

**Table IV.** Cont'd

Treatment modality	Condition of interest	Cases, n	Subsequent reports	Citations, n	URL
Cidofovir (same case as HPV 66 wart in a patient with HIV)	HPV verruca	1	Multiple studies showing effectiveness in studies of 14, 24, 30, and 47 patients Pilot study of topical cidofovir with 14 patients found that it was effective for refractory lesions	51	<a href="https://www.jaad.org/article/S0190-9622(00)53691-3/fulltext">https://www.jaad.org/article/S0190-9622(00)53691-3/fulltext</a>
Q-switched alexandrite and ruby laser	Imipramine-induced hyperpigmentation	1	Multiple case reports showing effectiveness of Q-switched alexandrite laser for causing hypopigmentation in various conditions Many showing effectiveness of Nd:YAG also	37	<a href="http://www.jaad.org/article/S0190-9622(00)28667-2/abstract">http://www.jaad.org/article/S0190-9622(00)28667-2/abstract</a>

*Er:YAG*, Erbium-doped yttrium-aluminum-garnet; *5-FU*, 5-fluorouracil; *GVH*, graft-versus-host; *HPV*, human papilloma virus; *IVIg*, intravenous immunoglobulin; *Nd:YAG*, neodymium-doped yttrium-aluminum-garnet; *NSDHL*, NAD(P) dependent steroid dehydrogenase-like; *SLE*, systemic lupus erythematosus; *URL*, uniform resource locator; *UVA*, ultraviolet A; *UVB*, ultraviolet B.

**Table V.** Citations by article type

Article type	Citations, n
Case reports	34
CME articles	346
Prospective studies	95.2
Retrospective studies	85.2
Basic science research	80.2

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**Relative risk of microscopic colitis in dermatomyositis**

*To the Editor:* Chronic diarrhea, which is diagnosed when symptoms last 4 weeks or longer, is common in dermatomyositis and is attributable to many causes. Among the general population, 7.5% to 15% of chronic diarrhea is caused by microscopic colitis (MC), an idiopathic inflammatory colonic disease diagnosed by

colonoscopy that affects 107 to 219 individuals per 100,000.<sup>1-3</sup> Herein, we have investigated the association between MC and dermatomyositis.

This cohort study reviewed adult patients with dermatomyositis at the University of Pennsylvania between 2000 and 2017 (N = 644). Dermatomyositis subtype (classic dermatomyositis [CDM] vs clinically amyopathic [CADM]), highest antinuclear antibody (ANA) titer, myositis-specific antibody (MSA) and myositis-associated antibody (MAA) serologies, and gastroenterologic diagnoses were obtained by chart review. MC diagnosis required confirmatory colonic biopsy. Relative risks (RRs) were calculated against historic controls.<sup>1-6</sup> Statistical analyses were performed with Stata software (version 15.0, StataCorp LLC, College Station, TX). The University of Pennsylvania institutional review board approved this protocol (No. 828959).

Table I illustrates baseline characteristics and compares patients with MC to those without MC (non-MC). In all, 14 patients had colonic biopsy-confirmed MC. The median age at dermatomyositis onset was 49 years (interquartile range [IQR], 36.8-58 years). Patients with MC were more likely to be older, be white, and have CADM than patients with non-MC ( $P = .003$ ,  $P = .03$ , and  $P = .009$ , respectively). Most patients were female, with no sex differences observed ( $P = .14$ ). The median ANA titer was 1:80 (IQR <1:40-1:640

**Table I.** Baseline characteristics of adult patients with dermatomyositis who were seen in the dermatology and rheumatology clinics at the University of Pennsylvania between January 1, 2000, and December 31, 2017, including a comparison of patients with and without MC

Metric	Full cohort (N = 644)	MC (n = 14)	Non-MC (n = 630)	P value (MC vs non-MC)
Median age at symptom onset, y (IQR)	49 (36.8-58)	66 (51-69.8)	49 (36-58)	<b>.003</b>
Female sex	533 (82.8%)	14 (100%)	519 (82.4%)	.14
Patient-reported race/ethnicity, n (%)				<b>.03</b>
White	478 (74.2)	13 (92.9)	465 (73.8)	
Black	76 (11.8)	0	76 (12.1)	
Asian, American Indian, or Alaskan Native	20 (3.1)	0	20 (3.2)	
Other	70 (10.9)	1 (7.1)	69 (11.0)	
Dermatomyositis subtype, n (%)				<b>.009</b>
CDM	439 (68.2)	5 (35.7)	434 (68.9)	
CADM	205 (31.8)	9 (64.3)	196 (31.1)	
Autoantibody profile				
Median highest ANA titer (IQR)	1:80 (<1:40-1:640) (n = 555)	1:80 (<1:40-1:640) (n = 11)	1:80 (<1:40-1:640) (n = 544)	.95
MSA, n (%)				
Any positive	93/437 (21.3)	2/9 (22.2)	91/428 (21.2)	>.99
Jo-1	32/422 (7.6)	1/8 (12.5)	31/414 (7.5)	.47
PL-7	5/241 (2.1)	0/5	5/236 (2.2)	>.99
PL-12	5/241 (2.1)	0/5	5/236 (2.2)	>.99
EJ	0/241	0/5	0/236	>.99
OJ	1/241 (0.4)	0/5	1/236 (0.4)	>.99
Mi-2	15/257 (5.8)	1/6 (16.7)	14/251 (5.6)	.31
MDA-5	12/58 (20.7)	0/1	12/57 (21.1)	>.99
SRP	5/212 (2.4)	0/5	5/207 (2.4)	>.99
SAE-1	5/52 (9.6)	0/1	5/51 (9.8)	>.99
TIF1- $\gamma$	18/146 (12.3)	0/2	18/144 (12.5)	>.99
NXP-2	3/72 (4.2)	0/2	3/70 (4.3)	>.99
MAA, n (%)				
Ro	82/452 (18.1)	1/9 (11.1)	81/443 (18.3)	>.99
RNP	52/386 (13.5)	2/9 (22.2)	50/377 (13.3)	.35
PM/Scl	13/176 (7.4)	0/3	13/173 (7.5)	>.99
Ku	5/240 (2.1)	1/5 (20.0)	4/235 (1.7)	.10

Boldface indicates statistical significance.

ANA, Antinuclear antibody; CADM, clinically amyopathic dermatomyositis; CDM, classic dermatomyositis; IQR, interquartile range; MAA, myositis-associated antibodies; MC, microscopic colitis; MSA, myositis-specific antibodies.

[n = 555]), and 93 of 437 patients (21.3%) had at least 1 positive MSA. There were no differences in ANA titers or MSA/MAA serologies. Versus historic controls, the RR of MC in dermatomyositis was 14.1 (95% confidence interval [CI], 8.3-24.2); the RR was greater in CADM (28.6 [95% CI, 14.5-56.1]) than in CDM (7.4 [95% CI, 3.1-18.0]) ( $P = .02$ ) (Table II). MC onset occurred simultaneously with dermatomyositis onset (median time, 0 years after dermatomyositis onset [IQR, -2 to 1.5 years]). Of the patients with MC, 6 had improvement/significant improvement of diarrhea with treatment of their dermatomyositis, 2 improved somewhat, and 5 experienced no change. Overall, treatment regimens did not differ substantially between subgroups.

There are several important limitations. Patients with severe disease, including colonic symptoms, may be over-represented at our center. Gastroenterologic diagnoses were extractable only if elicited. Colonoscopies with biopsies are not performed on every patient with dermatomyositis; thus, we may be underestimating the true prevalence of MC. RRs were calculated against historic controls, and systematic differences may exist between our patients with dermatomyositis and population-based cross-sectional studies. Despite high RRs in this large cohort of patients with dermatomyositis, we had relatively few patients with MC. Additionally, only a subset of our patients had complete autoantibody profiles (n = 52) owing to test availability during the study period.

**Table II.** RRs of gastroenterologic diagnoses versus historic adult controls from the United States

Gastroenterologic diagnosis	Prevalence (historic controls)	Dermomyositis RR (95% CI)	CDM RR (95% CI)	CADM RR (95% CI)	P value (CDM vs CADM)
MC (n = 14)	0.154% <sup>2,3</sup>	<b>14.1 (8.3-24.2)</b>	<b>7.4 (3.1-18.0)</b>	<b>28.6 (14.5-56.1)</b>	<b>.02</b>
IBS (n = 46)	11.8% <sup>4</sup>	0.63 (0.44-0.90)	0.56 (0.37-0.87)	0.78 (0.46-1.3)	.35
IBD (n = 11)	0.286% <sup>5</sup>	<b>6.0 (3.3-11.0)</b>	<b>5.6 (2.6-11.9)</b>	<b>6.8 (2.5-18.5)</b>	.75
Celiac disease (n = 9)	0.95% <sup>5</sup>	1.5 (0.74-2.9)	0.96 (0.35-2.6)	<b>2.6 (1.0-6.4)</b>	.15
Chronic diarrhea NOS* (n = 39)	6.6% <sup>1</sup>	0.92 (0.61-1.4)	0.76 (0.46-1.2)	1.3 (0.72-2.2)	.18

Boldface indicates statistical significance.

CADM, Clinically amyopathic dermatomyositis; CDM, classic dermatomyositis; CI, confidence interval; IBD, inflammatory bowel disease; IBS, irritable bowel syndrome; MC, microscopic colitis; NOS, not otherwise specified; RR, relative risk.

\*Patients with diarrhea lasting 4 weeks or longer and not attributable to MC, IBS, IBD, celiac disease, or medication.

The relationship between MC and dermatomyositis requires further investigation. It is possible that MC and dermatomyositis share the same underlying inflammatory pathway or have similar risk factors. Notably, both disorders demonstrate increased risk of concomitant autoimmune diseases and most often affect middle-aged to elderly white women. Over-representation of MC in patients with CADM versus in patients with CDM suggests further phenotypic differences between these subgroups. Future prospective studies may better estimate autoantibody-phenotype correlation in this cohort.

In summary, we found over-representation of MC among patients with dermatomyositis and simultaneous symptom onset. Although this association requires further study, we recommend assessment for chronic diarrhea in patients with dermatomyositis, as it may be a symptom of MC. Because MC may be inadequately treated by dermatomyositis therapy, referral to gastroenterology for additional management may be warranted.

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