

Key Literature – BÜHLMANN fecal Calprotectin Citations

Value of fecal Calprotectin in IBD:

- **Jensen, M.D. et al., 2011, Fecal calprotectin is equally sensitive in Crohn’s disease affecting the small bowel and colon, *Scandinavian Journal of Gastroenterology*** BÜHLMANN fCAL® ELISA

“The first study to show that fecal calprotectin is equally sensitive in colonic and small bowel CD.”
- **Mindemark, M. & Larsson, A. 2012, Ruling out IBD: Estimation of the possible economic effects of pre-endoscopic screening with F-calprotectin, *Clinical Biochemistry*** BÜHLMANN fCAL® ELISA

“The estimated demand for colonoscopies was reduced by 50 % to 67 %. This corresponded to a cost avoidance of approximately up to € 2.13 million.”

Diagnosis of IBD patients:

- **Burri, E. et al., 2013, Monoclonal antibody testing for fecal calprotectin is superior to polyclonal testing of fecal calprotectin and lactoferrin to identify organic intestinal disease in patients with abdominal discomfort, *Clinica Chimica Acta*** BÜHLMANN fCAL® ELISA

“...we demonstrated, that the diagnostic accuracy of monoclonal antibody testing of calprotectin is superior to both polyclonal antibody testing...”
- **De Sloovere, M. et al. 2017, Analytical and diagnostic performance of two automated fecal calprotectin immunoassays for detection of inflammatory bowel disease, *Clin Chem Lab Med*** BÜHLMANN fCAL® turbo

“Bühlmann assays were superior with 100 % sensitivity...”
- **Labaere, D. et al., 2014, Comparison of six different calprotectin assays for the assessment of inflammatory bowel disease, *United European Gastroenterology Journal*** Quantum Blue® fCAL

“The EliA [Phadia] cut off for diagnosis was optimal at a level of 15 mg/g. This is as low as the detection limit of the assay, which is analytically unacceptable.”
- **Manz, M. et al., 2012, Value of fecal calprotectin in the evaluation of patients with abdominal discomfort: an observational study, *BMC Gastroenterology*** BÜHLMANN fCAL® ELISA

“All together, those results support the concept that fecal calprotectin is a useful marker in the evaluation of patients with abdominal discomfort...”
- **Sydora, M. J. et al., 2012, Validation of a point-of-care desk top device to quantitate fecal calprotectin and distinguish inflammatory bowel disease from irritable bowel syndrome, *Journal of Crohn’s and Colitis*** BÜHLMANN fCAL® ELISA

“Quantum Blue Reader® calprotectin levels were available within 30 min and correlated well with results derived from standard ELISA assays.” Quantum Blue® fCAL
- **Turvill, J. et al., 2018, Evaluation of the clinical and cost-effectiveness of the York Faecal Calprotectin Care pathway, *Frontline Gastroenterol*** BÜHLMANN fCAL® ELISA

“The sensitivity and specificity of the York Faecal Calprotectin Care Pathway (YFCCP) are 0.94...and 0.92...”

Special Focus on Cut-off:

- **Berinstein, J.A. et al., 2019, The Clinical Accuracy of the BÜHLMANN fCAL ELISA in the Differentiation of Inflammatory Bowel Disease From Irritable Bowel Syndrome: A Multicenter Prospective Case-Control Study, *Crohn’s & Colitis 360*** BÜHLMANN fCAL® ELISA

“In differentiating IBD from IBS, the BÜHLMANN fCAL ELISA is very sensitive (93.3%) at a cutoff <80 µg/g and balanced sensitivity (84.4%) and specificity (85.4%) at a cutoff >160 µg/g (AuROC 0.933).”

- Pavlidis, P. *et al.*, 2013, Diagnostic accuracy and clinical application of faecal calprotectin in adult patients presenting with gastrointestinal symptoms in primary care, *Scandinavian Journal of Gastroenterology* BÜHLMANN fCAL® ELISA

“This study provides the first evidence on the use of fCal [BÜHLMANN fCAL® ELISA] testing in primary care.....to be used as part of the pathway for management of patients with suspected IBS.”
 - Seenan, JP. *et al.*, 2015, Are we exposing patients with a mildly elevated faecal calprotectin to unnecessary investigations?, *Gastroenterology* BÜHLMANN fCAL® ELISA

“we propose an alternative diagnostic approach of repeating the FC after 6-8 weeks in patients with values of 100-200 µg/g.”
 - Walsham and Sherwood, 2016, Fecal calprotectin in inflammatory bowel disease, *Clinical and Experimental Gastroenterology* BÜHLMANN fCAL® ELISA

“The choice of a cutoff will depend on whether sensitivity or specificity is considered to be the most important and needs to be made taking into consideration the clinical features of an individual patient.”
- The use of fecal Calprotectin in Pediatrics:**
- Foster, A. J. *et al.*, 2019, Consecutive fecal calprotectin measurements for predicting relapse in pediatric Crohn’s disease patients, *World J Gastroenterol* BÜHLMANN fCAL® ELISA

“Routine fecal calprotectin testing in children with CD in clinical remission is useful to predict relapse.”
 - Meglicka, M. *et al.*, 2017, Can we predict mucosal inflammation in children with ulcerative colitis without colonoscopy? Own experience in assessing faecal calprotectin, *Post N Med* Quantum Blue® fCAL

“The area under the curve (AUC) for discrimination between subgroup of patients in remission vs moderate disease was 0.90 with cut-off level of 300 µg/g and sensitivity 0.89, specificity 0.82.”
 - Peura, S. *et al.*, 2017, Normal values for calprotectin in stool samples of infants from the population-based longitudinal born into life study, *Scand J Clin Lab Invest* BÜHLMANN fCAL® turbo

“To conclude, determining the upper limits for normal values enable the use of the turbidimetric immunoassay as a diagnostic tool for gastrointestinal disorders in children under 2 years, facilitating fast and cost-efficient monitoring of gastric inflammation.”
 - Prell, C. *et al.*, 2014, Comparison of three tests for faecal calprotectin in children and young adults: a retrospective monocentric study, *BMJ Open* BÜHLMANN fCAL® ELISA

“In conclusion, measurement of FC in paediatric patients with unspecific symptoms is very helpful in order to avoid invasive procedure.”
 - Rodriguez, A. *et al.*, 2017, Correlation of rapid point-of-care vs send-out fecal calprotectin monitoring in pediatric inflammatory bowel disease, *World Journal of Gastrointestinal Pharmacology and Therapeutics* Quantum Blue® fCAL

“...we present the first correlation study of rapid POC calprotectin testing in a pediatric IBD cohort in the United States.”
 - Rodriguez-Belvis, M. V. *et al.*, 2019, Normal fecal calprotectin levels in healthy children are higher than in adults and decrease with age, *Paed & Child Health* Quantum Blue® fCAL

“Normal FC values in healthy children (particularly in infants) are higher than those considered to be altered in adults and show a negative correlation with age. It is necessary to reconsider the upper limits of FC levels for paediatric patients according to age...”
 - Zhu, Q. *et al.*, 2016, Fecal Calprotectin in Healthy Children Aged 1-4 Years, *PLOS ONE* BÜHLMANN fCAL® ELISA

“Children aged from 1 to 4 years old have lower FC concentrations compared with healthy infants (<1 years), and higher FC concentrations when comparing with children older than 4 years and adults.”

Further Literature citing the BÜHLMANN fecal Calprotectin Assays:

- Asberg, A. *et al.*, 2019, Measuring calprotectin in plasma and blood with a fully automated turbidimetric assay, *Scandinavian Journal of Clinical and Laboratory Investigation*
- Baillet, P. *et al.*, 2018, Faecal calprotectin and magnetic resonance imaging in detecting Crohn's disease endoscopic postoperative recurrence, *Lancet Gastroenterol Hepatol*
- Barbut, F. *et al.*, 2017, Faecal lactoferrin and calprotectin in patients with Clostridium difficile infection: a case-control study, *Eur J Clin Microbiol Infect Dis*
- Ben-Horin, S. *et al.*, 2019, Assessment of small bowel mucosal healing by video capsule endoscopy for the prediction of short-term and long-term risk of Crohn's disease flare: a prospective cohort study, *Lancet Gastroenterol Hepatol*
- Bin-Nun, A. *et al.*, 2015, Rapid Fecal Calprotectin (FC) Analysis: Point of Care Testing for Diagnosing Early Necrotizing Enterocolitis, *Am J Perinatol*
- Brandse, J.F. *et al.*, 2016, Performance of Common Disease Activity Markers as a Reflection of Inflammatory Burden in Ulcerative Colitis, *Inflamm Bowel Dis*
- Burri, E. *et al.*, 2014, Diagnostic yield of endoscopy in patients with abdominal complaints: incremental value of faecal calprotectin on guidelines of appropriateness, *BMC Gastroenterology*
- Calafat, M. *et al.*, 2015, High Within-day Variability of Fecal Calprotectin Levels in Patients with Active Ulcerative Colitis: What Is the Best Timing for Stool Sampling? *Inflamm Bowel Dis*
- Chang, M. *et al.*, 2014, Faecal calprotectin as a novel biomarker for differentiating between inflammatory bowel disease and irritable bowel syndrome, *Molecular Medicine Reports*
- Delefortrie, Q. *et al.*, 2015, Comparison of the Liaison® Calprotectin kit with a well-established point of care test (Quantum Blue — Bühlmann-Alere®) in terms of analytical performances and ability to detect relapses amongst a Crohn population in follow-up, *Clinical Biochemistry*
- Dhaliwal, A. *et al.*, 2014, Utility of faecal calprotectin in inflammatory bowel disease (IBD): what cut-offs should we apply? *Frontline Gastroenterology*
- Du, L. *et al.*, 2016, Within-Stool and Within-Day Sample Variability of Fecal Calprotectin in Patients With Inflammatory Bowel Disease, *J Clin Gastroenterol*
- Ferreiro-Iglesias, R. *et al.*, 2015, Usefulness of a rapid faecal calprotectin test to predict relapse in Crohn's disease patients on maintenance treatment with adalimumab, *Scandinavian Journal of Gastroenterology*
- Frin, A-C. *et al.*, 2016, Accuracies of fecal calprotectin, lactoferrin, M2-pyruvate kinase, neopterin and zonulin to predict the response to infliximab in ulcerative colitis, *Digestive and Liver Disease*
- Gauss, A. *et al.*, 2016, Quality of Life Is Related to Fecal Calprotectin Concentrations in Colonic Crohn Disease and Ulcerative Colitis, but not in Ileal Crohn Disease, *Medicine*
- Halfvarson, J. *et al.*, 2017, Dynamics of the human gut microbiome in inflammatory bowel disease, *Nature Microbiology*
- Hessels, J. *et al.*, 2012, Evaluation of Prevent ID and Quantum Blue rapid tests for fecal calprotectin, *Clin Chem Lab Med*
- Juricic, G. *et al.*, 2019, Faecal calprotectin determination: impact of preanalytical sample treatment and stool consistency on within- and between-method variability, *Biochem Med (Zagreb)*
- Kok, L. *et al.*, 2012, Diagnostic Accuracy of Point-of-Care Fecal Calprotectin and Immunochemical Occult Blood Tests for Diagnosis of Organic Bowel Disease in Primary Care: The Cost-Effectiveness of a Decision Rule for Abdominal Complaints in Primary Care (CEDAR) Study, *Clinical Chemistry*
- Kolho, K. *et al.*, 2012, Rapid Test for Fecal Calprotectin Levels in Children With Crohn Disease, *JPGN*
- Kristensen, V. *et al.*, 2015, Prediction of Endoscopic Disease Activity in Ulcerative Colitis by Two Different Assays for Fecal Calprotectin, *Journal of Crohn's and Colitis*
- Lasson, A. *et al.*, 2015, The Intra-Individual Variability of Faecal Calprotectin: A Prospective Study In Patients With Active Ulcerative Colitis, *Journal of Crohn's and Colitis*
- Levine, A. *et al.*, 2014, Comparison of Outcomes Parameters for Induction of Remission in New Onset Pediatric Crohn's Disease: Evaluation of the Porto IBD Group "Growth Relapse and Outcomes with Therapy", *Inflamm Bowel Dis*
- Li, F. *et al.*, 2014, Comparison of the different kinds of feeding on the level of fecal calprotectin, *Early Human Development*

- Lin, Wei-Chen *et al.*, 2015, Fecal calprotectin correlated with endoscopic remission for Asian inflammatory bowel disease patients, *World J Gastroenterol*
- Noebauer, B. *et al.*, 2017, Analytical evaluation of a fully automated immunoassay for faecal calprotectin in a paediatric setting, *Biochem Med (Zagreb)*
- Martins, S. *et al.*, 2019, Comparison of a rapid test and an automated method for faecal calprotectin measurement, *Practical Laboratory Medicine*
- Oord, T. and Hornung, N., 2014, Fecal calprotectin in healthy children, *Scandinavian Journal of Clinical & Laboratory Investigation*
- Oyaert, M. *et al.*, 2017, Analytical performance and diagnostic accuracy of six different faecal calprotectin assays in inflammatory bowel disease, *Clin Chem Lab Med*
- Oyaert, M. *et al.*, 2013, Comparison of two immunoassays for measurement of faecal calprotectin in detection of inflammatory bowel disease: (pre)-analytical and diagnostic performance characteristics, *Clin Chem Lab Med*
- Padoan, A. *et al.*, 2018, Improving IBD diagnosis and monitoring by understanding preanalytical, analytical and biological fecal calprotectin variability, *Clin Chem Lab Med*
- Paul, S. *et al.*, 2013, Therapeutic Drug Monitoring of Infliximab and Mucosal Healing in Inflammatory Bowel Disease: A Prospective Study, *Inflamm Bowel Dis*
- Pelkmans, L.P.J. *et al.*, 2019, Analytical Performance and Clinicopathologic Correlation of Four Fecal Calprotectin Methods, *Am J Clin Pathol*
- Rogler, G. *et al.*, 2013, Concept for a rapid point-of-care calprotectin diagnostic test for diagnosis and disease activity monitoring in patients with inflammatory bowel disease: Expert clinical opinion, *Journal of Crohn's and Colitis*
- Shentova, R. *et al.*, 2016, Diagnostic Value of Fecal Calprotectin Point of Care Testing in the Pediatric Practice, *Merit Res. J. Med. Med. Sci.*
- Weil, D. *et al.*, 2019, Accuracy of calprotectin using the Quantum Blue Reader for the diagnosis of spontaneous bacterial peritonitis in liver cirrhosis, *Hepatology Research*
- Wang, S. *et al.*, 2014, Faecal calprotectin concentrations in gastrointestinal diseases, *Journal of International Medical Research*
- Whitehead, S.J. *et al.*, 2012, Between-assay variability of faecal calprotectin enzyme-linked immunosorbent assay kits, *Ann Clin Biochem*
- Wright, E.K. *et al.*, 2016, Cost-effectiveness of Crohn's disease post-operative care, *World J Gastroenterol*
- Yamamoto, T., 2015, The clinical value of fecal calprotectin and lactoferrin measurement in postoperative Crohn's disease, *United European Gastroenterology Journal*
- Zittan, E. *et al.*, 2018, Fecal calprotectin correlates with active colonic inflammatory bowel disease but not with small intestinal Crohn's disease activity, *JGH*