



# Is it breast cancer? – common dermatologic disorders found on the breast

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**Abstract:** There are a number of dermatologic conditions than can present on the breast. Patients and their physicians are often concerned that these skin changes may represent underlying breast cancer and, as a result, may be seen in a routine breast surgery practice. These conditions can be designated into malignant, infectious, and inflammatory categories. To thoroughly evaluate these skin concerns, a complete history, physical exam, and breast imaging should be completed to exclude malignancies. Attention should be paid to any history of autoimmune diseases, patient's other health conditions, family medical history, medication list and immunization status. A skin punch biopsy can be useful in the diagnostic evaluation of these skin disorders. Most of the malignancies affecting the skin of the breast are related to underlying breast cancers and would be treated accordingly. Early involvement by a dermatologist may be helpful in evaluation and treatment of these patients with benign dermatologic conditions of the breast.

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Approximately 10% of all outpatient visits in the United States are for dermatologic complaints (1). Most breast surgeons are comfortable identifying the asymptomatic, benign skin lesions, such as skin tags, nevi, and blackheads. Most other skin disorders are seen and managed by dermatologists (1). However, when these other skin disorders appear on the breast as the main or only site of involvement, both patients and physicians can become concerned about Paget's disease, inflammatory breast cancer, or some other unusual manifestation of breast cancer. Fortunately, most skin diseases of the breast are just that, benign dermatologic diseases.

To make an accurate diagnosis, a thorough history and physical are needed. As with any other patient with breast concerns, family history, history of autoimmune diseases, other health history, medication list, immunization status and recent breast imaging can be helpful. Details regarding initial symptoms, changes in the skin lesions, duration, prior episodes and changes in medication or topical contacts should

be obtained. A skin biopsy is often required for definitive diagnosis or at least to rule out malignancy (*Table 1*).

The breast is composed of layers—skin, pre-mammary fat, mammary layer, and retromammary fat, lying on top of muscle and chest wall. The nipple and areolar complex (NAC) is specialized skin which includes smooth muscle, Montgomery glands which provide lubrication during lactation and double the melanin count of the surrounding skin (2-4). The types of skin conditions seen on the skin of the breast can be categorized as malignant, infectious, or inflammatory. Many of these conditions can develop or exacerbate during breastfeeding.

## Malignant

For comparison with benign entities affecting the skin of the breast, there are several malignancies that can present as changes in the skin of the breast. Primary skin malignancies such melanoma, Bowen's disease and basal cell

**Table 1** Clinical summary of dermatological conditions commonly found on the breast

Condition	Breast location	Other common locations	Painful	Pruritic	Erythematous	Scaly	Risk factors	Punch biopsy useful
Inflammatory breast cancer	Whole breast	None	Yes	Maybe	Yes	No	Women, younger age, obesity, Blacks	Maybe
Paget's disease	Unilateral nipple	None	No	No	Yes	Yes	Usual breast cancer risk factor	Yes
Herpes zoster	Linear thoracic dermatome	Anywhere	Yes	No	No	No	Immuno-compromised, women, Caucasians	No
Nipple thrush	Nipple	None	Yes	No	Yes	Yes	Breast feeding	No
Intertrigo	Inframammary fold, axilla	Groins, buttocks	No	No	Yes	No	Obesity, diabetes, HIV, large breast size	No
Allergic dermatitis	Any	Anywhere	No	Yes	Yes	No	–	No
Eczema	Bilateral nipple	Anywhere	No	Yes	Yes	Yes	Family history	Yes
Psoriasis	Anywhere	Anywhere	Yes	Yes	Yes	Yes	Family history, smoking	Yes
Inverse psoriasis	Inframammary fold	None	Yes	Yes	Yes	Yes	Family history, smoking	Yes
Reynaud's	Nipple	Hands	Yes	No	Bi or triphasic color change	No	Known disease in hands	No
Hidradenitis suppurativa	Inframammary fold, axilla	Groins, buttocks, perineum, genitals	Yes	No	No	No	Possibly smoking, obesity, family history	No
Morphea	Any	Any	No	No	Yes	No	Radiation, women	Yes
Calciophylaxis	Any	Abdomen, buttocks, thighs, flanks	Yes	No	No	No	End stage renal disease, obesity, diabetes, women, hyperphosphatemia, warfarin	No

carcinoma can be seen on the skin of the breast, although rare. Basal cell carcinoma is seen more commonly in men given the higher sun exposure of the chest in men (5). The most common malignancy involving the skin of the breast is breast cancer. Breast cancer presents with skin involvement in 6–10% of cases (6–8). This can be either by local skin involvement from the underlying cancer or as a true inflammatory breast cancer due to tumor invasion of dermal lymphatics. National Comprehensive Cancer Network (NCCN) guidelines describe the inflammatory breast cancer presentation as painful, erythematous, and edematous breast skin over at least one-third of the breast. These patients will often present with axillary adenopathy as well. If a skin punch biopsy reveals carcinoma involving the dermal lymphatics, it can help make the diagnosis; however,

a negative punch biopsy does not exclude a diagnosis of inflammatory breast cancer (9,10). Direct skin involvement by local extension can present with focal edema, erythema, ulceration or skin nodules while subtle skin involvement can present as skin retraction, nipple inversion or other changes related to involvement of the underlying Cooper's ligaments (9). A more unusual breast cancer presentation is Paget's disease of the breast which presents with thickened, eczematous skin on the NAC, sometimes also with pigment changes and overlying crust (*Figure 1*). Paget's represents 1% of all breast cancers and the majority involve the breast parenchyma in addition to the skin (11,12). Physical examination, skin biopsy and breast imaging will often distinguish breast cancer involving the skin from other primary skin disorders.



**Figure 1** Paget's disease.



**Figure 2** Herpes zoster at the inframammary fold and upper abdomen.

## Infectious

Outside of puerperal and non-puerperal mastitis, there are other infectious entities that can be found involving the skin of the breast, such as herpes zoster and nipple thrush. Herpes zoster (shingles) is caused by a reactivation of the varicella zoster virus as immunity wanes due to age or immunosuppression. Approximately, 30% of adults will develop herpes zoster over their lifetime. Women are at increased risk while blacks are at reduced risk for herpes zoster (13,14). Initial presentation is often abnormal skin

sensations such as burning, stinging, or tingling, followed by vesicular skin lesions 2–3 days later along a dermatome (*Figure 2*) (15). Herpes zoster can be seen along any dermatome but the thoracic dermatomes along the intercostal nerves are commonly involved and therefore, can involve the skin of the breast. Antivirals such as acyclovir, valacyclovir, or famciclovir can be used to shorten the course while oral steroids can be used in conjunction with these antivirals to reduce pain and promote early healing (15). In 2017, a recombinant varicella zoster virus vaccine was approved. The vaccine reduced the incidence of herpes zoster by 96% in those receiving the vaccine. The vaccine is approved for adults 50 years and older for prevention of herpes zoster (16).

Nipple thrush presents typically with burning, shooting, or stabbing nipple pain radiating to the chest wall in a breastfeeding mother. Clinical findings are often less impressive than the patient's symptoms. *Candida albicans* is typically the causative organism. Skin of the NAC may be erythematous, shiny, and flaky (17). Infants may have a fiery red diaper rash or white patches on the oral mucosa. Both the mother and infant must be treated to prevent reinfection. Gentian violet is considered safe and effective for both mother and infant. Concentrated solution less than 0.5% can be applied once daily for no more than 7 days to the infant's mouth and then immediately breastfeed. Infant's mouth and mother's nipple will be purple after feeding. If mother's nipple is not purple at the end of the feed, then the gentian violet should be applied directly to the nipple (18,19). Alternatively, 1ml nystatin suspension can be applied to the infant's mouth after each feed for 7–10 days while topical nystatin cream can be applied to the NAC twice daily for 14 days (18). If topical treatment was unsuccessful, oral fluconazole can be used both for the mother as well as infants over 6 months of age (19). Also, all linens and bras should be washed in hot water with distilled vinegar as well as washing all pacifiers, nipples, breast pump shields and any other parts that contact breast milk (18).

## Inflammatory

There are a number of inflammatory skin conditions which can be seen on the breast. Friction and moisture occurring in skin folds can cause areas of maceration and erythema known as intertrigo. Inframammary folds, axillae, interdigital and intergluteal folds are commonly affected. Known risk factors include obesity, diabetes, large pendulous breasts, and HIV (20). Treatment involves use of barrier creams and absorbent products to minimize friction and manage moisture. Short



**Figure 3** Dermabond allergy.

course of low potency steroid cream can be used for symptom relief. If no improvement is achieved with above measures, an alternate diagnosis such as inverse psoriasis should be considered (20,21). Bacterial and fungal superinfection can occur with intertrigo. The most common organism is candida. This will typically present with satellite pustules and papules. Topical antifungal cream (nystatin or azole) with barrier creams should be used for initial treatment (20,21). Alternatively, a combination steroid cream with azole can be used but is often cost-prohibitive and can cause atrophy of the skin if overused. Oral fluconazole can be used when topical treatments fail (22).

Allergic contact dermatitis is the most common dermatologic diagnosis identified by internists, family physicians and pediatricians (1). History should include asking about new soaps, laundry detergent, fabric softeners, personal hygiene products, and bras. Other common contact allergens are also tattoos, piercings and nail polish (23). In breastfeeding mothers, ingredients in nipple creams such as lanolin, chamomile, aloe vera, chlorhexidine, topical vitamin E, fragrances, tea bags as well as solid foods in the infant's diet can all be associated with allergic contact dermatitis (24). Low to moderate potency topical steroids, oral steroids 4 h prior to lactation and photosynthesis are all options for treatment while breastfeeding (25-27). Topical steroids should be wiped from the NAC prior to feeding to minimize infant exposure. Expressed breast milk can be used to wipe off topical steroids as it is less irritating than water or other materials (24). Another common contact allergen on the breast that a breast surgeon is likely to encounter is 2-octylcyanoacrylate glue used for skin closure. This is commonly found branded as Dermabond (Ethicon, Inc., Somerville, NJ, United States) or LiquiBand (Advanced Medical Solutions Ltd., Winsford, Cheshire, United

Kingdom). Breakdown products of these glues include formaldehyde and cyanoacetate which can induce a reaction, especially in open wounds or areas of thin skin (28,29). Erythema, urticaria, and/or pruritis starting at and then spreading from the incision without fever or tenderness is the typical presentation (*Figure 3*). Most of these reactions were seen within 5–7 days of surgery (30,31). In a single series of 102 consecutive patients after breast surgery, 14% had contact dermatitis to Dermabond confirmed by scratch test; all these patients also reacted to LiquiBand and therefore the reaction was not brand specific (30). Contact dermatitis has also been reported with the use of Dermabond Prineo (Ethicon, Inc., Somerville, NJ, United States) which is 2-octylcyanoacetate combined with a self-adhesive polyester mesh (32). Treatment includes removing the glue and adding topical steroid cream, either over the counter 1% or prescription 2.5%, depending on severity. For cases that do not improve within a few days, steroid dose pack can be added (30-32). Contact dermatitis of the breast has also been reported with a bra with a gel insert containing propylene glycol (33), a bra containing P-tert-butylphenol formaldehyde resin on the inner bra fabric (34) and clothing dye disperse blue 106 (35).

Eczema is the most common presentation of atopic dermatitis of the breast and usually involves the NAC (5). Presentation may include erythema, scale formation, weeping, crusting, fissuring, erosion, excoriation or lichenification of the NAC skin (36,37). Eczema usually involves the NAC bilaterally (*Figure 4*). This can be seen in women with a history of eczema elsewhere on the body. Initial presentation can also be precipitated by breastfeeding due to the feeding action or contact with food residue in the infant's mouth (37). Management includes avoiding known irritants, use of topical steroids, lubricants, and antibiotics (5).

Psoriasis can present on the skin of the breast and NAC. On the NAC, this will present as a well-demarcated, erythematous plaque with fine, micaceous scales. Nursing mothers with a history of psoriasis may develop exacerbations due to the irritation from latch on and suckling. When presenting in the inframammary fold, it is known as inverse (or intertriginous) psoriasis and can be mistaken for other dermatoses as it will lack scale and maceration and is often well-demarcated. First line therapy involves 2- to 4-week course of low potency topical steroids, topical immunomodulators and calcitriol and calcipotriene (topical vitamin D) (38). Topical immunomodulators are contraindicated in breastfeeding due to potential oral absorption by the infant. Calcipotriene, however, can be



**Figure 4** Eczema of the nipple and areolar bilaterally.

used during breastfeeding as long as less than 20% body surface area is covered daily (18). As a systemic therapy, phototherapy with ultraviolet B, methotrexate, and biologic agents such as etanercept, adalimumab, infliximab, alefacept, and ustekinumab can be used. Data is limited on safety of biologic agents during breastfeeding (19)

Raynaud's phenomenon of the nipple is caused by vasospasm of the arterioles causing intermittent ischemia. Biphasic or triphasic color change of the nipple can be seen (39). History of Raynaud's of the hands can be seen in 20% of women of childbearing age and is a risk factor for Raynaud's phenomenon of the nipple (40). This phenomenon has also been correlated with a history of breast surgery (39). This diagnosis should be considered in a breastfeeding mother who has had at least 4 weeks of nipple pain in spite of treatment for bacterial and fungal causes of nipple pain. Treatment should include avoiding cold temperatures, wearing warm clothes, taking hot showers twice daily prior to breastfeeding, and avoiding caffeine, nicotine, and any other vasoconstrictive drugs (39). Nifedipine 30–60 mg/day sustained release is approved by the American Academy of Pediatrics for breastfeeding mothers. Most will improve substantially with 14 days of treatment (41). If adverse effects such as dizziness, headache, hypotension, nausea, or tachycardia are noted, a decrease in dose to 10 mg/day may still be effective and better tolerated (39) For medication-averse patients, high-dose vitamin B6 at 100 mg twice daily can be used based on anecdotal evidence (24).

Hidradenitis suppurativa (HS) is a chronic inflammatory condition affecting the hair follicles in the gland-bearing regions including armpits, inframammary area of the breasts, buttocks, genital areas, groins, and perianal area (42). The inflammation of these apocrine glands leads to boils, abscess,

sinus tracts, malodorous drainage and ultimately scarring. Patients with HS report low quality of life (43,44), general health (45) and depression (46). HS can be seen in 1–4% of the population (42,47,48). Onset is typically seen after puberty, and peak incidence is in the 20s–30s (49). Incidence is more common in women by a 3:1 ratio (47,48,50). Women more commonly affected on the breasts and inguinal regions while men are more likely to have involvement of the buttocks (42,51). However, there does not appear to be a sex-related difference in severity (51). Severity is graded using the Hurley severity scale (52). Development of HS has been associated with smoking (43,53), increased body mass index (BMI) (43,48), and family history of HS (54,55). Other studies have not substantiated these associations (50,56). Increased disease severity has been associated with increased BMI, atypical location of HS, absence of family history, history of severe acne, smoking and obesity (43,50,51). Medical management is preferable if possible. Medical treatments include topical erythromycin or clindamycin, oral clindamycin, dapsone, tetracycline, or minocycline (57–59). Several years ago, adalimumab was approved for moderate to severe HS. Two multicenter trials demonstrated  $\geq 50\%$  reduction in abscess and nodule count with no new abscesses or draining fistulas after 12 weeks of treatment (60). Other medical treatments include oral zinc as well as topical or oral retinoids. For medical failures, wide local excision, CO<sub>2</sub> laser ablation, radiotherapy and radiofrequency treatment are also options. (59,61–63).

Morphea, also known as localized scleroderma, is rare with less than 3 cases per 100,000 in the United States (64). Histologically, there is increased collagen with nonspecific inflammatory changes in the dermis and atrophy of the epidermis (65). The etiology is unknown but thought to be an autoimmune disease given that antibodies to type IV collagen have been identified in scleroderma (66,67). It is most common in women. There have been case reports of large plaque morphea being associated with lung, hematologic and breast cancer, prompting consideration of this as a possible paraneoplastic syndrome (64). Morphea can also be a consequence of radiation. Radiation-induced morphea occurs in 2 of 1,000 cases and presents as a gradually hardened, reddened, uncomfortable skin corresponding to the radiation field (68) (*Figures 5,6*). It has been suggested that the development of radiation-induced morphea may be a result of release of radiation-induced neoantigens affecting fibroblasts, endothelial proteins, collagen, or elastin proteins (69). Steroids, methotrexate, and UVA-1 phototherapy can be used to slow progression



**Figure 5** Acute presentation of morphea.



**Figure 6** Chronic morphea.

and manage symptoms (68).

Calciophylaxis is a multifactorial cutaneous, vascular disease known also as calcific uremic arteriolopathy and uremic small artery disease. It is characterized by painful, non-healing wounds which occur most commonly in patients with end-stage renal disease (70). The skin lesions develop after medial calcification, intimal fibrosis of arterioles and thrombotic occlusion. Early presentation can mimic breast cancer (71). Calciophylaxis lesions start as indurated, tender plaques which progress to stellate, necrotic plaques and ultimately cutaneous ulceration. These

typically involve the adipose rich portions of the body, including the abdomen, breasts, buttocks, flanks, thighs, and trunk (72). The incidence is 1–4% of patients on dialysis. Risk factors include female sex, obesity, diabetes, hyperphosphatemia, chronic/end-stage renal disease, and warfarin use (73–76). The prognosis for patients with calciophylaxis is poor with 2-year survival rates as low as 20% while the mortality rate is greater than 80% in patients who have developed cutaneous ulcerations (77). Multidisciplinary approach including specialists in dermatology, nephrology, wound care, and pain management is important. Diagnosis can be confirmed with small (3–5 mm) punch biopsy at the edge of a lesion, but this could also worsen the ulcer. Early consultation with a pain management specialist or depending on patient's overall health status, palliative care specialist, is warranted as pain is the most significant complaint. Surgical debridement is controversial, but the primary mortality cause is sepsis; therefore, debridement of infected lesions is indicated. Maggot debridement, chemical debridement, negative pressure dressings, hyperbaric oxygen and skin grafting are other wound care options that can be utilized (69). Sodium thiosulfate (STS) has become one of the mainstays for treatment of calciophylaxis. STS can chelate calcium salts from the skin, subcutaneous tissue, and organs. Effective dosages have been reported from 5 to 25 mg three times per week during or after hemodialysis, providing improvement in pain and ulcers in 70% of patients (78–84). Correction of calcium and phosphate abnormalities is another key in treatment. This can include parathyroidectomy for patients with concomitant hyperparathyroidism but is often precluded by the surgical risk of these patients (70).

In closing, a number of benign skin entities can present on the breast. A complete history and physical exam are warranted as well as breast imaging to exclude breast cancer. Skin punch biopsy is often useful in eliminating malignancy as the etiology for the skin changes. Many of the inflammatory conditions can be treated initially with low potency topical steroids. Early involvement by a dermatologist can be useful.

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