

Evaluation of CRP, Fecal Lactoferrin and Clinical Activity Indices for Assessing the Presence of Intestinal Inflammation in IBD and IBS Patients

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INTRODUCTION

Determining the presence of intestinal inflammation is the main criteria for the differentiation of irritable bowel syndrome (IBS) from inflammatory bowel disease (IBD) and for tailoring medical therapy. Clinical indices have proven too complex and time-consuming for daily routine practice leading to an assessment of clinical symptoms and use of independent lab parameters. Serological parameters for systemic inflammation such as C-reactive protein (CRP) and sedimentation rate are utilized often in the clinical assessment of IBD but are limited by low sensitivity and specificity for intestinal inflammation. Lactoferrin, a neutrophil-derived protein, has been shown to be a sensitive and specific indicator of intestinal inflammation in IBD. Recent studies have shown the correlation of elevated fecal lactoferrin (≥ 7 ug/mL) to disease activity in IBD and the increase in levels as an indicator of relapse. Fecal lactoferrin is baseline in healthy subjects and in IBS. The aim of our study was to assess the correlation between levels of lactoferrin, serum CRP and disease activity indices to grades of intestinal inflammation as determined by endoscopic and histopathologic examinations of subjects suspected of IBD and IBS.

METHODS

Test Population: A total of 97 adult patients, 37 Crohn's disease (CD), 31 ulcerative colitis (UC) and 29 IBS were enrolled following informed consent at an adult IBD clinic over an 8 month period. A total of 52 patients was scored as active IBD by endoscopy. The mean age was 42 years and the male:female ratio was 1:2. Receiver operator curve analysis (ROC) were performed and the area under the curve (AUC) were calculated.

Lab Parameters: Fecal lactoferrin was determined using ELISA (TECHLAB® IBD-SCAN®) with a cut-off for elevated levels of ≥ 7 ug/mL. Serum CRP was determined using an ELISA (CRPLX, Tina-quant, Roche/Hitachi) with a positive cut-off of ≥ 0.5 mg/dL.

Activity Indices: A Colitis Activity Index (CAI) was used to assess subjects with UC using a cut-off of > 5 calculated score for indicating active disease. The Crohn's Disease Activity index (CDAI) was calculated for CD and considered positive at > 150 calculated score. In the analysis for correlation, the CAI and CDAI indices were combined.

Endoscopic Score: Endoscopically obtained histopathology specimens in addition to macroscopic colonoscopy results were used as the standard reference. Each endoscopy was scored regarding inflammation: 0 = "no acute inflammation", 1 = "mild acute inflammation", 2 = "moderate acute inflammation" and 3 = "high acute inflammation". "No inflammation" was defined as the appearance of a healthy mucosa with no ulcerations. "Mild inflammation" was defined by erythema, decreased or absent vascular pattern, friability of mucosa and single aphthous lesions. "Moderate inflammation" was defined as additional multiple aphthous lesions and small ulcers. "High inflammation" was characterized by additional presence of spontaneous bleeding, large ulcerous lesions, nodules and/or narrowing.

Histopathology: Tissue biopsies were retrieved from areas of disease involvement as determined visually. Slides were prepared using conventional hematoxylin-eosin (HE) stain and the magnification ranged from 50x to 400x. Each stain was graded as follows: "No inflammation" featured shaped and asymmetric crypt architecture. "Mild inflammation" showed single crypt abscesses. "Moderate inflammation" was indicative of frequent crypt abscesses. "High inflammation" was defined as increased infiltration of inflammatory cells (neutrophils) into the lamina propria.

RESULTS

Figure 1. Receiver Operator Curve for Lactoferrin verses CRP compared to Endoscopy.

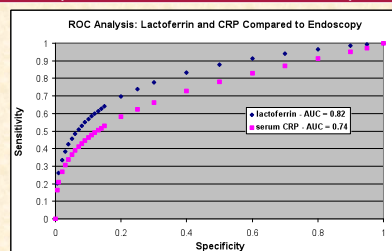


Figure 2. Receiver Operator Curve for Lactoferrin verses Endoscopy for UC and CD

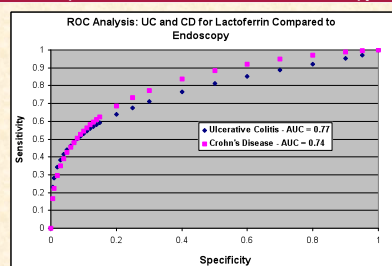


Table 1. Lactoferrin, CRP and Activity Index vs Endoscopy

Parameter	Sensitivity	Specificity	Correlation	N
Lactoferrin	83%	76%	79%	97
CRP	62%	71%	66%	97
CAI	57%	25%	81%	31
CDAI	25%	100%	41%	37

RESULTS

Table 2. Endoscopic Pictures for Crohn's Disease

No acute inflammation Score = 0	Mild inflammation in CD featuring single aphthous lesion Score = 1	Moderate inflammation in CD featuring multiple aphthous ulcers and small ulcers Score = 2	Severe inflammation in CD featuring extensive longitudinal ulcers Score = 3
Mean \pm SE lactoferrin = 15 ± 4 ug/mL Mean \pm SE serum CRP = 0.5 ± 0.1 mg/dl	Mean \pm SE lactoferrin = 70 ± 12 ug/mL Mean \pm SE serum CRP = 1.6 ± 0.3 mg/dl	Mean lactoferrin = 194 ± 86 ug/mL Mean \pm SE serum CRP = 1.5 ± 0.5 mg/dl	Mean lactoferrin = 553 ± 205 ug/mL Mean \pm SE serum CRP = 4.4 ± 1.5 mg/dl

CONCLUSIONS

• Lactoferrin measurements showed the highest sensitivity and specificity to endoscopy score for grading intestinal inflammation in patients being assessed for active IBD and IBS.

• A linear correlation was observed with Lactoferrin and serum CRP compared to endoscopic and histologic results.

• The CDAI and CAI indices showed a poor sensitivity and specificity for assessing intestinal inflammation when compared to endoscopic and histologic results.

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