

Generalized Acquired Cutis Laxa Associated With Multiple Myeloma With Biphenotypic IgG- λ and IgA- κ Gammopathy Following Treatment of a Nodal Plasmacytoma

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Background: Cutis laxa is a rare dermatosis that can be inherited or acquired. The acquired form is rare and has been associated with various conditions, including multiple myeloma, monoclonal gammopathy of undetermined significance, and heavy chain deposition disease.

Observations: We describe a 48-year-old man who developed generalized cutis laxa over a 4-year duration. There were no preceding skin changes except for a history of erythematous plaques with granuloma annulare-like features on his buttocks and lateral hips. He underwent treatment of an axillary lymph node plasmacytoma with surgery and radiation 4 years prior to his cutaneous changes and had been clinically monitored with a diagnosis of monoclonal gammopathy of unknown significance (MGUS). Cutaneous manifestations prompted a systemic evaluation

demonstrating a persistent monoclonal IgG- λ M-spike on immunofixation electrophoresis and lytic bone lesions. He was later found to have biphenotypic IgG- λ and IgA- κ multiple myeloma.

Conclusions: Multiple myeloma, plasma cell dyscrasia, and heavy-chain deposition disease have been very rarely reported to be associated with acquired cutis laxa (ACL). Findings in our patient support the hypothesis that paraproteinemia is a cause of ACL through immunologic destruction of elastic fibers manifesting as granuloma annulare-like plaques. Evaluation for an underlying gammopathy is essential for the workup of a patient with new-onset ACL.

Arch Dermatol. 2011;147(3):323-328

CUTIS LAXA (CL) IS A RARE dermatosis resulting in loose, wrinkled, redundant skin secondary to defects in dermal elastic tissue. When involving the face, patients classically have a “bloodhound-like” or “hound dog-like” appearance. Extracutaneous manifestations may also occur, including pulmonary emphysema, diverticulae of the gastrointestinal tract or genitourinary tract, and cardiovascular defects. Cutis laxa may be inherited or acquired with acquired cutis laxa (ACL)

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having a later onset of disease, and more generalized involvement and is related to various different etiologies including medications, inflammatory diseases, infections, and hematologic disorders.¹ We describe a 48-year-old man who developed ACL and granuloma annulare (GA)-like lesions as a paraneoplastic manifestation of early myeloma years after being treated for a lymph node plasmacytoma.

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REPORT OF A CASE

A 48-year-old man was referred for evaluation of “recalcitrant” GA. At the time of referral, we noted a 4-year history of gradually developing loose, wrinkled skin of his face, chest, upper back, lateral hips, buttocks, and proximal upper extremities. There were no preceding cutaneous changes on his face and upper body; however, he developed asymptomatic erythematous plaques with GA-like features on his buttocks and hips. Eight years earlier, a nodal plasmacytoma was surgically excised from his left axilla. He received local radiation therapy at that time and was clinically monitored by an oncologist for the working diagnosis of monoclonal gammopathy of unknown significance (MGUS).

His medical history was otherwise unremarkable, and his medications included oral acitretin, 25 mg/d, and daily oral multivitamins: oral vitamin E, 400 IU; oral vitamin D, 2000 IU; omega-3 fish oil, 2000 mg; and B-complex vitamin supplements. Acitretin was added by the referring dermatologist 1 month prior to his ini-

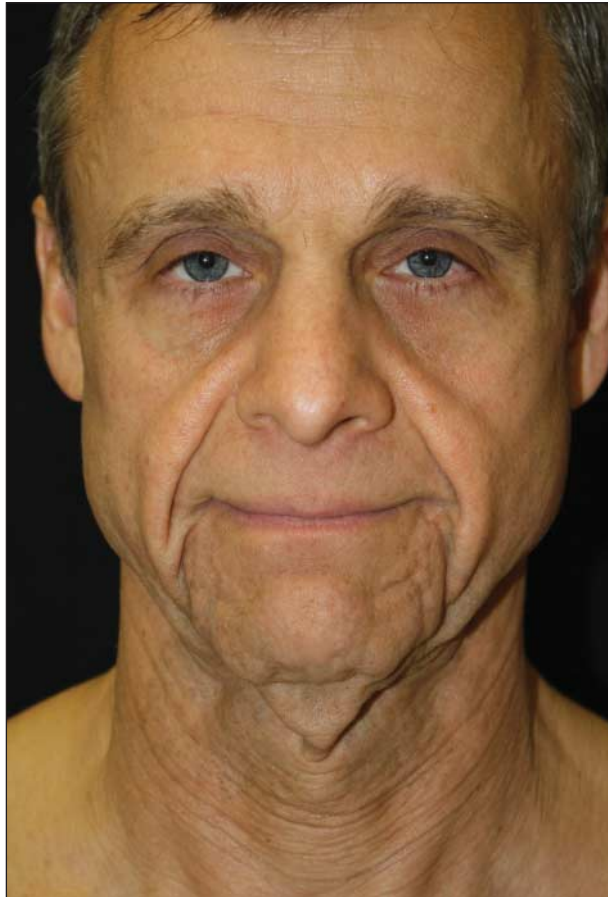


Figure 1. Loose, sagging skin on the face and neck with “bloodhound-like” appearance.



Figure 2. Right lateral hip with loose, wrinkly, redundant folds with faint erythema.

tial presentation to us without improvement of his skin disease. His family history was unremarkable.

Physical examination demonstrated a healthy-appearing man who appeared older than his stated age. He had loose, sagging skin on the face and neck along with wrinkled, lax skin on the chest, upper back, proximal upper extremities, and the lateral aspects of his hips (**Figure 1** and **Figure 2**). Granuloma annulare-like erythematous, nonscaly plaques were noted on his lower back, buttocks, and lateral hips in association with increased wrinkling (**Figure 3**).

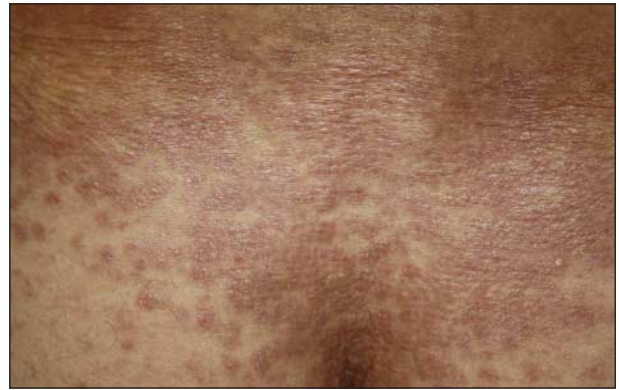


Figure 3. Sacral area with nonscaly, somewhat annular, erythematous papules and plaques.

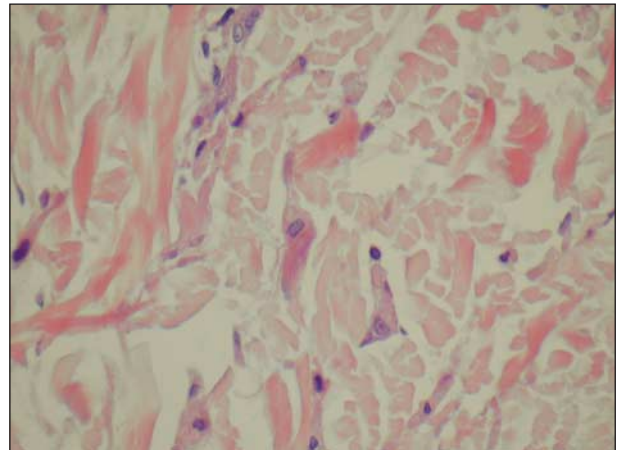


Figure 4. A 4-mm punch biopsy specimen from the hip demonstrating paucicellular infiltrate of interstitial histiocytes with intracytoplasmic eosinophilic refractile elastic fiber fragments (hematoxylin-eosin, original magnification $\times 600$).

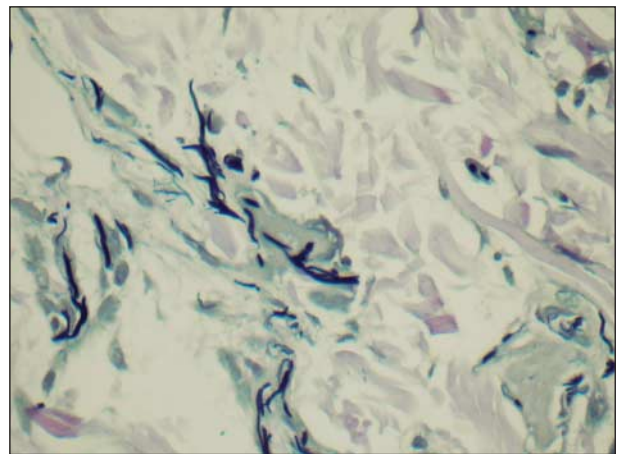


Figure 5. Verhoeff–Van Gieson stain highlights histiocytic cells engulfing fragmented elastic fibers, as well as diminished elastic fibers in the surrounding dermis (original magnification $\times 600$).

METHODS

Findings from two 4-mm punch biopsy specimens of the patient's left hip and upper back revealed a normal epidermis and dermoepidermal junction with few lymphocytes and histiocytes around superficial blood vessels and interstitially in the upper dermis. A marked decrease in elastic fibers with elasto-

Table 1. Summary of Acquired Cutis Laxa (ACL) Associated With Plasma Cell Dyscrasias

Source	Sex, Age, y	Site(s) of Cutis Laxa	Associated Findings	Skin Biopsy Finding	SPEP, UPEP, or IFE	Bone Marrow Evaluation	Treatment and Outcome
Turner et al ⁹	M/29	Face, neck, axillae, shoulders, upper extremities	Urticarial vasculitis with LCV and immune complex mediated glomerulonephritis	LCV with perivascular neutrophilic infiltrate with extravasated RBCs, fibrin deposition and perivascular karyorrhexis Marked loss of elastic fibers in zones of LCV	IgA myeloma involving kidneys	IgA myeloma	High-dose pulse methylprednisolone and cyclophosphamide; urticaria persisted; patient became hemodialysis dependent and died of his disease
Scott et al ⁹	F/44	Face, neck, axillae, wrists, abdomen	Started following penicillin hypersensitivity reaction Extensive colonic diverticulae, bladder and rectal prolapse, loss of support of eyelids, palate, and uvula	Fragmentation and granulation of dermal elastic fibers DIF and IIF were negative	SPEP: IgG gammopathy UPEP: IgG with κ FLCs and κ attached to heavy chains	Aspirate: 58% immature plasma cells confirming diagnosis of myeloma	Treatment and outcome not discussed
Cho et al ¹⁰	F/46	Face, neck, trunk, extremities	Began after penicillin hypersensitivity reaction with marked facial and neck edema Panacinar emphysema, uterine and vaginal prolapse, rectocele, hiatal hernia, colonic diverticulae Airway obstruction, pulmonary restriction, and hypertension	Skin biopsy finding consistent with CL DIF: IgG bound to dermal elastic fibers	SPEP: monoclonal γ spike UPEP: IgG and κ FLCs 24-h urine: 4.6 g protein	Aspirate revealed 58% plasma cells confirming diagnosis of myeloma	Prednisone, melphalan, cyclophosphamide; patient became bedridden over the following 18 mo and died after endotracheal tube was removed
Ting et al ¹¹	F/45	Entire body with more severity on face, neck, axillae, and perineum	Followed episodic "puffiness" of eyelids Loss of elasticity of lungs, bladder, and rectum	Absence of elastic fibers in the upper dermis and marked diminished amount in deep dermis DIF: negative	SPEP: monoclonal gammopathy UPEP: λ paraproteinuria	Aspirate showed 57% immature plasma cells confirming diagnosis of myeloma	Treatment and outcome not discussed
McCarty et al ¹²	M/62	Face, neck, trunk, and extremities	Exercise intolerance and fatigue Lytic vertebral lesions	Fragmented dermal elastic fibers DIF: negative	SPEP: monoclonal IgG- κ proteinemia	60% Plasma cells in bone marrow aspirate confirming myeloma	Melphalan and prednisone initially. Developed spontaneous bilateral humeral fractures requiring surgery and radiation therapy. Then treatment with doxorubicin, vincristine, and dexamethasone was initiated; serum immunoglobulin levels declined. Skin disease continued to progress
Gupta and Helm ¹³	F/62	Face, neck, chest, back	Had a 5-y history of IgG myeloma prior to development of CL	Loss of elastic fibers; no inflammatory infiltrate noted	SPEP: elevated levels of γ globulin and β 2-microglobulin IFE: homogeneous bands to IgG and the κ region UPEP: monoclonal κ FLCs	Aspirate consistent with IgG multiple myeloma with 40% plasma cells	Prior to onset of CL, patient had been prescribed vincristine, melphalan, doxorubicin, cyclophosphamide, prednisone, interferon, granulocyte-colony stimulating factor, thalidomide, dexamethasone. At time of presentation, she was taking prednisone, 50 mg every other day, and thalidomide, 100 mg/d which was increased to 400 mg/d; her myeloma "markers" improved, and her cutaneous disease gradually progressed

(continued)

phagocytosis by epithelioid cells and giant cells were observed (**Figure 4** and **Figure 5**). Results from periodic acid–Schiff and giemsa stains were unremarkable. No evidence of amyloid was seen with crystal violet. No alteration of collagen or

increased mucin deposition was appreciated. Initially, the biopsy specimen involving his left hip had been diagnosed as GA and that from his upper back as mid-dermal elastolysis. Further review of the specimens concluded that both biopsy specimens

Table 1. Summary of Acquired Cutis Laxa (ACL) Associated With Plasma Cell Dyscrasias (continued)

Source	Sex, Age, y	Site(s) of Cutis Laxa	Associated Findings	Skin Biopsy Finding	SPEP, UPEP, or IFE	Bone Marrow Evaluation	Treatment and Outcome
Yoneda et al ¹⁴	M/71	Both thumbs with lax skin	Lumbar back pain, paresthesias of right leg, night sweats; EKG with atrial fibrillation	Fingertip biopsy: reduced elastic fibers with fragmentation Amyloid around Meissner corpuscle	SPEP: monoclonal IgG-κ UPEP: large amount of Bence Jones κ proteins	Aspirate with immature plasma cells (no further details)	Cyclophosphamide; decrease in serum IgG κ and urine Bence Jones protein; skin lesions persisted; rectal biopsy indicated no amyloidosis
Yoneda et al ¹⁴	M/62	Acral sites on fingertips and soles of feet	Hepatomegaly; osteolytic lesions of both femurs; diffuse osteoporosis; renal insufficiency; hypercalcemia	Fingertip biopsy: reduction and fragmentation of elastic fibers Amyloid deposition	Elevated serum IgG 16.9 g/L (RR, 7.5-18 g/L) SPEP: monoclonal IgG λ UPEP: Bence Jones λ proteins	Aspirate with numerous immature plasma cells (no further details)	Cyclophosphamide and prednisolone; decrease of serum monoclonal IgG λ and urine Bence Jones protein; cutaneous lesions progressed; amyloidosis involving the liver, kidneys and entire intestine led to death from chronic intestinal pseudo-obstruction and renal failure
Appiah et al ¹⁵	F/64	Axillae, medial thighs, eyelids, labia majora with flesh-colored papules with loose, wrinkled skin of fingertips	None discussed	Axillary, lip and thigh biopsy: nodular amyloid deposits with decrease and clumping of elastic fibers in dermis	SPEP and UPEP with prominent homogenous band in mid-γ region IFE: κ FLCs	Biopsy of bone marrow: 25%-30% plasma cells with κ light chain restrictions; amyloid deposits in bone marrow staining for κ light chains	Treatment and outcome not discussed
Dicker et al ¹⁶	F/59	Acrolocalized ACL with tender tense areas of "puffiness" of fingertips resolved leaving lax skin on fingerpads on her thumbs and second and third fingers bilaterally	Tongue swelling leading to airway obstruction; history of carpal tunnel syndrome; hypothyroidism	Elliptical biopsy right index finger: Amyloid deposition in dermis; elastic fibers not assessed owing to amount of amyloid deposition	SPEP: monoclonal band UPEP: Bence Jones proteins	Biopsy of bone marrow: plasma cell dyscrasia; did not meet criteria for diagnosis of myeloma	Cycles of C-VAMP; after 2 cycles of C-VAMP laxity of skin improved as did the size of her tongue; patient considering bone marrow transplant at time of publication
This article	M/48	Face, neck, upper trunk, axillae, proximal upper extremities, lateral hips, lower back, and buttocks	Erythematous nonscaly papules and plaques on patient's lower back and buttocks; multiple lucent bone lesions in skull and ribs; skin lesions developed 4 years after treatment for lymph node plasmacytoma of left axilla	Findings from left hip and upper back biopsy specimens: normal epidermis and dermoepidermal junction, marked decrease in elastic fibers with elastophagocytosis; crystal violet negative for amyloid	IFE: monoclonal IgG-λ M-spike (stable compared with level 1 year prior)	Bone marrow biopsy with 10% plasma cells Subsequently, diagnosed as having biphenotypic IgG-λ and IgA-κ multiple myeloma	Lenalidomide, 25 mg/d orally, dexamethasone, 40 mg/wk, oral pamidronate monthly and aspirin, 81 mg. During 5 mo of therapy, patient had stable hematologic markers, skeletal disease; skin laxity gradually progressive

Abbreviations: CL, cutis laxa; C-VAMP, cyclophosphamide, vincristine, adriamycin, and methylprednisolone; DIF, direct immunofluorescence; EKG, electrocardiogram; FLC, free light chain; IFE, immunofixation electrophoresis; LCV, leukocytoclastic vasculitis; RBC, red blood cell; RR, reference range; SPEP, serum protein electrophoresis; UPEP, urine protein electrophoresis.

were more suggestive of dermal elastolysis consistent with ACL rather than GA.

Findings from a complete blood cell count, including differential, hepatic function panel, basic metabolic panel, fasting lipid profile, thyroid panel, anti-Ro/SSA antibody, anti-La/SSB antibody, antinuclear antibody, anti-double-stranded DNA antibody, serum ceruloplasmin, serum copper level, serum β-2 microglobulin, erythrocyte sedimentation rate, and echocardiogram were negative for disease or were within reference range. Serum levels of IgG, IgA, IgM, albumin, total protein, α1-globulin, α2-globulin, γ-globulin, and total globulin were also within reference range on serum protein electrophoresis (SPEP).

Immunofixation electrophoresis (IFE) revealed a stable monoclonal IgG-λ M-spike (0.5 g/dL vs 0.4 g/dL when evaluated the previous year). One year prior to his presentation, the patient had elevations of serum κ free light chain (FLC) level (118 mg/L; reference range, 3.3-19.4 mg/L) and serum λ FLC level (79.3 mg/L; reference range, 5.7-26.3 mg/L).

A bone marrow biopsy was performed, revealing 10% plasma cells. A skeletal survey was also performed, revealing multiple lucent bone lesions, less than 5 mm in size, in the patient's skull along with lytic rib lesions. Biphenotypic IgG-λ and IgA-κ multiple myeloma was subsequently diagnosed by the patient's oncologist.

Treatment with oral lenalidomide, 25 mg/d; dexamethasone, 40 mg/wk; oral pamidronate monthly; and aspirin, 81

Table 2. Summary of Acquired Cutis Laxa Associated With Immunoglobulin Heavy Chain Deposition

Source	Sex, Age, y	Clinical Findings	Skin Biopsy Finding	Investigative Findings	Treatment	Outcome
Tan et al ¹⁸	M/50	Developed lax skin on face, neck, trunk, and extremities with a history of gammopathy, glomerulonephritis; recent 30-lb weight loss	Skin biopsy: loss of elastic fibers in superficial and deep dermis DIF: IgG deposited around dermal elastic fibers and within walls and lumens of dermal blood vessels	Serum IgG- λ gammopathy with λ FLCs IgG glomerular deposits leading to membranoproliferative glomerulonephritis; hemodialysis dependent No bone marrow involvement	Prednisolone and cyclophosphamide	Developed emphysema and peripheral polyneuropathy No mention of response of cutaneous changes
Harrington et al ⁹	F/38	Lax skin on face, axillae, trunk, and extremities with history of urticaria, renal insufficiency, monoclonal immune deposition of IgG-heavy chains in heart and kidney	Skin biopsy: marked reduction of dermal elastic fibers with elastophagocytosis DIF: IgG deposition on elastic fibers in papillary dermis	SPEP: normal	Lenalidomide; caused reversible renal insufficiency and patient then placed on treatment with dexamethasone and bortezomib	Not discussed
Fernández de Larrea et al ⁴	M/52	Lax skin of face, neck, axillae and groin in setting of monoclonal gammopathy of undetermined significance who had renal failure	Skin biopsy: marked reduction of elastic fibers DIF: IgG deposits on the elastic fibers in the dermis, along the dermoepidermal junction, around blood vessels and adnexal structures	IgG- λ monoclonal gammopathy	Initial treatment with granulocyte CSF; patient developed alveolar hemorrhage and worsening renal function Treatment with bortezomib and oral dexamethasone was initiated	Stabilization of cutaneous disease and hemodialysis dependent at time of publication

Abbreviations: CSF, colony-stimulating factor; DIF, direct immunofluorescence; FLC, free light chain; SPEP, serum protein electrophoresis.

mg/d, was initiated. The patient's hematologic markers and skeletal disease remained stable; however, his cutaneous laxity gradually progressed during 5 months on this regimen.

COMMENT

Acquired cutis laxa manifests as localized or generalized laxity and has been associated with inflammatory dermatoses (ie, urticaria, dermatitis herpetiformis, sarcoidosis, amyloidosis, systemic lupus erythematosus, erythema multiform), medication use (ie, penicillamine, penicillin, isoniazid), hypersensitivity reaction to insect bites and related to an underlying hematologic disorder (ie, multiple myeloma, lymphoma, immunoglobulin heavy-chain deposition disease, plasma cell dyscrasia).¹⁻⁴ Acquired cutis laxa has also been reported in patients following cutaneous mastocytosis, Sweet syndrome in pediatric patients (Marshall syndrome), and interstitial granulomatous dermatitis.⁵⁻⁷ At least 10 patients have been described in the literature as having ACL associated with multiple myeloma (**Table 1**).⁸⁻¹⁶

Our patient's cutaneous laxity distribution is consistent with descriptions of prior cases. In contrast to prior reports, this is the first case, to our knowledge, of ACL due to myeloma associated with the clinical presentation of GA-like plaques. It is also interesting to note that the face and upper body had only isolated skin laxity without preceding plaques. Histologic examination of the erythematous lesions showed marked elastolysis with elastophagocytosis by giant cells and lacked evidence of amyloid deposi-

tion. The pattern of elastic fiber destruction with engulfment by phagocytes can be a nonspecific finding but is characteristic of elastolytic giant cell granuloma, which occurs on sun-damaged areas in contrast to our patient. However, a papular variant with 2- to 3-mm skin-colored papules occurring on the chest, neck, back, and shoulders of a 43-year-old woman was recently described in association with a IgG- λ gammopathy.¹⁷

The patient's cutaneous changes prompted further systemic investigation leading to the diagnosis of early myeloma, which could improve his overall survival. It is theoretically possible that use of immunosuppressive agents may improve his gammopathy and decrease the progression of his cutaneous changes; however, the likelihood is very low given the outcomes of prior reported cases.

The exact pathogenesis of ACL is unclear. In the setting of myeloma, amyloid light chains are produced by plasma cells and are deposited in various organs leading to end-organ failure. Three of the cases¹⁴⁻¹⁶ reviewed did show evidence of amyloid deposition with reduction and fragmentation of elastic fibers, and the patient described by Dicker et al¹⁶ with localized acrolocalized ACL had so much dermal amyloid deposition that elastic fibers could not be evaluated. In addition to amyloid deposition, immunoglobulin-heavy chain deposition has also been reported with ACL (**Table 2**).^{3,4,18} Unfortunately, we could not assess immunoglobulin deposition owing to lack of tissue. This hypothesis could be the basis for the cell-mediated destruction of elastic fibers in the gammopathy-associated cases of cutis laxa and the case of papular

elastolytic giant cell granuloma recently described. However, it is difficult (if not impossible) to determine if the immune deposits are the primary event or a normal response to repair and "clean up" damaged tissue.

In conclusion, ACL is a very rare entity described in the literature, and cases related to monoclonal gammopathy are even scarcer. We believe our case supports the theory that myeloma-associated immunoglobulin deposition on elastic fibers triggers a cell-mediated immune response leading to their destruction phagocytosis. In our patient, this resulted in decreased skin laxity and the development of plaques with a clinical presentation strikingly resembling GA. Clinicians should be aware of this association and evaluate for the presence of a gammopathy with immunofixation electrophoresis when a patient presents with ACL and/or GA-like plaques with histologic characteristics resembling the so-called elastolytic giant cell granuloma.

Accepted for Publication: July 14, 2010.

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Author Contributions: Both authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* New and Callen. *Acquisition of data:* New and Callen. *Analysis and interpretation of data:* New and Callen. *Drafting of the manuscript:* New and Callen. *Critical revision of the manuscript for important intellectual content:* Callen. *Administrative, technical, and material support:* Callen. *Study supervision:* Callen. **Financial Disclosure:** Dr Callen has received honorarium from Amgen, Abbott, Genentech, Centocor, Electrical Optical Sciences, Celgene, and Medicis. He serves on a safety monitoring committee for Celgene.

Disclaimer: Dr Callen is Associate Editor of the *Archives of Dermatology*, but he was not involved in any of the decisions regarding review of the paper or its acceptance.

Additional Contributions: Janine Malone, MD, assisted with the dermatopathologic photographs and captions.

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