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# “Peeling paint” dermatosis in a leukemia patient



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**Key words:** cancer; kwashiorkor; peeling paint dermatosis; protein malnutrition.

## INTRODUCTION

Kwashiorkor refers to signs and symptoms resulting from severe protein malnutrition. Loss of dietary protein causes osmotic imbalance and fluid retention, with the characteristic protuberant abdomen and dependent edema. Lack of protein results in hypoalbuminemia, growth retardation, mental apathy, immunodeficiency, hepatic steatosis, anemia, and cutaneous findings such as pigmentary changes (eg, darkening of the skin, alternating bands of normal colored and lighter hair “flag sign”), alopecia, and dermatoses, including the pathognomonic “peeling paint.”<sup>1</sup>

Kwashiorkor often affects populations of the underdeveloped world, with higher incidences in areas of famine. Although there are few data on kwashiorkor's incidence in the United States, a 2011-2012 report from the Centers for Disease Control and Prevention describes the prevalence of underweight adults (body mass index <18.5) to be 0.9% of individuals aged 40 to 59 years and 1.6% of those aged 60 years and older.<sup>2</sup> Because access to nutrition is not usually a factor in malnutrition development in the United States, underlying causes such as eating disorders, fad diets, dietary restrictions (real or “perceived” sensitivities), chronic disease, and hospitalization have to be addressed.<sup>3-6</sup> We describe a rare case of “peeling paint” dermatosis in a leukemia patient thought to have developed kwashiorkor because of neutropenic bowel inflammation and dietary restriction.

## CASE REPORT

We present a 36-year-old woman with B-cell acute lymphoblastic leukemia treated with the

CALGB-10403 protocol<sup>7</sup> and ponatinib whose clinical course was complicated by chronic thrombocytopenia requiring monthly platelet transfusion, and acute renal failure necessitating dialysis and a low-protein diet. After the patient's renal failure improved, dialysis was discontinued; however, she continued her low-protein diet for 8 months, without fruit or vegetables, nor oral supplementation of vitamins, minerals, or protein. The patient presented with asymptomatic desquamation of the extremities and trunk (Fig 1), 10 of 10 abdominal pain, and 10 to 12 episodes of diarrhea necessitating hospital admission for further evaluation. Her physical examination was significant for ichthyosiform plate-like scale with minimal erythema over the trunk and large adherent sheets of peeling skin over the extremities.

Skin biopsy was remarkable for epidermal pallor, as well as increased compact orthokeratosis with underlying basket weave, which may be suggestive of a desquamative process (Fig 2). Laboratory assessments were notable for decreased levels of albumin (2.3 g/dL; range 3.7-5.3 g/dL), copper (65 µg/dL; range 85-155 µg/dL), vitamin A/retinol (0.07 mg/L; range 0.30-1.20 mg/L), vitamin B1 (4 nmol/L; range 8-30 nmol/L), vitamin B6 (8.6 nmol/L; range 20-125 nmol/L), vitamin D/25-hydroxycholecalciferol (7.5 mg/mL; range >40 ng/mL), vitamin E/α-tocopherol (5.1 mg/L; range 5.5-18.0 mg/L), and zinc (44 µg/dL; range 55-150 µg/dL). Folate, vitamin B2, B12, and C levels were within normal limits. In regard to her abdominal pain, the patient received a diagnosis of neutropenic enterocolitis and typhlitis as a complication of her chemotherapy-induced neutropenia. The patient

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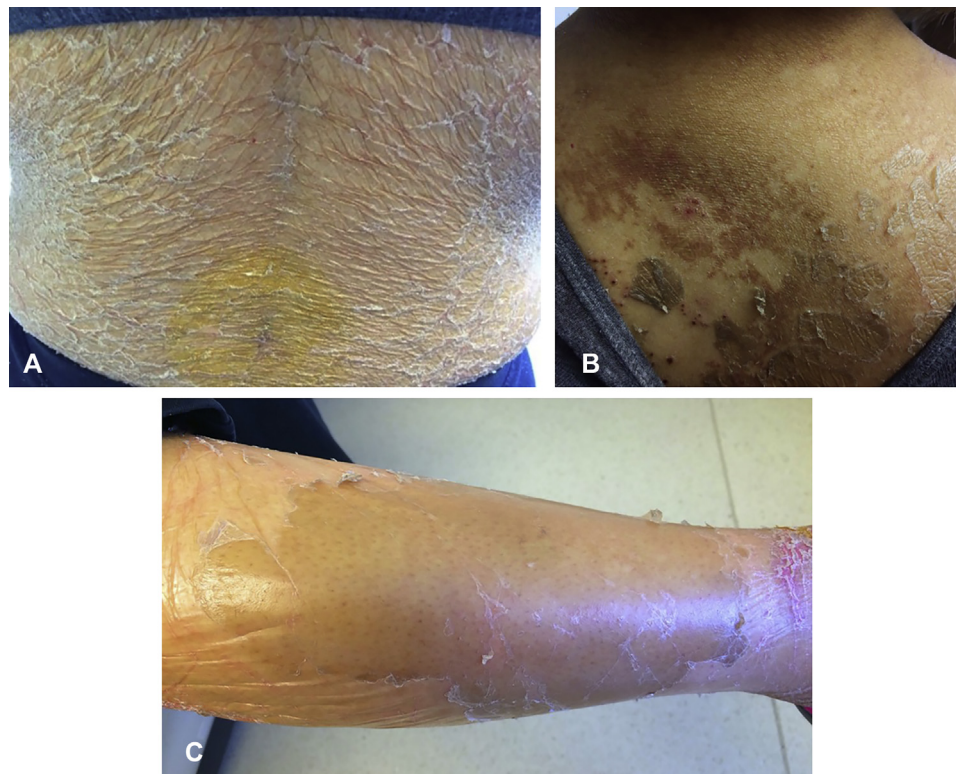
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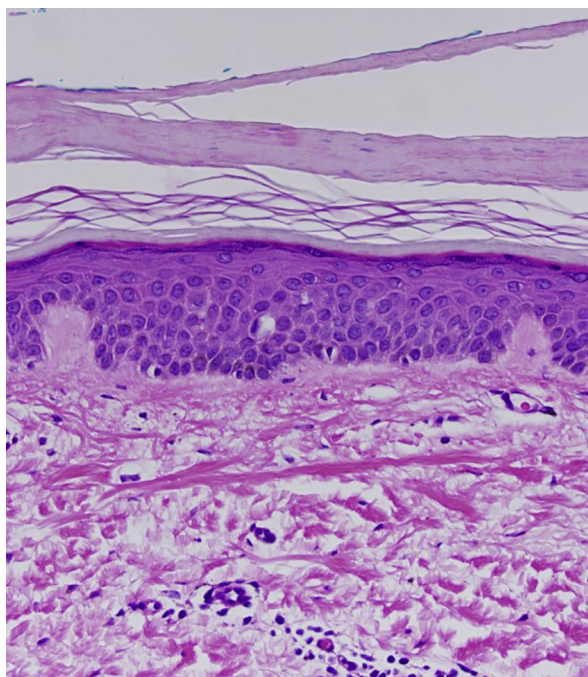
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**Fig 1.** Ichthyosis and platelike scale of the “peeling paint” dermatosis, characteristic of kwashiorkor of the back (A), anterior portion of the chest (B), and lower extremity (C).



**Fig 2.** Skin biopsy with epidermal pallor and compact orthokeratosis with underlying basket weave.

was also found to have an unrelated *Klebsiella* urinary tract infection, requiring treatment with intravenous meropenem. The initial differential

diagnosis of her dermatosis included a paraneoplastic process, drug reaction, transfusion reaction, or nutritional deficiency. Given the patient’s history of poor diet, diagnosis of neutropenic enterocolitis and typhlitis, profoundly low albumin level, and “peeling paint” dermatosis, she received a diagnosis of kwashiorkor. Although she had numerous deficiencies, we believed that the overall presentation of her skin fit best with this diagnosis.

The patient’s malnutrition was initially treated by encouraging oral intake and dronabinol 2.5 mg (titrated up to 10 mg) orally twice daily. Unfortunately, albumin levels continued to decrease. It was decided to start total parenteral nutrition and her skin findings resolved. She was discharged from the hospital in stable condition and has not experienced further episodes of desquamation.

## DISCUSSION

Kwashiorkor is rarely diagnosed in the United States; however, chronic diseases (gastrointestinal, cardiovascular, neuromuscular, febrile, and psychiatric diseases; malignancy; or immunodeficiency such as AIDS), prolonged hospitalization, or both may predispose patients to protein depletion. Approximately 70% of cancer patients will develop

malnutrition, with low protein and albumin levels.<sup>4-6</sup> Specifically, in chronic lymphoid leukemia, production of oleoylethanolamide causes lipolysis and contributes to cachexia.<sup>8</sup>

Our patient presented with several predisposing factors for severe protein malnutrition, including restrictive diet, enterocolitis, and typhlitis, causing decreased nutritional absorption, as well as a chronic disease course with multiple hospitalizations. In addition to hypoalbuminemia and “peeling paint” dermatosis characteristic of kwashiorkor, the patient had multiple vitamin and mineral deficiencies consistent with poor diet. Vitamins and minerals act as important enzyme cofactors, and their dietary loss may also result in cutaneous disease. Decreased zinc level is implicated in skin ulceration and poor wound healing. Vitamin B3 and B6 deficiencies cause pellagra and pellagra-like dermatitis, while decreased vitamin A causes xerotic, thickened skin with perifollicular scale.

Seemingly rare nutritional deficiencies may occur in patients who undergo massive stress such as chronic disease, prolonged hospitalization, or self-imposed dietary restrictions. Appropriate counseling of patients at risk should occur with a multidisciplinary team including clinicians, nutritionists, and dietitians to ensure proper nutrition. With these

comorbidities in mind, physicians should anticipate the development of severe protein malnutrition in specific populations, and be ready to diagnose and treat resulting dermatoses early to avoid further patient morbidity or mortality.

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