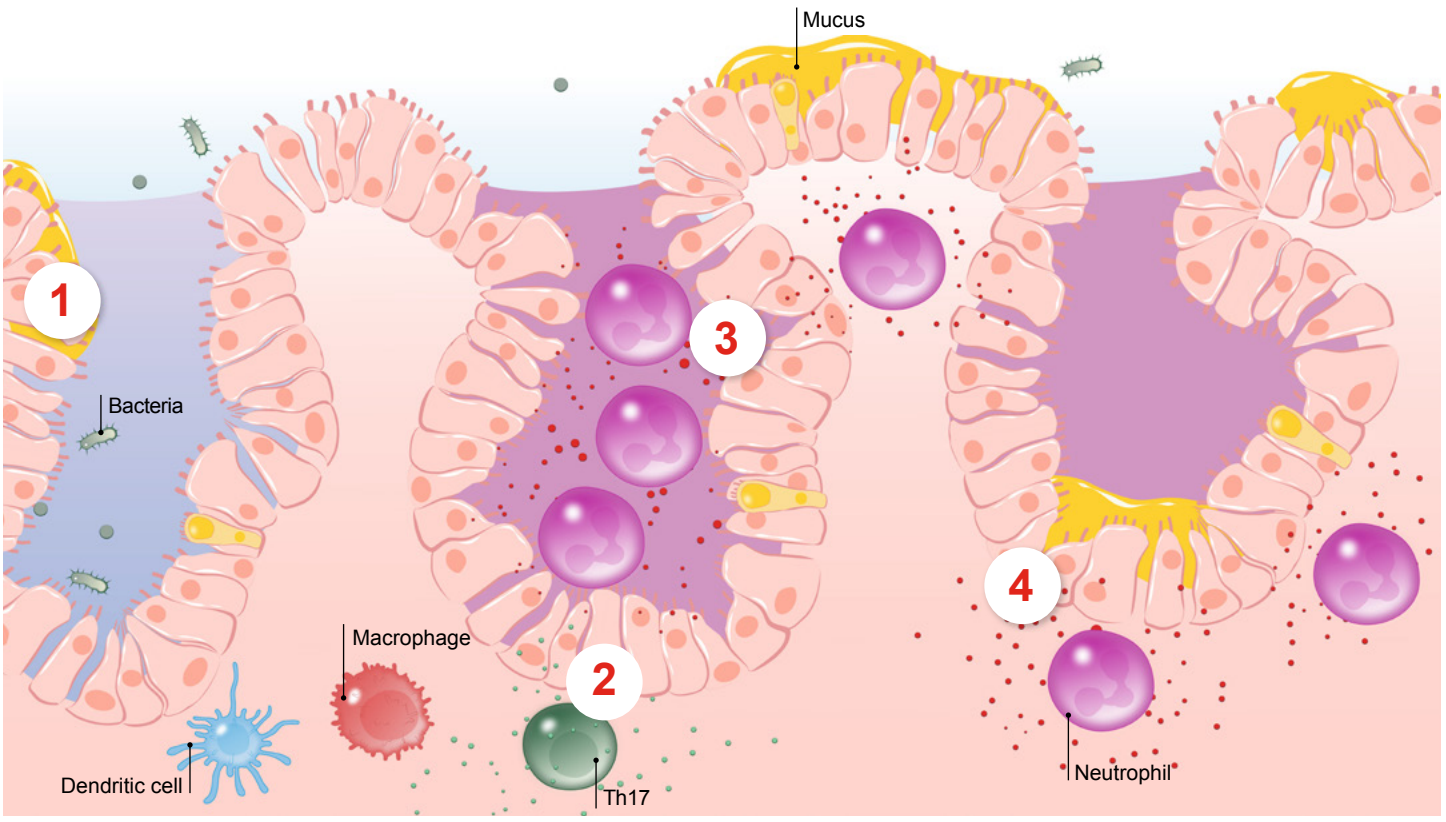
Assessing Inflammation in Crohn's Disease

Changes in Cytokine Expression Drive Inflammation in CD[1,2]



1 **Impaired intestinal barrier function** allows for translocation of bacteria and microbial products from the gut lumen into the bowel wall, activating an inflammatory response[1]

2 **Activation of cytokines** (eg. IFN, TNFα, IL-1β, IL-6, IL-23, IL-12), **chemokines** (eg, CXCL1/2/5) causes neutrophils to infiltrate the mucosa[2-4]

3 **Neutrophils are recruited to and accumulate within the mucosa,** driven by pro-inflammatory cytokine and chemokine signaling[1,3,4]

4 **Neutrophil degranulation results in the release of calprotectin, reactive oxygen species, and toxic molecules.**[5,6] Calprotectin accumulates in stool,[6] while the reactive oxygen species and toxic molecules amplify inflammatory conditions[6]

Over time, the amplified inflammatory conditions cause cell damage, which may result in tissue remodeling, fibrosis, and the formation of fissures, fistulas, and strictures[7-9]

Tools for Evaluating Inflammation in CD

These tools reflect the inflammatory process and can guide clinical decisions[6,9-12]

ENDOSCOPY and Cross-Sectional Imaging

- **Endoscopy** can be used to visualize and evaluate mucosal lesions[6,11]
- **CTE or MRE** can assess mucosal inflammation, bowel wall thickness, and identify complications (eg, stricture, abscess, and fistula)[6,9-11]
- **IUS** offers a noninvasive, radiation-free alternative to assess disease activity and identify complications at POC, which aids in timely decision making.[6,10-12] IUS can be used in pregnant patients[12]

Histology Via Biopsy: Neutrophils

- The accumulation of **neutrophils** within the intestinal mucosa indicates active inflammation[5,16]

Serum BioMarker: CRP

- **CRP is a non-specific marker of inflammation**.[11,13] Hepatic CRP synthesis is induced by acute-phase cytokines (IL-6, TNFα, IL-1β) released during inflammation[13]
- Serum CRP may be used as a marker of disease activity, and relapse[11,13]
- Approximately 20-25% of patients with CD experiencing a flare do not show an elevated CRP level[14]

Stool Biomarker: FC

- **FC is sensitive to gut inflammation**. A cutoff of >50-100 µg/g is used to differentiate inflammatory from noninflammatory colonic disease.[11]
- Neutrophil degranulation leads to increased FC levels.[6,15-16]
- FC is used to assess disease activity, response to treatment, and to monitor for relapse[15-16]

CD=Crohn's disease; CRP=C-reactive protein; CXCL=CXC-motif chemokine Ligand; CTE=computed tomography enterography; FC=fecal calprotectin; IFN=interferon; IL=interleukin; IUS=intestinal ultrasound; MRE=magnetic resonance enterography; POC=point of care; TNF=tumor necrosis factor.

1. Neurath MF. *Nat Rev Immunol*. 2014;14(5):329-342. 2. Yeshi K, et al. *J Clin Med*. 2020;9(5):1273. 3. Neurath MF. *Nat Rev Immunol*. 2024;24(8):559-576. 4. Griffin GK, et al. *J Immunol*. 2012;188(12):6287-1. 5. Fournier BM, Parkos CA. *Mucosal Immunol*. 2012;5(4):354-366. 6. Plevris N, Lees CW. *Gastroenterology*. 2022;162(5):1456-1475. 7. Chen L, et al. *Front Immunol*. 2023;13:1055914. 8. Petagna L, et al. *Biol Direct*. 2020;15(1):23. 9. Dolinger M, et al. *Lancet*. 2024;403(10432):1177-1191. 10. Maccioni F, et al. *Diagnostics*. 2026;16(6):882. 11. Lichtenstein GR, et al. *Am J Gastroenterol*. 2025;120(6):1225-1264. 12. Chavannes M, et al. *Clin Gastroenterol Hepatol*. 2024;22(9):1790-1795.e1. 13. Vermeire S. *Inflamm Bowel Dis*. 2004;10(5):661-665. 14. Chang S, et al. *World J Gastroenterol*. 2015;21(40):11246-11259. 15. Ma C, et al. *Best Pract Res Clin Gastroenterol*. 2019;38-39:101602. 16. Bjarnason I. *Gastroenterol Hepatol* (NY). 2017;13(1):53-56.