Client: Example Client ABC123
123 Test Drive

UNITED STATES

Physician: Doctor, Example

Patient: Patient, Example

DOB

Sex:

Patient Identifiers: 01234567890ABCD, 012345

Visit Number (FIN): 01234567890ABCD

Collection Date: 01/01/2017 12:34

Eosinophil Granule Major Basic Protein, Tissue Biopsy

ARUP test code 2010921

SO Source	Tissue
	Performed At:
	Medical Director: , MD CLIA Number:
Eosinophil Granule MBP in Tissues	See Note
	CLINICAL INFORMATION Odynophagia, evaluate for eosinophilic esophagitis/eosinophil-related inflammation
	Specimen Details B22-00880 A - Esophagus, proximal; Collected: ; Received:
	DIAGNOSTIC INTERPRETATION
	Abnormal, relatively minimal positive cellular and extracellular eosinophil granule major basic protein 1 (eMBP1) Overall grade, 0.5+ Approximate tissue area with staining, 3 percent
	(See Results and Comments)
	RESULTS EOSINOPHIL MAJOR BASIC PROTEIN 1 TESTING
	Examination of the tissue sections tested for eosinophil granule major basic protein 1 (eMBP1) reveals: Cellular*: 2-3+ intensity, 0.5+ extent (Eosinophil count, 2 per high power field, 400x, 1 HPF counted) Extracellular: 2-3+ intensity, 0.5+ extent with focal clusters of granules and focal confluent tissue
	* Intact cells showing positive eMBP1 staining counted per 400x (40x objective lens and 10x eyepiece lens) high power field (HPF) in areas of sections with maximal cells. Some cells may not be counted as intact cells that are obfuscated by extracellular eMBP1 deposition, and some degranulated cells that appear mainly intact may be included.

H=High, L=Low, *=Abnormal, C=Critical

COMMENTS
Specific

The results from this testing for eosinophil granule major basic protein 1 (eMBP1) in the tissues from the proximal esophagus are positive and, therefore, abnormal, but demonstrate minimal intact cellular infiltration and limited extracellular deposition. As judged by the staining, eosinophil activity, as a contributor to the pathophysiology, is not prominent. The positive findings in these tissues are insufficient to support a diagnosis of eosinophilic esophagitis. Of note, the tissue is small, and the findings could be a remnant of a previous state with greater eosinophil involvement and do not exclude the possibility of more prominent eosinophil involvement elsewhere.

Eosinophil-related inflammation commonly is observed in antibody-associated dermatologic diseases, such as pemphigoid and pemphigus, which also may affect the esophagus; neutrophil involvement is typically greater than eosinophil involvement in linear IgA disease. Eosinophils are not characteristically found in lichenoid reactions, except lichenoid drug reactions. Direct immunofluorescence can be helpful in identifying diagnostic markers in these disorders. Further testing for eMBP1 can be performed if additional biopsy tissue is obtained for direct immunofluorescence; this can be more accessible perilesional oral mucosa or skin, if lesions are present elsewhere for:
- Direct Immunofluorescence, Tissue Biopsy (Cutaneous, Mucosal, Epithelial) (ARUP test number 0092572).

Serum testing also may be helpful to assess epithelial antibody-associated diseases and can be accomplished by submitting a serum specimen through ARUP Laboratories for:
- Immunobullous Disease Antibody Panel (ARUP test number 3001409).

Correlation of the findings with clinical presentation is needed, including with respect to medication use and treatment status. Correlation with histopathological examination of formalin-fixed tissue may be helpful, although extracellular granule protein deposition and degranulated cells may not be recognized in formalin-fixed tissues.

General

Eosinophil infiltration and/or degranulation normally are present in thymus, lymph node, gastrointestinal tract from stomach through large intestine, and bone marrow and not in other tissues and organs; therefore, cellular and extracellular eosinophil granule major basic protein 1 (eMBP1) immunostaining typically is negative in tissues from normal proximal esophagus. In addition to a threshold count of infiltrating eosinophils in esophageal mucosa as a diagnostic criterion, patients with eosinophilic esophagitis often show prominent eMBP1 immunostaining in small bowel tissues, but this is not a defined diagnostic criterion for eosinophilic esophagitis and may be eosinophilic gastrointestinal disease (EGID). Moreover, diagnostic criteria in eosinophilic esophagitis for extracellular eMBP1 have not been established.

Eosinophil granule proteins, including eMBP1, have various and numerous toxic effects on tissues and organs. In determining whether eosinophils and eosinophil granule proteins may be playing a pathogenic role, consideration must be given to the treatment status of the patient (glucocorticoid and other therapies may rapidly reduce eosinophils in tissues as well as blood) and whether the specimens are representative of involved tissues (active eosinophil inflammation may be patchy). Extracellular eosinophil granule proteins may persist in tissues for a long time after deposition and may not reflect current

activity. Moreover, some positive staining likely is the result of crush artifact in the specimen procurement and freeze artifact in processing, especially extracellular granules in areas where eosinophils normally are present and/or infiltrate. Also, some eosinophils may be observed in tissues from incidental intravascular presence, more common in patients with peripheral blood eosinophilia and more common in highly vascularized tissues.

TESTING METHODS
The tissue from proximal esophagus, received in Michel transport medium, after washing and cryoembedding, is sectioned. Sections are reacted with antibody to eosinophil granule major basic protein 1 (eMBP1) by indirect immunofluorescence utilizing a fluorescein isothiocyanate (FITC)-conjugated secondary antibody for detection, and subsequently examined by fluorescence microscopy to identify intact eosinophils and extracellular eosinophil granule protein deposition. The antibody-stained sections are graded on a visual analog scale with reference images. In addition to the overall grade recorded for cellular and extracellular staining in each specimen, a maximal eosinophil count per high power field, 400x, is performed, and an estimate of the percentage of tissue with positive eMBP1 staining is rendered. A technically adequate hematoxylin and eosin (H and E)-stained section of the tissue is comparatively examined for morphological features and orientation. The antibody-stained sections also are compared to a serial section stained with normal rabbit IgG (as a negative control). A skin biopsy specimen with multiple infiltrating eosinophils and extracellular eMBP1 deposition serves to establish that the expected specific staining is detected in the assay (as a positive control). This indirect immunofluorescence testing was developed, and its performance characteristics were determined by the Immunodermatology Laboratory at the University of Utah. It has not been cleared or approved by the FDA (US Food and Drug Administration). FDA clearance or approval currently is not required for clinical use of this testing performed in a CLIA-certified laboratory (Clinical Laboratory Improvement Amendments). The results are not intended to be used as the sole means for clinical diagnosis or patient management decisions.

Electronically signed by , MD, on
at .
Performed At:

Medical Director: , MD
CLIA Number:

EER Eosinophil Granule MBP in Tissues

See Note

Authorized individuals can access the ARUP Enhanced Report using the following link:

https:

VERIFIED/REPORTED DATES

Procedure	Accession	Collected	Received	Verified/Reported
SO Source	22-173-114685			
Eosinophil Granule MBP in Tissues	22-173-114685			
EER Eosinophil Granule MBP in Tissues	22-173-114685			

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END OF CHART

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