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# Eccrine poromatosis following chemotherapy and radiation therapy

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## Abstract

Eccrine poroma presents as a single, symptomless erythematous papule in areas with a high density of eccrine sweat glands. Although rare, eccrine poromas can present as multiple lesions, otherwise known as eccrine poromatosis. The etiology of eccrine poromatosis is unclear. We present two cases of eccrine poromatosis in patients who had undergone chemotherapy, radiation therapy, and stem cell transplant. This case report serves to raise awareness of this condition and highlight its association with malignancies and their treatment.

*Keywords: eccrine poromatosis, eccrine poroma, poroma, chemotherapy, radiation therapy, malignancies*

## Introduction

Eccrine poromas are benign, adnexal, slow-growing neoplasms originating from the intra-epidermal eccrine duct and the acrosyringium. These tumors belong to a group of benign eccrine ductal tumors that also include hidroacanthoma simplex, dermal ductal tumor, and poroid hidradenoma. Eccrine poromas account for nearly 65% of poroid neoplasms and 10% of sweat gland tumors [1]. No predilection for race or sex have been identified.

Clinically, an eccrine poroma presents as a single, symptomless erythematous papule in areas with a high density of eccrine sweat glands such as the palms, soles, and fingers. Although rare, eccrine poromas can present as multiple lesions, otherwise known as eccrine poromatosis. A broader distribution that includes the neck, trunk, and face may be observed. Newer reports suggest that eccrine poromatosis may occur in the setting of concurrent or history of chemotherapy, but the relationship is unclear [2].

We present two cases of eccrine poromatosis in patients who had undergone chemotherapy, radiation therapy, and stem cell transplant for lymphoma.

## Case Synopsis

### Case 1

A 58-year-old man presented to the clinic with four pink, pedunculated, exophytic, 2-14mm sized papules on his dorsal left foot, right flank, and left groin (**Figure 1**). The patient's medical history included diffuse large B-cell lymphoma with several masses including one lesion near the hippocampus. He had extensive treatment 10

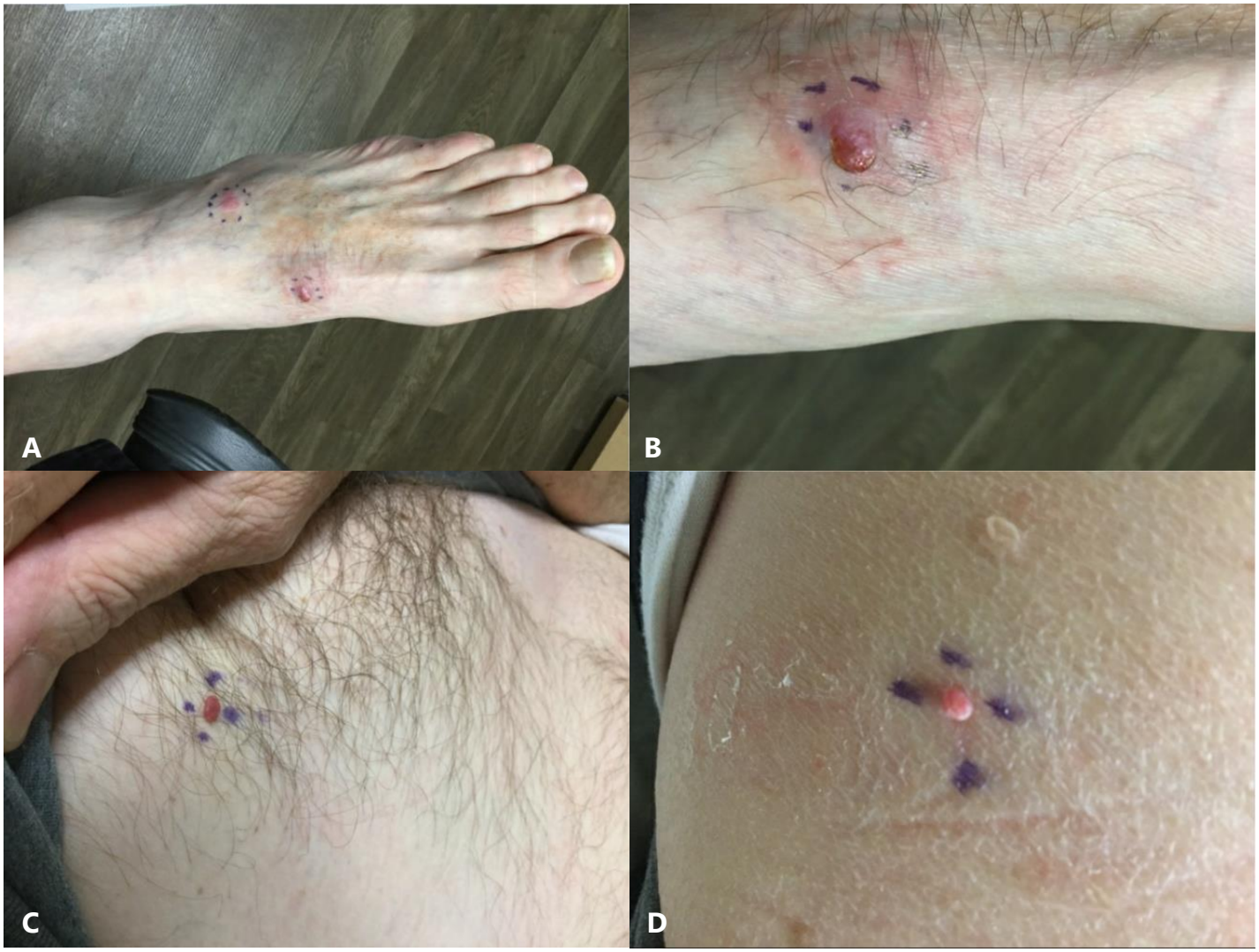


**Figure 1**. *Eccrine poromas of the* **A, B)** *dorsal left foot and* **C, D)** *right flank.*

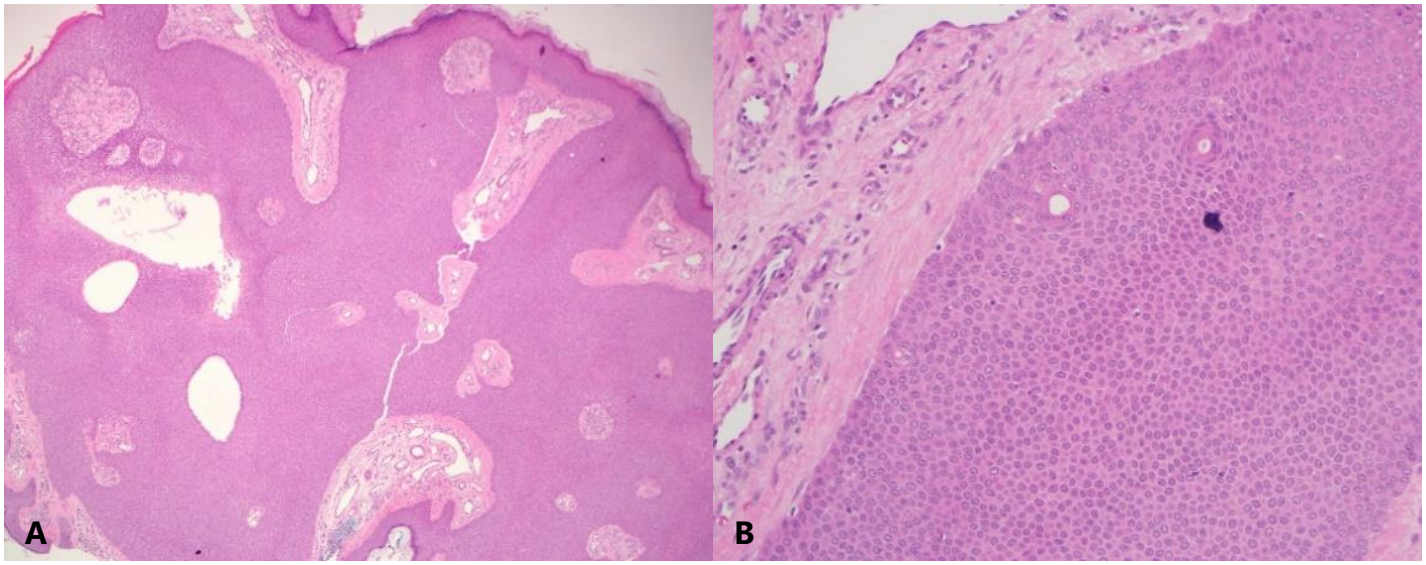


**Figure 2**. *Eccrine poroma histopathologic findings of interanastamosing islands of cuboidal cells with occasional ductal differentiation. H&E,* ***A)*** *40× and* ***B)*** *200×.*

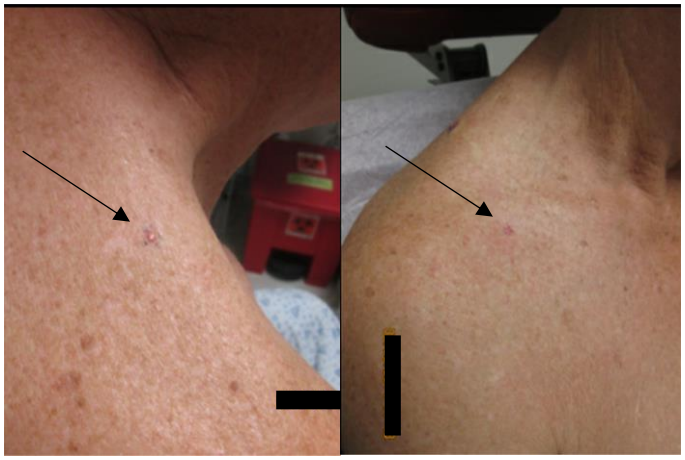

**Figure 3**. *Eccrine poromas on the right upper back (left) and right anterior shoulder (right).*

years prior that included 5 rounds of rituximab, cyclop hosphamide, doxorubicin, vincristine, and prednisone (R-CHOP); 20 rounds of radiation; intrathecal liposomal cytarabine; stem cell transplant; and 8 rounds of methotrexate, etoposide, and cyclophosphamide. Outside of his history of lymphoma, the patient's past medical history was unremarkable. Review of systems was also unremarkable. Four shave biopsies were performed. Histopathological examination demonstrated an epidermis with inter-anastamosing islands of monotonous appearing bland cuboidal cells with occasional ductal differentiation (**Figure 2**). Similar epithelial islands were also seen in the dermis. These findings were consistent with eccrine poromatosis. No further treatment was performed. The patient was then lost to follow up.

**Case 2**

A 72-year-old man presented to the clinic with a pink eroded papule on the right anterior shoulder and a pink and yellow papule on the right upper back (**Figure 3**). The patient's medical history included mantle cell lymphoma 10 years prior for which he received high-dose R-CHOP, stem cell transplant; he remained on maintenance rituximab and lenalidomide. He also had a history of prostate cancer 6 years prior for which he underwent radical prostatectomy and radiotherapy. The patient denied any symptoms or trauma to the affected areas. Shave excisions of the two papules were performed. Histopathological examination demonstrated an epidermis with superficial islands of monotonous-appearing cuboidal cells with epidermal interconnection and prominent ductal differentiation (**Figure 4**). These findings were consistent with eccrine poromatosis. No further treatment was performed. Four years later, there is no evidence of recurrence to date.

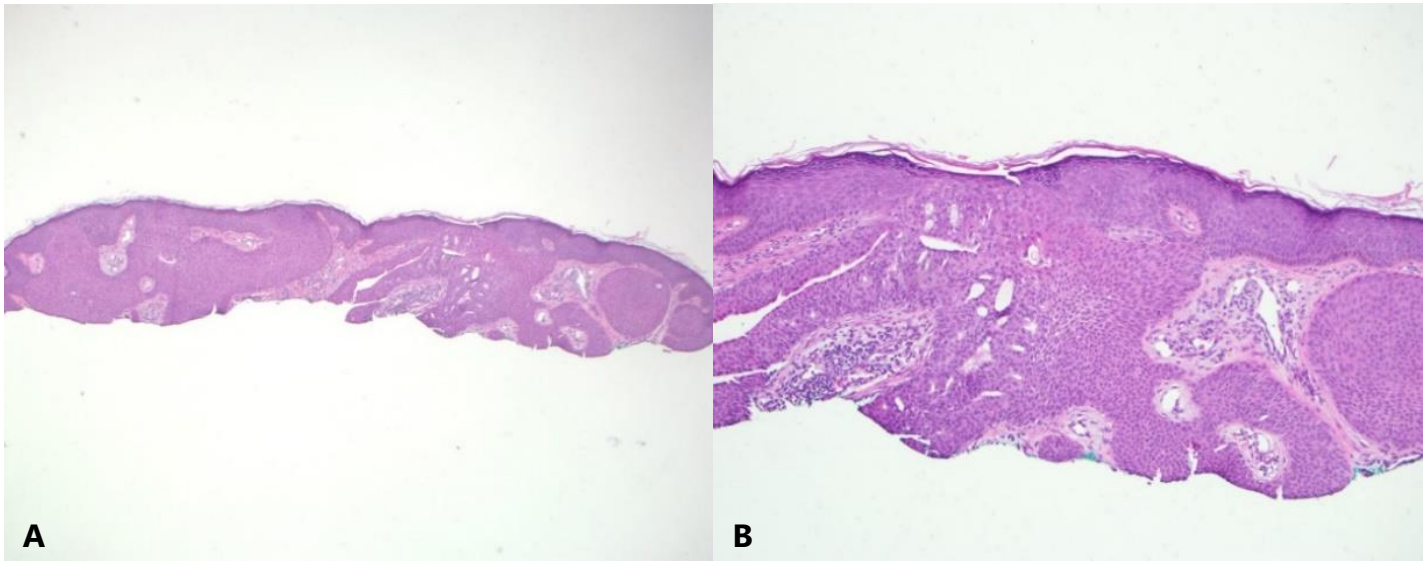


**Figure 4**. *Eccrine poroma histopathologic findings of an epidermis with superficial islands of monotonous appearing cuboidal cells with epidermal interconnection and prominent ductal differentiation. H&E,* ***A)*** *40× and* ***B)*** *100×.*

## Case Discussion

Multiple eccrine poromas are an uncommon presentation of a rare disease. This case report serves to raise awareness of this condition and highlight its association with malignancies and their treatment.

Although no definitive etiology for eccrine poromatosis has yet been described, possible etiologies for the development of multiple eccrine poromas include chemotherapy, radiation, actinic damage, and human papillomavirus [3]. Indeed, in both of our patients, the identified potential etiologies among those previously reported were a history of high-dose chemotherapy and radiation therapy 10 years prior to eccrine poromatosis appearance. A recent case of eruptive poromatosis in a pregnant woman in her third trimester indicates that there could be a hormonal association [4]. Others have suspected a tumor suppressor gene defect in eccrine cells [5].

Chemotherapy or radiation therapy may be the most likely etiology for eccrine poromatosis. That is, a history of chemotherapy and/or radiation therapy is often noted in eccrine poromatosis cases (**Table 1**), [2, 3, 5-17]. Although it is common for patients to receive both chemotherapy and radiation therapy throughout the course of their neoplastic treatment, eccrine poromatosis most commonly occurs on non-irradiated skin in patients who received polychemotherapy [2]. Additionally, eccrine poromatosis developed in patients who received chemotherapy without radiation therapy as well. Specifically, Yoshii et al. described a case of eccrine poromatosis in a patient with systemic lupus erythematosus who received cyclophosphamide and mizoribine but no radiation therapy [18].

Chemotherapy is also implicated in the development of other eccrine conditions including neutrophilic eccrine hidradenitis and syringosquamous metaplasia. Previous reports suggested that the chemotherapeutic metabolites accumulate in the sweat apparatus and are either directly cytotoxic to, or induce remodeling in, the eccrine sweat glands [2, 19]. Because eccrine poromatosis occurs years, sometimes even decades, following chemotherapy exposure, it is likely that there is a combination of remodeling and regeneration that triggers tumor development [8].

Treatment of eccrine poromas is typically done by simple excision. Other successful treatment modalities have included electrosurgical desiccation, cryotherapy, and imiquimod [4, 9]. Eccrine poromas can rarely transform into eccrine porocarcinomas. Therefore, careful monitoring or treatment by a dermatologist is recommended.

## Conclusion

Eccrine poromatosis is a condition characterized by an eruption of multiple eccrine poromas. Various etiologies have been discussed in the literature. We present two cases of eccrine poromatosis in patients who had undergone chemotherapy, radiation therapy, and stem cell transplant. This case report raises awareness of this condition and highlights its association with malignancies and their treatment.

## Potential conflicts of interest

The authors declare no conflicts of interests.

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**Table 1.** *Malignancy-associated eccrine poromatosis.*

| Reference | Age; Sex | Race | Location | Size (mm) | No. of poromas | Cancer | Treatment of cancer | Treatment of poromas | Follow up; recurrence? |
|---|---|---|---|---|---|---|---|---|---|
| Fujii et al. (2012), [2] | 66; F | J | Bilateral thighs, left forearm, hip, and lower abdomen | 1-7mm | >19 | 1. Chronic lymphocytic leukemia<br>2. Follicular B-cell lymphoma (left parotid gland, mediastinum, and para-aortic lymph nodes) | 1. Cyclophosphamide and "other chemotherapeutic regimens"<br>2. Epirubicin, vincristine, mitoxantrone, cyclophosphamide, methotrexate, prednisolone, etoposide, cisplatin, and "unidentified regimens"<br>3. Surgical resection and radiation therapy to right eyelid | N/A | N/A |
| Fujii et al. (2012), [2] | 62; M | N/A | Left lower leg, right heel, and right sole | 4-7mm | 3 | Malignant fibrous histiocytoma (right thigh) | Wide resection of right thigh, doxorubicin, ifosfamide. and radiation therapy to right leg | Excisional biopsy | N/A |
| Fujii et al. (2012), [2] | 59; M | J | Right palm, left hand, and sole and heel of left foot | 3-15mm | 4 | Malignant B-cell lymphoma | CHOP, methotrexate, and rituximab | Biopsy and resection | N/A |
| Fujii et al. (2012), [2] | 72; M | J | Back, right thigh, right knee, trunk, and extremities | 2-15mm | >5 | Diffuse large B-cell lymphoma | CHOP and etoposide | Excisional biopsy | N/A |
| Deckelbaum et al. (2014), [3] | 73; M | N/A | Soles | N/A | 30 | Testicular lymphoma | CHOP and radiation | Excisional biopsy | N/A |
| Mahlberg et al. (2006), [5] | 42; M | N/A | Distal extremities, primarily palms and left sole | 4-16mm | 14 | Acute lymphocytic leukemia | Chemotherapy, total body irradiation, and allogenic bone marrow transplant. | Shave biopsy | N/A |
| Navi et al. (2008), [6] | 64; M | N/A | Chest, left nipple, eyelid, left forearm, and left ankle | N/A | 7 | Non-Hodgkin lymphoma with history of colorectal carcinoma | CHOP and rituximab | Shave biopsy and complete excision | N/A |

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|---|---|---|---|---|---|---|---|---|---|
| Diamantis et al. (2011), [7] | 53; M | N/A | Palms, left elbow, and heels | 2-6mm | 6 | Mantle cell lymphoma | Allogenic stem cell transplant. Photopheresis, tacrolimus, systemic corticosteroids, and mycophenolate mofetil for chronic graft-versus-host disease | Shave biopsy | N/A |
| Valdebran et al. (2018), [8] | 32; F | N/A | Feet and lower eyelid | 1-2mm | 17 | Acute promyelocytic leukemia | Tretinoin, amphotericin B, busulfan, etoposide, arsenic trioxide, cytarabine, and bone marrow stem cell transplant | Mild electrocauterization | N/A |
| Mayo et al. (2015), [9] | 43; M | AA | Bilateral plantar feet, hands, and arms | 1-9mm | 16 | Mantle cell lymphoma | Cyclophosphamide, vincristine, doxorubicin, dexamethasone, methotrexate, cytarabine, and autologous stem cell transplant (pre-transplant regimen of busulfan, cyclophosphamide, and etoposide) | Excision to four eccrine poromas, imiquimod 5% cream and cryosurgery ablation | N/A |
| Kurokawa et al. (2001), [10] | 72; M | N/A | Bilateral thighs, right lumbus, left elbow, left brachium, left leg, bilateral shoulders, left buttock, left inguinal region, and left breast | 3-8mm | 14 | Mycosis fungoides | Whole body electron beam irradiation (except for the head), regional electron beam irradiation (bilateral lower extremities, right antebrachium, left palm, left antebrachium, trunk, and buttocks), and interferon-γ1a | Shave biopsy and observation | >2 years with no changes |
| Miura et al. (2013), [11] | 72; F | N/A | Abdomen, trunk, neck, and extremities | 5mm | 11 | Nasolacrimal duct adenocarcinoma | Radical excision and post-operative radiation therapy | Surgical removal under anesthesia | N/A |
| Nguyen et al. (2012), [12] | 25; M | N/A | Right dorsal foot, right medial foot, both soles, | N/A | 8 | Acute myelogenous leukemia | Autologous bone marrow transplant | Salicylic acid (did not respond) and | N/A |

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|---|---|---|---|---|---|---|---|---|---|
| | | | and both heels | | | | | shave biopsy | |
| Garshick et al. (2014), [13] | 46; M | N/A | Palms and soles | 2-5mm | 22 | Acute myeloid leukemia | Cytarabine, daunorubicin, etoposide, and autologous stem cell transplant | Shave excision | N/A |
| Takahashi et al. (2015), [14] | 63; F | N/A | Right thigh, lower abdomen, left forearm, and bilateral calves | 1-12mm | ≥5 | Acute myelocytic leukemia | Idarubicin, cytarabine, prednisolone, and autologous peripheral blood stem cell transplant | Excision | N/A |
| Sherman et al. (2010), [15] | 32; M | N/A | Left great toe, right 5th toe, left sole, and webspace between left 4th and 5th toe | 2-8mm | 4 | 1. Testicular teratoma with para-aortic and supraclavicular lymph node involvement and pulmonary metastasis<br>2. Acute myeloid leukemia<br>3. Squamous cell carcinoma of esophagus | 1. Orchidectomy, bleomycin, cisplatin, and etoposide<br>2. Cytarabine, daunorubicin, etoposide, allogenic bone marrow transplant (preceded by cyclophosphamide and total body irradiation), and fludarabine. Second allogenic bone marrow transplant (melphalan and fludarabine).<br>3. Ivor-Lewis esophagectomy<br>4. Prednisolone and cyclosporine (for graft-versus-host disease) | Curettage and shave excision | >8 years no recurrence |
| Lim et al. (2018), [16] | 63; F | N/A | Left thigh, left buttock, left breast, left clavicular region, left hand and fingers, left forearm, left lateral neck, right arm, right temple, and scalp | N/A | >18 | Metastatic right breast cancer | Mastectomy, 5-fluorouracil, epirubicin, cyclophosphamide, letrozole, paclitaxel, trastuzumab, pertuzumab, tamoxifen, resection of right infraclavicular mass, and radiation therapy to right chest wall, axilla, and supraclavicular fossa | Shave excision | N/A |

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|---|---|---|---|---|---|---|---|---|---|
| Aung et al. (2017), [17] | 45; M | N/A | Toes, heels, and fingers | 3-6mm | >3 | Acute myeloid leukemia | Chemotherapy and allogenic stem cell transplant | Biopsy | N/A |

*AA= African American; CHOP= Cyclophosphamide, doxorubicin, vincristine, and prednisolone; J= Japanese; mm= millimeter; No.= Number of poromas; Ref.=Reference, Tx= Treatment.*