

# A novel AI Tool is accurate at interpreting histology and detects response to Neihulizumab therapy in patients with moderate to severe ulcerative colitis: Proof of Concept

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## BACKGROUND

Histological remission is increasingly regarded as an important therapeutic target for ulcerative colitis (UC). However, assessment and scoring of mucosal biopsies is a time-consuming procedure prone to inter- and intra-observer variability. We used a novel Artificial Intelligence (AI)-powered method (AI Tool) <sup>1</sup> to analyze pathology slides from a phase II study in UC.

## AIM

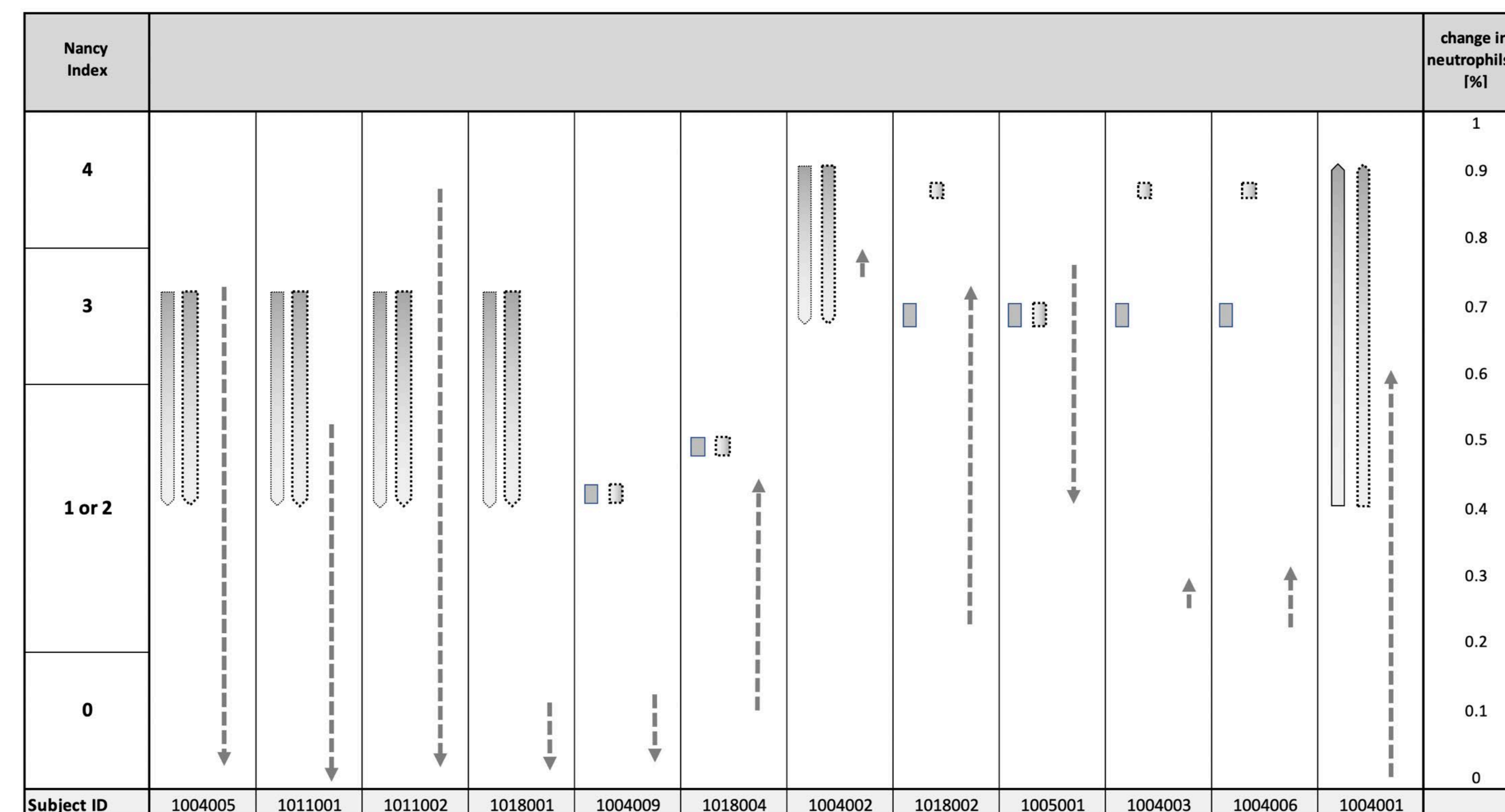
The primary aim was to assess the utility of using an AI Tool to generate a disease stage score from automated analysis of a digitised biopsy slides of Ulcerative Colitis subjects. The secondary aim was to research the relationship between Ulcerative Colitis disease stage and the level of neutrophil incursion of biopsy tissue.

## METHODS

We reviewed the histological slides from a phase 2b study of Neihulizumab (NCT03298022), a novel immune checkpoint agonistic antibody that binds to human CD162 that is being tested in UC and graft versus host disease.

12 subjects with UC received 10 doses of neihulizumab, administered over a 12-week period, with biopsies taken at weeks 0 and 12. Digital slides were analyzed by an expert pathologist who determined Nancy Indices for each of 24 slides.

The AI Tool delivered an AI-generated Nancy Index and automatically quantified metrics of cell and tissue types relevant to inflammation in UC, including neutrophil, eosinophil, plasmocyte and lymphocyte densities and percentage change in infiltrated tissue. Statistical analysis comparing AI scores to pathology-determined scores was performed.



**Figure 1. Individual subject response assessments at W0 and W12.**

- Column 1, Nancy Indices.
- Columns 2-13, subject data
- 'Subject ID', anonymized subject identifier
- In columns 2-13, flat end of gradient arrows corresponds to baseline assessments and the arrow end to the W12 assessments, the gradient indicating higher to lower Nancy Index
- Columns 2-13, arrow with thin border (left), Nancy Index by expert pathologist; arrow with darker dotted border (middle), Nancy Index by AI; dotted arrow (right), neutrophils [% area] by AI
- Column 14 neutrophils [% area ] counted as area of neutrophils / area of tissue

## RESULTS

The AI Tool-determined Nancy Indices demonstrated excellent correlation (87%) with the Nancy Indices conducted by an expert pathologist.

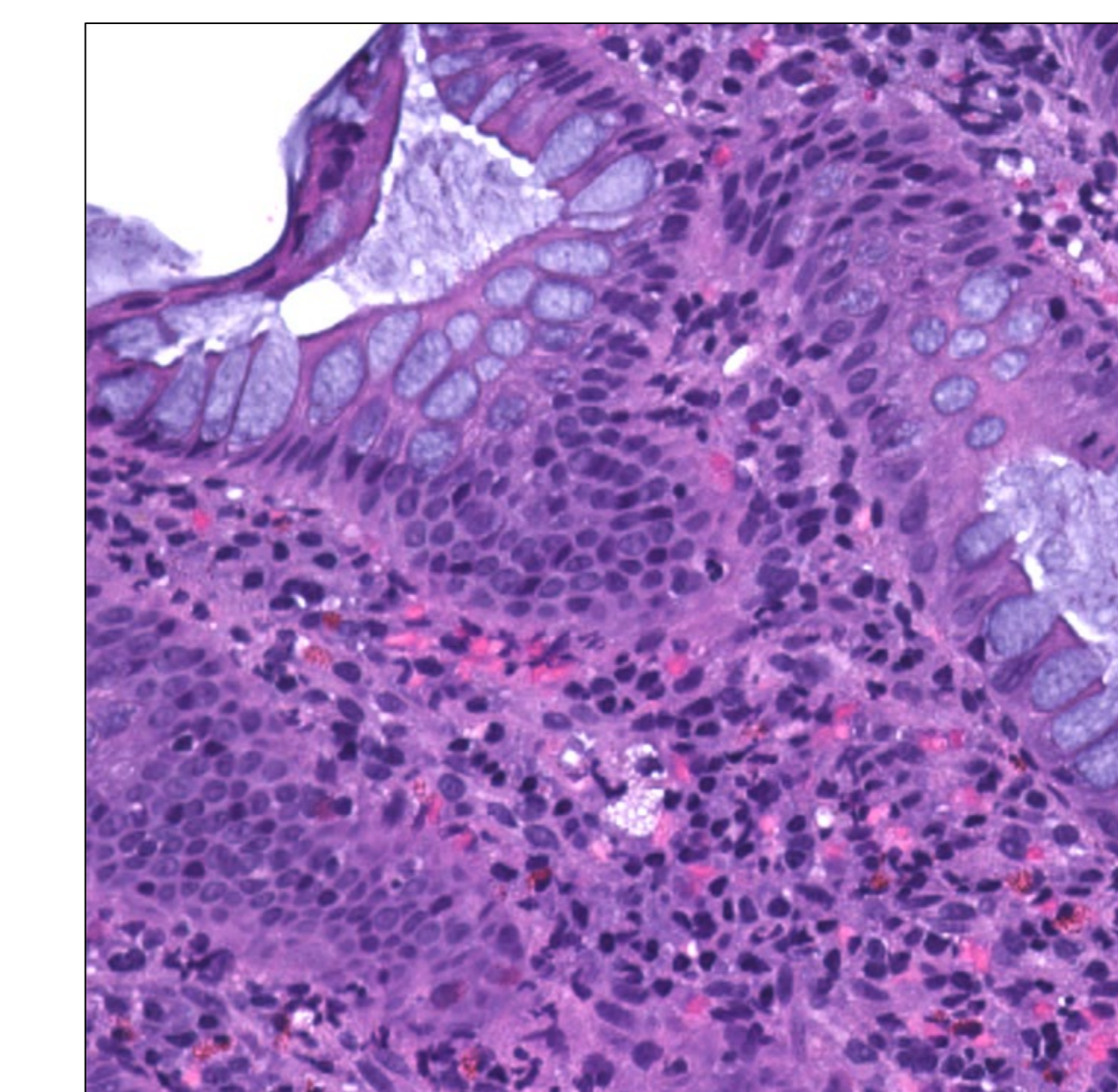
Figure 1 illustrates the scores for each subject. In the 4 of 12 subjects who achieved clinical remission, the AI Tool demonstrated an average 93% decrease in automatically detected neutrophils.

For those subjects who did not achieve clinical remission, the percentage of neutrophils showed increase from the baseline to W12.

## CONCLUSIONS

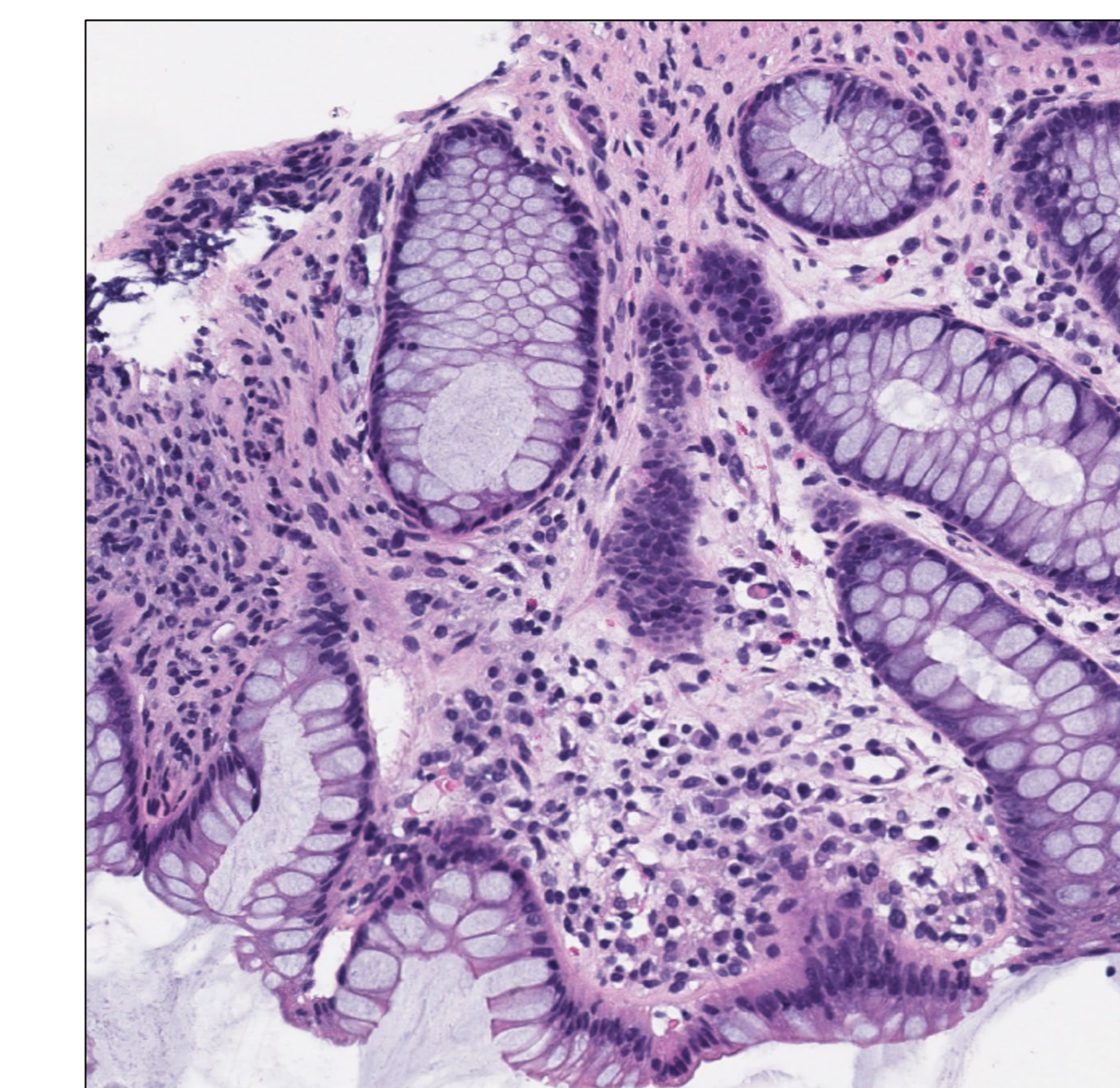
We demonstrate that this novel AI-powered assessment of histology correlates very well to the established Nancy Histological Index, and also correlates to the clinical assessment of patients in a phase 2b study of UC.

We propose that AI-powered assessments of histological activity may simplify interpretation in clinical trials and have utility in clinical practice and trials.



*Subject 1011002 – Week 0*

*Pathologist Nancy score: 3  
AI Nancy score: 3  
Neutrophil score: 0.92*



*Subject 1011002 – Week 12*

*Pathologist Nancy score: 1  
AI Nancy score: 2  
Neutrophil score: 0.03*

**Figure 2. Examples from subject 1011002 at Week 0 and Week 12**

Both pathologist and AI report a decrease in Nancy score. The AI Tool reports a significant decrease in presence of neutrophils (Neutrophil score: (Area of neutrophils / Area of tissue) x100 )

## REFERENCES

1. Peyrin-Biroulet, L et al. An artificial intelligence-driven scoring system to measure histological disease activity in Ulcerative Colitis, Journal of Crohn's & Colitis, Vol.16, Issue Supplement\_1, Jan. 2022, Page i105, <https://doi.org/10.1093/ecco-jcc/jjab232.097>

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IAG, Image Analysis Group owns IP to the AI Tool  
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