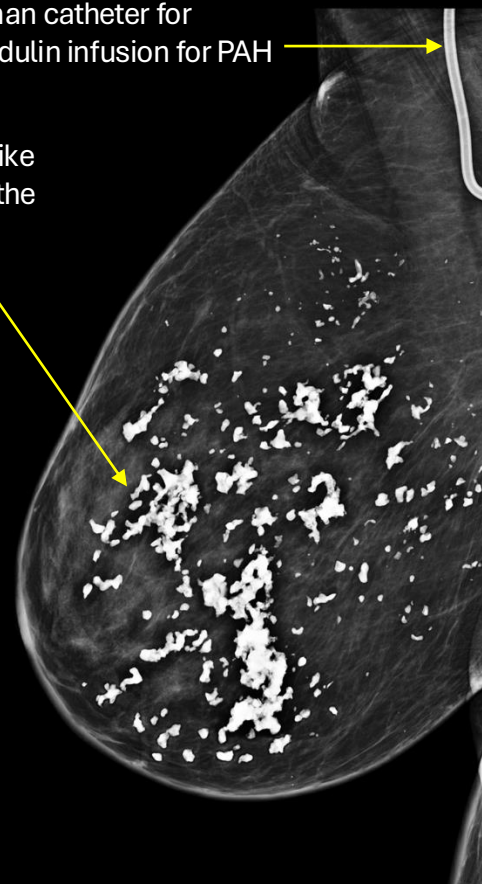
Mammogram R CC (2026)

Hickman catheter for
Remodulin infusion for PAH

Diffuse, coarse, rock-like
calcifications sparing the
fibroglandular tissue

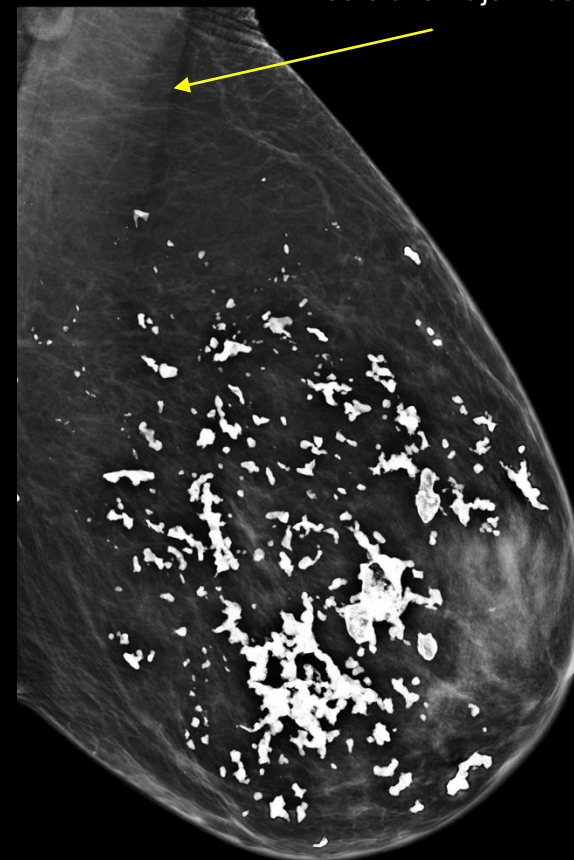


Mammogram L CC (2026)



Mammogram R MLO (2026)

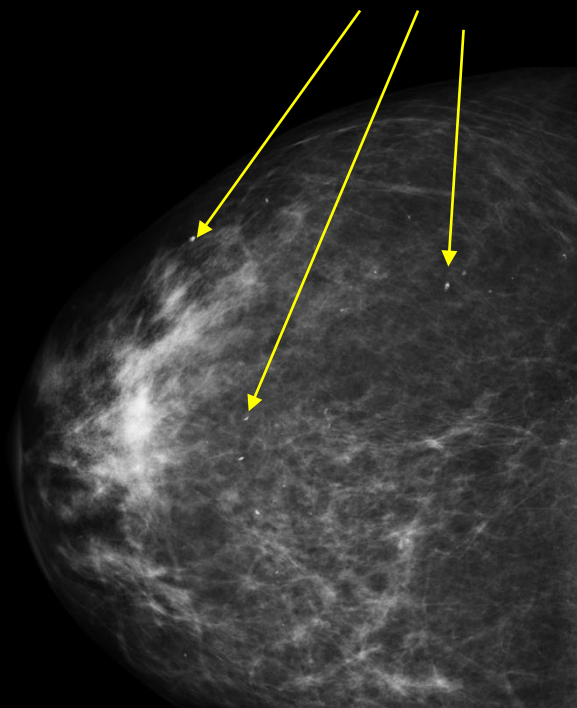
Pectoralis Major Muscle



Mammogram L MLO (2026)

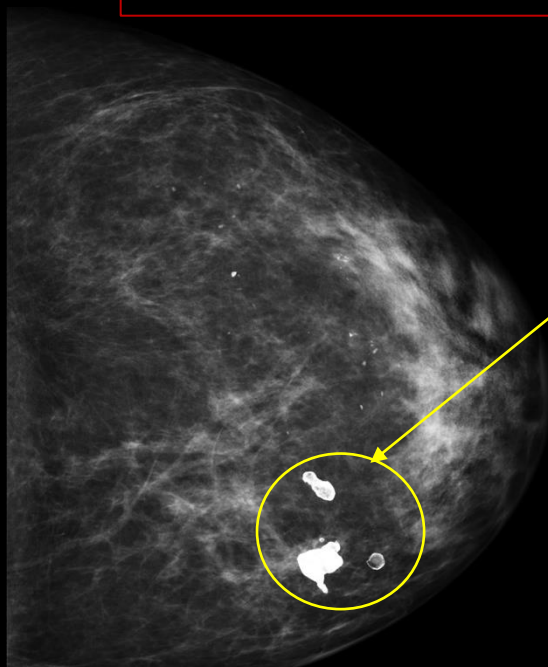
Primary Findings (Labeled)

Scattered round calcifications with total absence of coarse calcifications within the breast



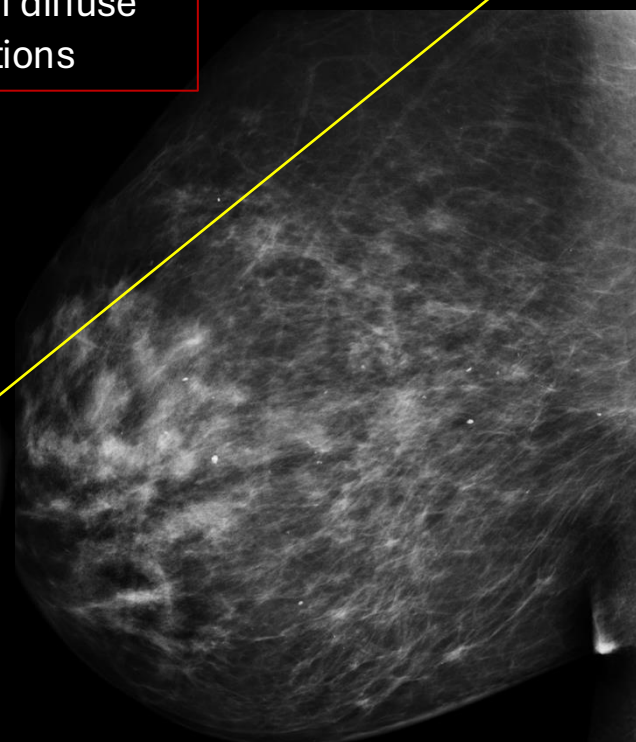
Mammogram R CC (2010)

Comparison with the 2026 mammogram shows progressive 16-year accumulation of diffuse subcutaneous calcifications

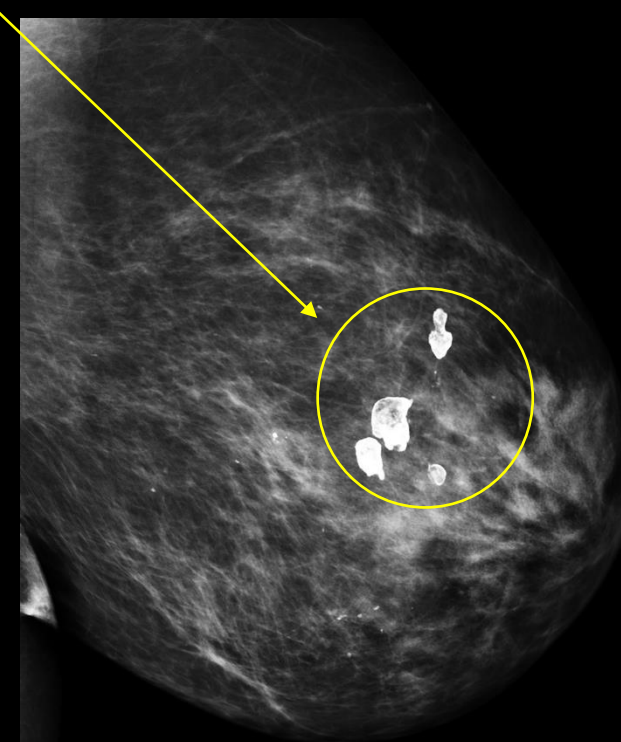


Mammogram L CC (2010)

Focal cluster of coarse calcifications



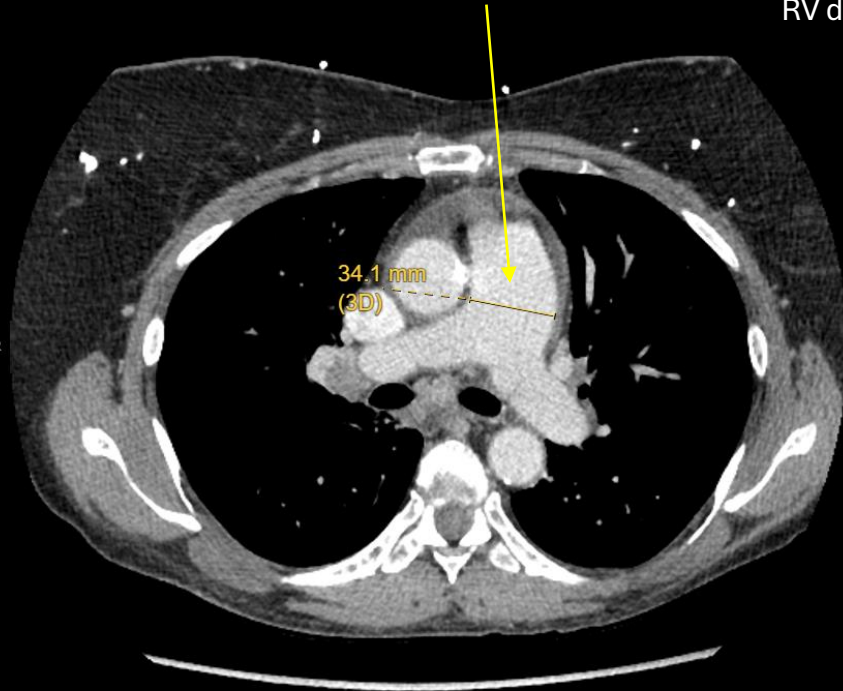
Mammogram R MLO (2010)



Mammogram L MLO (2010)

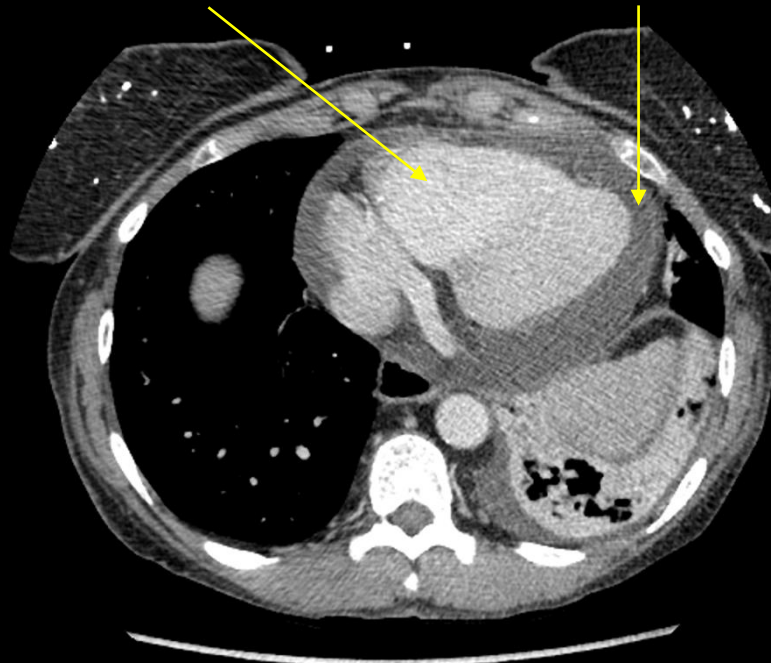
Associated Findings (Labeled)

Main pulmonary artery dilation
measuring 34.1 mm, exceeding 29 mm
threshold, consistent with known PAH



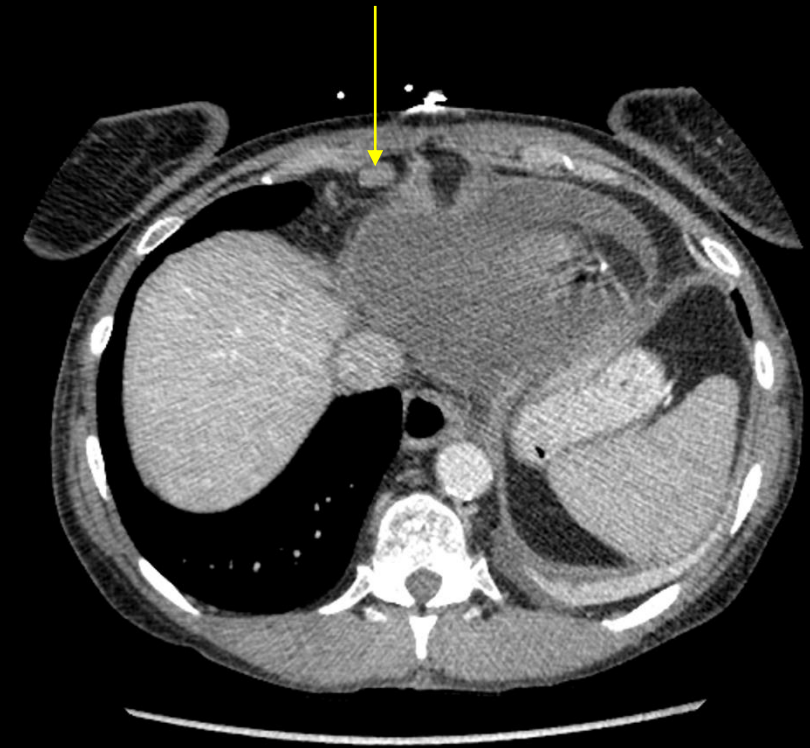
Axial Contrast-Enhanced CT Chest
(Level of pulmonary arteries)

RV dilation secondary to PAH



Axial Contrast-Enhanced CT Chest
(Level of heart ventricles)

Moderate low attenuating fluid
surrounding the ventricular myocardium
with mild pericardial thickening
reflective of pericardial effusion

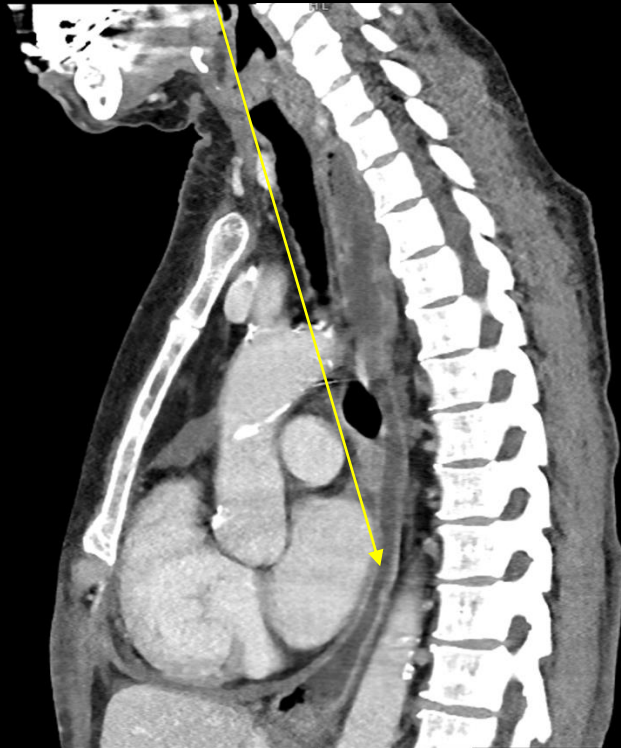


Axial Contrast-Enhanced CT Chest
(Level of diaphragm)

Cardiophrenic lymphadenopathy
from lymphatic channel scarring

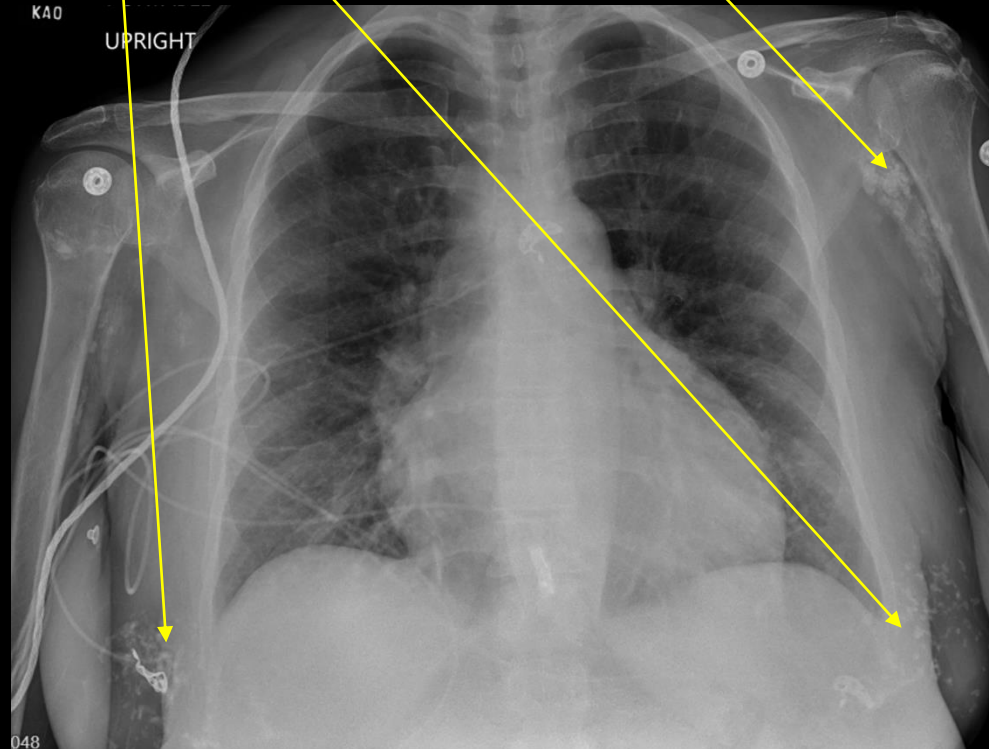
Associated Findings (Labeled)

Markedly dilated, lower 2/3 patulous esophagus with retained fluid/secretions, reflective of severe esophageal dysmotility



Sagittal Contrast-Enhanced
CT Chest

Extensive, coarse, calcifications across bilateral breasts and chest wall soft tissues



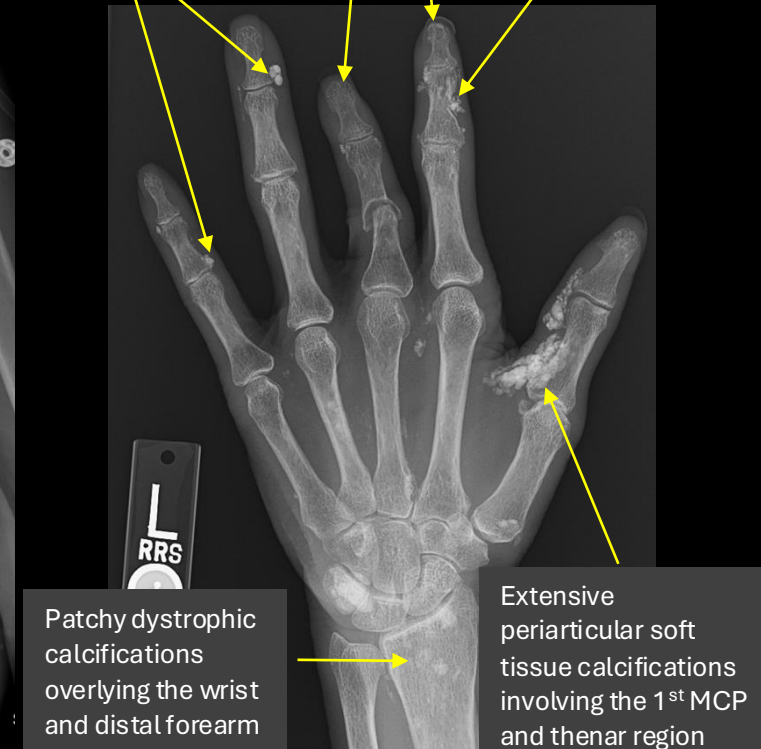
Upright AP Chest Radiograph

Dense, lobulated periarticular calcifications in the left axilla (tumoral calcinosis mimic)

Subcutaneous calcifications involving the 4th DIP and 5th digit (preserved joint spaces)

Marked resorption of distal phalangeal tufts demonstrating acro-osteolysis

Subperiosteal cortical resorption adjacent to soft tissue calcinosis



PA Radiograph Left Hand

Final Dx:

Limited SSc (CREST Syndrome)

Case Discussion

- **Background**

- Systemic Sclerosis is a systemic autoimmune disease causing vasculopathy and fibrosis of skin and organs¹
- 2 types of systemic sclerosis (SSc) can occur²:
 - Limited SSc (formerly CREST syndrome): Cutaneous sclerosis limited to the fingers, hands, and face that spares the trunk
 - Accounts for 60-70% of all cases with less rapid organ involvement
 - Diffuse SSc: Involves the trunk and has early involvement of the heart, lungs, and kidneys
 - Rarer, accounts for 30-40% of cases, but associated with higher overall mortality
- CREST syndrome is a group of associated symptoms that include calcinosis cutis, Raynaud's phenomenon, esophageal dysmotility, sclerodactyly, and telangiectasias¹

- **Epidemiology³**

- Affects females more than males, approximately in a 5:1 ratio
- Onset age is 30-50 years old
- Higher incidence, onset, and severity of manifestations in African American patients

Case Discussion

- Pathophysiology²

- Viruses, environmental exposures, autoantibodies, inflammatory cytokines, or proteolytic enzymes causes initial insult to vascular tissue, leading to thrombotic and fibrinolytic cascade activation
- As immune responses are activated, endothelial cells transform with abnormal responsiveness to feedback loop regulators, leading to tissue hypoxia manifesting as skin thickening and Raynaud's phenomenon
 - Additionally, platelets release thromboxane-A₂, leading to disorganized angiogenesis through PDGF and TGF- β manifesting as telangiectasias
- This hypoxia and oxidative stress activates Th2 helper cells and B cells to release pro-fibrotic cytokines
 - Activated B cells release autoantibodies such as Anti-centromere/nuclear/Scl-70 which can serve as important diagnostic and prognostic indicators depending on which antibodies are present
- As the vessel lumen narrows from fibrosis, this leads to manifestations such as PAH
- When cells die, the cell membranes fail to establish calcium homeostasis, leading to a massive influx of calcium into the intracellular space.
- Once inside the cell, the free calcium ions bind phosphate and form calcium hydroxyapatite crystals that bind to the necrotic collagen from fibrosis manifesting as calcinosis cutis
 - This manifestation is common in areas where microtrauma is common such as the fingertips and elbow extensor surfaces
- Once vascular injury becomes permanent, this leads to increased hypoxia, leading to a positive feedback loop

Case Discussion

- **Breast Imaging Findings**

- Within the breast, calcifications seen can be described using morphology and distribution⁴
 - Morphology: CREST syndrome calcifications in the breast are considered coarse per 2026 BI-RADS lexicon
 - On imaging, their appearance can vary depending on clinical progression with early calcifications appearing indistinct or amorphous measuring under 1mm. Late staging calcifications will appear rock-like, dense, irregularly bordered, and have lucent centers.
 - Distribution: Calcifications will be diffuse, regional, or clustered in the subcutaneous fat, subdermal space, or prepectoral soft tissues.
 - Spares the fibroglandular breast parenchyma
- Using Digital Breast Tomosynthesis (DBT) slices to analyze the calcifications in the z-coordinate plane will eliminate summation artifact by localizing calcifications to any of the 3 aforementioned tissue layers
- Once calcifications are localized outside the fibroglandular tissue, a BI-RADS 2 (benign) assessment can be assigned when aligned with the rest of the clinical picture⁵
- This avoids premature BI-RADS 0 (recall) or BI-RADS 4 (suspicious) designations that should be reserved for amorphous and/or fibroglandular calcifications that require biopsy⁵

- **Systemic Findings**

- On barium esophagram or chest CT, esophageal dysmotility manifests as a dilated, patulous esophagus with diminished or absent peristalsis in the distal two-thirds and an incompetent lower esophageal sphincter leading to reflux⁶
- On chest CT and radiographs, systemic manifestations include chest wall calcinosis masses, pulmonary interstitial fibrosis, and acro-osteolysis with soft-tissue microdeposits⁷

Case Discussion

Calcification Differential Diagnosis – Benign vs. Malignant Pathologies

	CREST/Calcinosis Cutis	Ductal Carcinoma in Situ (DCIS)	Fat Necrosis/Prior Trauma
Breast anatomic layer	Subcutaneous fat or prepectoral space	Terminal duct lobular units/ducts	Parenchyma or subcutaneous fat; often superficial
Calcification Morphology	Coarse (> 1mm) with a rock like appearance	Fine (< 1mm) pleomorphic, fine linear-branching, or amorphous	Lucent-centered, coarse, or dystrophic
Distribution	Scattered bilateral clusters only in subcutaneous fat	Segmental, linear, or clustered along ducts	Clustered at site of prior trauma or surgery
DBT Views	Deposits scroll into focus in subcutaneous fat	Deposits reside inside fibroglandular tissue apart from skin layers	Oil cyst with translucent center and calcified rim
BI-RADS Assessment	BI-RADS 2 (Benign)	BI-RADS 4 or 5 (Suspicious/Malignant)	BI-RADS 2 (Benign)
Management	Routine annual screening	Stereotactic or US guided biopsy	Routine screening (if atypical features then targeted US)

Case Discussion

Calcification Differential Diagnosis – Dermal and Foreign Body Pathologies

	CREST/Calcinosis Cutis	Diffuse Skin Calcifications	Implant Rupture
Breast anatomic layer	Subcutaneous fat or prepectoral space	Cutaneous and dermal layers of the skin	Retromammary or subpectoral extending into breast parenchyma and fat
Calcification Morphology	Coarse (> 1mm) with a rock-like appearance	Well circumscribed, round to polygonal with radiolucent centers	Typically absent (non-calcified findings); radiopaque silicone fluid collection can mimic masses
Distribution	Scattered bilateral clusters only in subcutaneous fat	Along skin folds (inframammary crease, parasternal, and axilla)	Asymmetric contour with silicone tracks along fat and fascial tissue planes
DBT Views	Deposits scroll into focus in subcutaneous fat	Sharp focus within the first or last 1-3 slices	Implant shell collapse with noticeable contour defect
BI-RADS Assessment	BI-RADS 2 (Benign)	BI-RADS 2 (Benign)	BI-RADS 0 (Incomplete)
Management	Routine annual screening	Follow up tangential view if unclear, otherwise routine screening	Callback for non-contrast Breast MRI (implant protocol) or targeted US. Possible surgery

Case Discussion

- **Final Teaching Points**

- **Clinical Diagnosis:** All 5 symptoms of CREST syndrome do not need to be present to diagnose, most guidelines suggest that 3 symptoms, or 2 symptoms with positive anti-centromere (ACA) antibody testing is sufficient for diagnosis⁸
- **Contradictory Lab Values:** Normal serum levels in calcium, phosphate, PTH, or Vitamin D are a classic sign for dystrophic calcification (calcium deposition into damaged tissue) and does not eliminate suspicion of CREST syndrome
- **Compartmentalization:** Calcinosis cutis lesions of CREST syndrome will localize to the subcutaneous fat, dermis, or prepectoral space. True intraductal malignancies such as DCIS originate within the fibroglandular tissue
- **Clinical Course:** Calcifications will enlarge in size and quantity over years to decades
 - This is expected course of limited systemic sclerosis and should be continued on regular follow-up screening for any abnormal changes
- **Comprehensive Chart Review:** Rheumatologic and dermatologic history should be obtained to rule out systemic causes such as CREST
 - Diffuse breast calcifications, such as with our patient, are exceedingly rare in the breasts of patients with CREST
 - Once these calcifications are associated with CREST, the overall assessment can be given a BI-RADS 2
 - Proper history prevents unnecessary stereotactic core needle biopsies and inappropriate diagnostic recalls
- **Cross Modality Correlation:** Remember to check concurrent CT and X-ray imaging for related symptoms if CREST syndrome is suspected

References:

1. Adigun R, Goyal A, Hariz A. Systemic Sclerosis (Scleroderma) [Updated 2024 Apr 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430875/>
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4. Sewchuran T, Kabeya JM. Calcinosis circumscripta of the breasts: The deeper meaning. *SA J Radiol*. 2023 Sep 27;27(1):2730. doi: 10.4102/sajr.v27i1.2730. PMID: 37794946; PMCID: PMC10546231.
5. Radswiki T, Morgan M, Breast imaging-reporting and data system (BI-RADS) assessment category 2. Reference article, Radiopaedia.org (Accessed on 19 Aug 2026) <https://doi.org/10.53347/rID-13953>
6. Solomon DA, Wittenberg J, Ghahremani GG, Halpert RD. Gastrointestinal manifestations of progressive systemic sclerosis (scleroderma). *Radiographics*. 2000;20(6):1615-1632. doi:10.1148/radiographics.20.6.g00no051615
7. Davuluri S, Lood C, Chung L. Calcinosis in systemic sclerosis. *Curr Opin Rheumatol*. 2022 Nov 1;34(6):319-327. doi: 10.1097/BOR.0000000000000896. Epub 2022 Aug 19. PMID: 35993867; PMCID: PMC9547890.
8. Schock GA, Simon D, Weitzman E, Weitzman R. An Atypical Case of CREST Syndrome With Early Complete Clinical Manifestation. *Cureus*. 2025 Jun 21;17(6):e86500. doi: 10.7759/cureus.86500. PMID: 40693094; PMCI