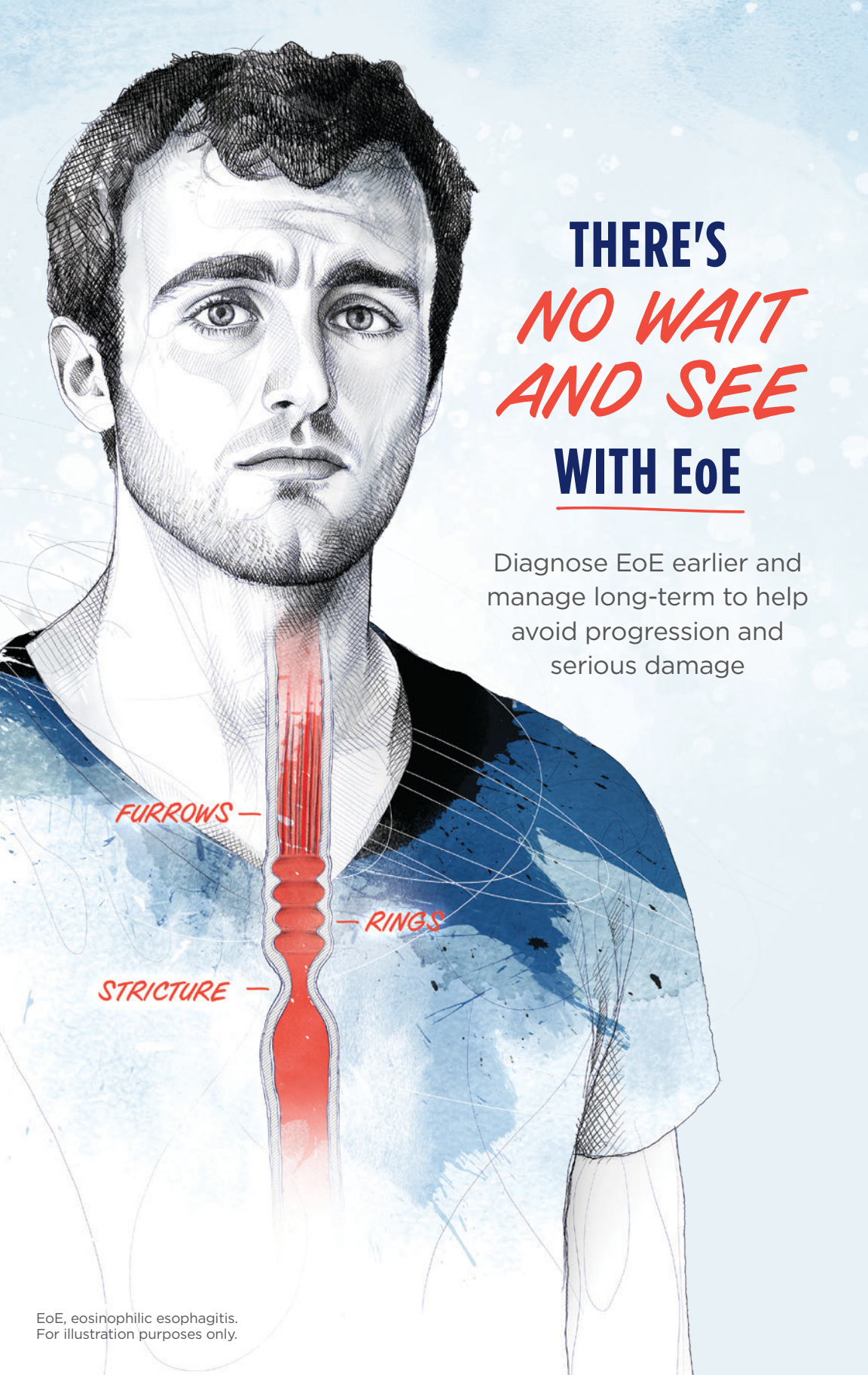


THERE'S *NO WAIT AND SEE* WITH EoE

Diagnose EoE earlier and manage long-term to help avoid progression and serious damage

EoE, eosinophilic esophagitis.
For illustration purposes only.

EoE is an inflammatory disease that is chronic and progressive[1-4]

EoE is a lifelong disease that can take years to diagnose accurately and get under control[2,5,6]

- Driven primarily by underlying type 2 inflammation, EoE can progress to cause long-term damage, including esophageal remodeling and fibrosis[2,3]
- Suspect EoE if your patients have other allergic diseases[7]
  - ~75% of patients with EoE have at least one coexisting type 2 inflammatory disease: allergic rhinitis, asthma, atopic dermatitis, chronic rhinosinusitis with nasal polyps (CRSwNP), and/or food allergies[8-11]
- EoE requires a long-term management plan to help achieve and maintain control[6]

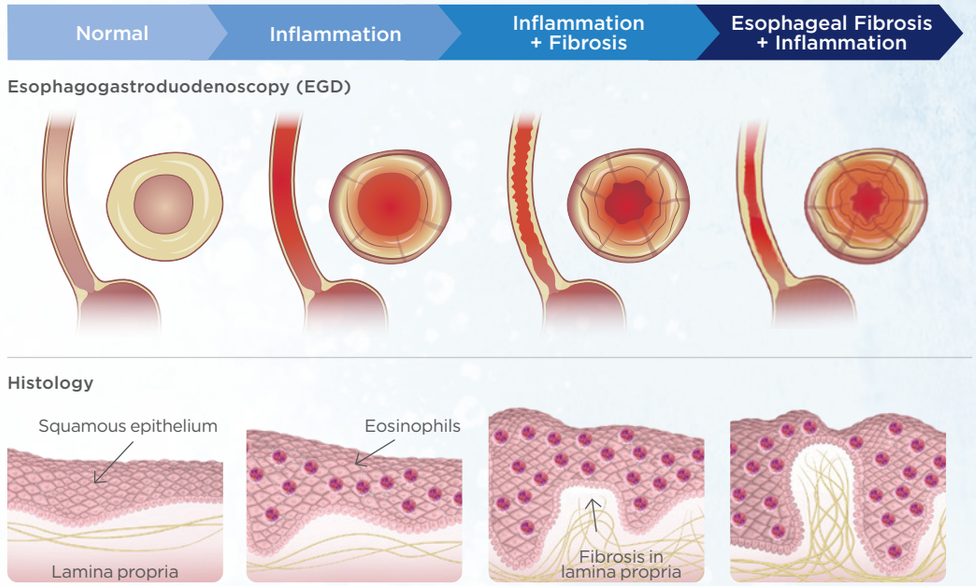
EoE significantly impacts patient and caregiver burden and quality of life[12]

- EoE patients may have dysphagia often causing chest pain and discomfort during meals[13]
- Social interactions involving food may cause stress, anxiety, and/or embarrassment, leading EoE patients to eat alone and avoid eating with others[14]
- Pediatric patients may struggle to maintain a healthy weight[14]

65% of adults with EoE are concerned about disease impact on social relationships[15]

1 IN 3 adults and minors with EoE and their caregivers report being unable to make plans with family or friends in advance[12]

EoE, if left uncontrolled, often progresses from an inflammatory to a fibrostenotic disease[2,3,16,17]



Disease progression leads to serious long-term complications and damage to the esophagus, including[2,14]:

To manage a chronic condition like EoE, you need a long-term plan[6]

- According to the ACG, because EoE is chronic, disease activity almost always recurs when treatment is stopped[4,7]

47% Increase of fibrotic features alone or with inflammatory features with uncontrolled disease[5,a]

The impact of chronic and progressive EoE on patients' lives reinforces the need for long-term disease control[6]

[a]Based on a diagnostic delay of 0-2 years.[5]

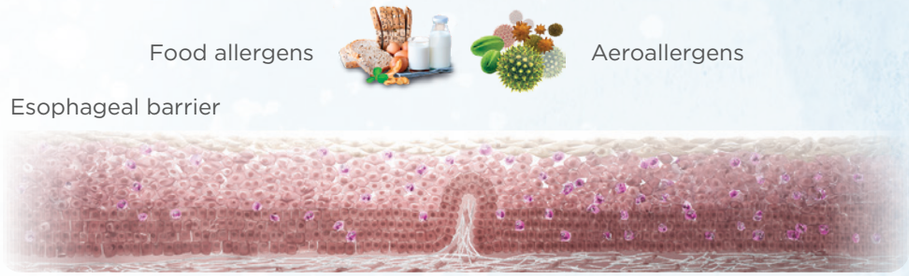
EoE is driven primarily by type 2 inflammation[3,18]

TYPE 2 INFLAMMATION IS A MAJOR TYPE OF CELL-MEDIATED IMMUNE RESPONSE[18,19]

Type 1 Defense against intracellular bacteria and viruses	Type 2 Defense against allergens and parasites	Type 3 Defense against extracellular bacteria and fungi
Key cells and cytokines  Th1 IFN-γ, IL-12, IL-2, TNF	**Key cells and cytokines**   Th2 Eosinophil    IL-4 IL-5 IL-13	**Key cells and cytokines**  Th17 IL-17, IL-22, IL-23
Autoimmunity, metabolic disorders • Rheumatoid arthritis • Autoimmune gastritis • Insulin-dependent diabetes mellitus • Inflammatory bowel disease • Hashimoto thyroiditis • Multiple sclerosis	**Allergy, fibrosis** • Eosinophilic esophagitis • Atopic dermatitis • Asthma • Chronic rhinosinusitis with nasal polyps • Food allergy	**Autoimmunity, metabolic disorders** • Rheumatoid arthritis • Psoriasis • Insulin-dependent diabetes mellitus • Inflammatory bowel disease • Multiple sclerosis • Uveitis

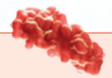
When overactive, type 2 inflammation can result in diseases such as EoE, atopic dermatitis, asthma, and other atopic conditions[8-10]

EoE PATHOGENESIS EXTENDS BEYOND EOSINOPHILS AND INVOLVES UNDERLYING TYPE 2 INFLAMMATION[3]



IL-4

- Eosinophil activation
- Epithelial barrier disruption
- Tissue inflammation
- Mast cell proliferation and survival
- IgE antibody production
- Amplifies and sustains type 2 inflammation



IL-5

- Eosinophil activation
- Eosinophil maturation and survival

IL-13

- Eosinophil activation
- Epithelial barrier disruption
- Tissue inflammation
- Esophageal muscular dysfunction
- Esophageal remodeling
- Fibrosis

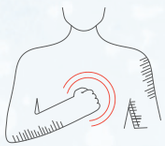
IL-4, IL-5, and IL-13 are key mediators of type 2 inflammation, directly impacting EoE symptoms, histology, and endoscopic appearance[3]

IFN, interferon; IL, interleukin; Th, T helper cell; TNF, tumor necrosis factor.

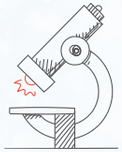
IgE, immunoglobulin E; ILC, innate lymphoid cell, TSLP, thymic stromal lymphopoietin.

EoE requires a long-term management approach that focuses on 3 key areas[6]

1 Symptoms



2 Histology



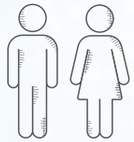
3 Endoscopic appearance

1 SYMPTOMS

Symptoms are one part of diagnosing and monitoring EoE, and can vary between patients and across age groups[14]

Children
(≤11 years)

- Regurgitation
- Vomiting
- Food refusal
- Abdominal pain
- Failure to thrive

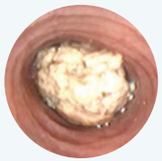


Adult and adolescent
(≥12 years)

- Dysphagia
- Food impaction
- Heartburn
- Nonswallowing chest pain
- Regurgitation

As EoE progresses, dysphagia can worsen, leading to food impactions that require ER visits[2]

- The ACG and ASGE recommend a biopsy at the time of food impaction removal to help confirm EoE diagnosis as early as possible[7]



54% of adult patients who present on an emergency basis with esophageal food impaction have EoE[24,25]

Even in the absence of symptoms, the underlying type 2 inflammation can still be present[26]

- Symptoms don't always correlate with histology[26]
- If the disease and underlying inflammation is not monitored, patients are at risk of undetected recurrence[26]

Adaptive behaviors can mask EoE symptoms and delay diagnosis, management, and assessment of treatment[5,27]

- Most people with EoE develop adaptive behaviors (coping mechanisms) to help manage their symptoms and avoid food impactions[13]
- Adaptive behaviors can contribute to a delay in EoE diagnosis that can increase the risk of severe disease complications.[2,5]

~60% of patients developed inflammation and fibrosis[5]

~39% of patients showed endoscopic evidence of stricture[5,a]

Consider asking your adult patients questions to uncover these common adaptive behaviors[17]:

- **I**mbibe fluids with meals
- **M**odify foods (cut into small pieces/puree)
- **P**rolong meal times
- **A**void hard texture foods
- **C**hew excessively
- **T**urn away tablets/pills

Children may exhibit different types of adaptive behaviors than adult patients[17]

- Refusing food and pocketing food in their cheek
- Difficulty advancing from pureed to solid food
- Having trouble expanding their diet to include new flavors and textures.[8]

It's important to look beyond only symptoms and address the persistent inflammation, which can cause structural changes to the esophagus[26]

ACG, American College of Gastroenterology; ASGE, American Society for Gastrointestinal Endoscopy.

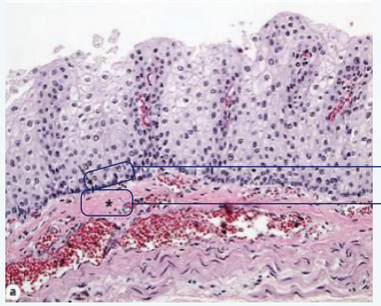
[a]Diagnostic delay of >5-8 years.[5]

EoE requires a long-term management approach that focuses on 3 key areas (cont'd)[6]

2 HISTOLOGY

Histology can reveal eosinophilic infiltrate as well as other abnormalities[6]

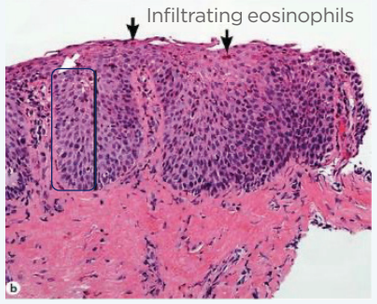
- Esophageal eosinophil counts are used to establish a diagnosis of EoE and are commonly used to assess treatment outcomes[1,28]
- Due to the patchiness of the disease, the ACG and ASGE recommend taking ≥6 biopsy samples from two distinct esophageal levels (proximal/mid, distal) to diagnose EoE[6,7]
- Histology can be used to reveal tissue abnormalities driven by inflammatory cells and mediators other than eosinophils[6]



Healthy tissue[29]

Normal epithelium (basal layer ≤3 cell layers thick)

Normal lamina propria



Select EoE tissue abnormalities, indicative of fibrosis[7,29]

Epithelium from a patient with EoE shows markedly thickened basal layer

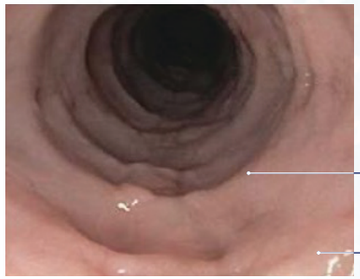
Thickened fibers in the lamina propria

The ACG guidelines and ASGE consensus paper recommend evaluating endoscopic appearance and histology, and not symptoms alone, to assess EoE activity during treatment[6,7]

3 ENDOSCOPIC APPEARANCE

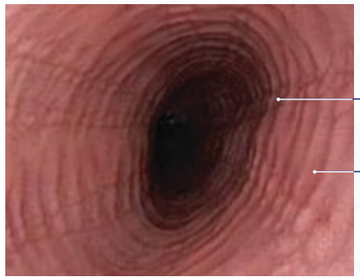
Endoscopic appearance can reveal inflammatory and fibrotic structural changes in the esophagus[6,30]

- Endoscopic features can be used to help evaluate disease[6,30]
- Endoscopic reference score (EREFS) assesses and grades the severity of 5 key esophageal features: edema, rings, exudates, furrows, and stricture[6,30,31]



Rings

Edema



Furrows

Rings

Stricture

Furrows

Exudates

The ACG guidelines and ASGE consensus paper recommend routinely using EREFS when assessing EoE activity during endoscopy[6,7]

EoE requires long-term comprehensive management

Aim for initial treatment response across 3 key areas[28]

	SYMPTOMS	HISTOLOGY	ENDOSCOPIC APPEARANCE
Response criteria	Decrease in symptoms, such as dysphagia	Reduced eosinophilia and inflammation	Improved findings in visible features such as edema, rings, exudate, furrows, or stricture

Assess treatments to confirm response and disease control

- Many patients don't respond adequately to common therapies like PPIs and TCS, or lose response later on[32,33]

of patients on PPIs did not achieve histologic remission.[32]
Based on 33 studies of 619 patients

of patients on TCS showed histologic relapse despite continuous treatment[33]
n=58/82

To maintain long-term control of EoE, ACG recommends[6,7]:

- **Staying on a maintenance treatment** even after achieving initial response or a state of remission
- **Regular monitoring to ensure continued response** and confirm there hasn't been a recurrence of symptoms, inflammation, or structural changes in the esophagus

PPI, proton pump inhibitor; TCS, topical corticosteroid.

References: 1. Lucendo AJ, Molina-Infante J, Arias Á, et al. Guidelines on eosinophilic esophagitis: evidence-based statements and recommendations for diagnosis and management in children and adults. *United European Gastroenterol J*. 2017;5(3):335-358. **2.** Cheng E, Souza RF, Spechler SJ. Tissue remodeling in eosinophilic esophagitis. *Am J Physiol Gastrointest Liver Physiol*. 2012;303(11):G1175-G1187. **3.** Chehade M, Falk GW, Aceves S, et al. Examining the role of type 2 inflammation in eosinophilic esophagitis. *Gastro Hep Adv*. 2022;1(5):720-732. **4.** Bredenoord AJ, Patel K, Schoepfer AM, et al. Disease burden and unmet need in eosinophilic esophagitis. *Am J Gastroenterol*. 2022;117(8):1231-1241. **5.** Schoepfer AM, Safroneeva E, Bussmann C, et al. Delay in diagnosis of eosinophilic esophagitis increases risk for stricture formation in a time-dependent manner. *Gastroenterology*. 2013;145(6):1230-1236.e2. **6.** Aceves SS, Alexander JA, Baron TH, et al. Endoscopic approach to eosinophilic esophagitis: American Society for Gastrointestinal Endoscopy Consensus Conference. *Gastrointest Endosc*. 2022;96(4):576-592.e1. **7.** Dellon E, Muir A, Katzka D, et al. ACG Clinical Guideline: Diagnosis and management of eosinophilic esophagitis. *Am J Gastroenterol*. 2025;120(1):31-59. **8.** van Rhijn BD, Bredenoord AJ. Management of eosinophilic esophagitis based on pathophysiological evidence. *J Clin Gastroenterol*. 2017;51(8):659-668. **9.** Jyonouchi S, Brown-Whitehorn TA, Spergel JM. Association of eosinophilic gastrointestinal disorders with other atopic disorders. *Immunol Allergy Clin North Am*. 2009;29(1):85-97. **10.** Padia R, Curtin K, Peterson K, Orlandi RR, Alt J. Eosinophilic esophagitis strongly linked to chronic rhinosinusitis. *Laryngoscope*. 2016;126(6):1279-1283. **11.** Chehade M, Jones SM, Pesek RD, et al. Phenotypic characterization of eosinophilic esophagitis in a large multicenter patient population from the consortium for food allergy research. *J Allergy Clin Immunol Pract*. 2018;6(5):1534-1544.e5. **12.** Pokrzywinski RM, Harding G, Brooks A, Goodwin B, Williams J. Documenting the journey of patients with eosinophilic esophagitis and the impact of the disease on patients and their caregivers: a cross-sectional, qualitative research study. *Adv Ther*. 2020;37(10):4458-4478. **13.** de Rooij WE, Evertsz FB, Lei A, Bredenoord AJ. General well-being and coping strategies in adult eosinophilic esophagitis patients. *J Neurogastroenterol Motil*. 2022;28(3):390-400. **14.** Muir AB, Brown-Whitehorn T, Godwin B, Cianferoni A. Eosinophilic esophagitis: early diagnosis is the key. *Clin Exp Gastroenterol*. 2019;12:391-399. **15.** Mukkada V, Falk GW, Eichinger CS, King D, Todorova L, Shaheen NJ. Health-related quality of life and costs associated with eosinophilic esophagitis: a systematic review. *Clin Gastroenterol Hepatol*. 2018;16(4):495-503. **16.** Dellon ES, Hirano I. Epidemiology and natural history of eosinophilic esophagitis. *Gastroenterology*. 2018;154(2):319-332. **17.** Hirano I, Furuta GT. Approaches and challenges to management of pediatric and adult patients with eosinophilic esophagitis. *Gastroenterology*. 2020;158(4):840-851. **18.** Annunziato FA, Romagnani C, Romagnani S. The 3 major types of innate and adaptive cell-mediated effector immunity. *J Allergy Clin Immunol*. 2015;135(3):626-635. **19.** Gandhi NA, Bennett BL, Graham NHM, Pirozzi G, Stahl N, Yancopoulos GD. Targeting key proximal drivers of type 2 inflammation in disease. *Nat Rev Drug Discov*. 2016;15(1):35-50. **20.** Underwood B, Troutman TD, Schwartz JT. Breaking down the complex pathophysiology of eosinophilic esophagitis. *Ann Allergy Asthma Immunol*. 2023;130(1):28-39. **21.** Sherrill JD, Kc K, Wu D, et al. Desmoglein-1 regulates esophageal epithelial barrier function and immune responses in eosinophilic esophagitis. *Mucosal Immunol*. 2014;7(3):718-729. **22.** O'Shea KM, Aceves SS, Dellon ES, et al. Pathophysiology of eosinophilic esophagitis. *Gastroenterology*. 2018;154(2):333-345. **23.** Leung J, Beukema KR, Shen AH. Allergic mechanisms of eosinophilic oesophagitis. *Best Pract Res Clin Gastroenterol*. 2015;29(5):709-720. **24.** Attwood S, Lamb C. Eosinophilic oesophagitis and other non-reflux inflammatory conditions of the oesophagus: diagnostic imaging and management. *Best Pract Res Clin Gastroenterol*. 2008;22(4):639-660. **25.** Hiremath GS, Hameed F, Pacheco A, Olive A, Davis CM, Shulman RJ. Esophageal food impaction and eosinophilic esophagitis: a retrospective study, systematic review, and meta-analysis. *Dig Dis Sci*. 2015;60(11):3181-3193. **26.** Safroneeva E, Straumann A, Schoepfer AM. Latest insights on the relationship between symptoms and biologic findings in adults with eosinophilic esophagitis. *Gastrointest Endosc Clin N Am*. 2018;28(1):35-45. **27.** Gomez Torrijos E, Gonzalez-Mendiola R, Alvarado M, et al. Eosinophilic esophagitis: review and update. *Front Med (Lausanne)*. 2018;5:247. doi:10.3389/fmed.2018.00247 **28.** Dellon ES, Gupta SK. A conceptual approach to understanding treatment response in eosinophilic esophagitis. *Clin Gastroenterol Hepatol*. 2019;17(11):2149-2160. **29.** Collins M. Histopathology of eosinophilic esophagitis. *Dig Dis*. 2014;32(1-2):68-73. **30.** Dellon ES, Gonsalves N, Hirano I, Furuta GT, Liacouras CA, Katzka DA; American College of Gastroenterology. ACG clinical guideline: evidenced based approach to the diagnosis and management of esophageal eosinophilia and eosinophilic esophagitis (EoE). *Am J Gastroenterol*. 2013;108(5):679-692. **31.** Dellon ES, Hirano I. Epidemiology and natural history of eosinophilic esophagitis. *Gastroenterology*. 2018;154(suppl 4):1-16. **32.** Lucendo AJ, Arias Á, Molina-Infante J. Efficacy of proton pump inhibitor drugs for inducing clinical and histologic remission in patients with symptomatic esophageal eosinophilia: a systematic review and meta-analysis. *Clin Gastroenterol Hepatol*. 2016;14(1):13-22. **33.** Greuter T, Godat A, Ringel A, et al. Effectiveness and safety of high- vs low-dose swallowed topical corticosteroids for maintenance treatment of eosinophilic esophagitis: a multicenter observational study. *Clin Gastroenterol Hepatol*. 2021;19(12):2514–2523.e2.

EoE requires long-term comprehensive management and control

Address the underlying type 2 inflammation
a driver of EoE progression[3]

Monitor and assess
treatment response to therapy and consider incorporating periodic endoscopy with biopsy to ensure maintenance of remission[6]

Understand the risk
Relying on an episodic approach to treatment increases risk for relapse and disease progression[6,7]

Aim for long-term remission
Continuous treatment of a chronic disease helps control inflammation and prevent disease progression[6]

To improve long-term outcomes, EoE requires prompt diagnosis and comprehensive management to control both the inflammatory and fibrostenotic aspects of the disease[1,5-7]

Scan to learn more about type 2 inflammation and EoE

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