# Evaluation of dynamic MRI as indicator of disease activity in perianal fistulizing Crohn's disease

**K. Horsthuis[1], C. Lavini[1], P. Stokkers[2], and J. Stoker[1]**
[1]Radiology, Academic Medical Center, Amsterdam, Netherlands, [2]Gastroenterology, Academic Medical Center, Amsterdam, Netherlands

## Introduction

Crohn's disease (CD) is complicated by perianal fistulas in up to 38% of patients. Magnetic Resonance Imaging (MRI) is the gold standard for evaluation of perianal disease as localization and extent of perianal CD can be adequately determined on MRI. However, no information is provided about the degree of inflammatory activity, while clinically the distinction between mild, moderate and severe disease probably is important to determine the treatment strategy and response to treatment.
The currently available clinical indices of severity (i.e. C-reactive protein, Perianal Disease Activity Index) are respectively unspecific and partially subjective. Dynamic contrast-enhanced MRI (DCE-MRI) is increasingly used to determine severity of disease in inflammatory processes. In DCE-MRI, analysis is performed of the different shapes the time-intensity curve (TIC) can display.; the TIC represents a mirror of the physiological parameters of the tissue (e.g. capillary permeability, tissue vascularization) that are changed in inflammatory conditions.
The purpose of our study was to assess the feasibility and added value of DCE-MRI in perianal fistulizing CD.

## Methods and materials:

24 patients with proven CD underwent pelvic MRI for evaluation of perianal fistulizing disease on a 1.5 Tesla MRI scanner. PDAI and CRP were determined. A 2-D dynamic T1-weighted Fast Spoiled Gradient Echo sequence (5 slices, 20 dynamic phases, temporal resolution 18 seconds ) was performed during which intravenous contrast medium was administered by bolus injection through a power injector. The DCE-MRI data were analyzed off-line using home-written software. A Region of Interest (ROI) was defined by the radiologist in the area around the perianal pathology (figure 1) to exclude all non-relevant areas such as the pelvic bones, and gluteal muscles in all slices. The TIC in the ROI were analyzed pixel by pixel using a classification flow-chart that placed each TIC in one of the 5 shapes described by Van Rijswijk et al. (ref. 1; see figure 1). The average amount of enhancement (ME) (figure 2) and the relative excess of each shape type were calculated in this area. Spearman correlation coefficients were calculated between the DCE-MRI parameters and the clinical indices.

## Results

In all patients regions of increased contrast enhancement were observed in the perianal area. In most enhanced pixels type 2 TICs were seen, indicating slow enhancement. However, in most patients areas showing quick enhancement were observed as well. No statistically significant correlations were seen between the relative amount of the different TIC patterns and the CRP and PDAI, respectively.

## Conclusion

DCE-MRI is feasible and provides consistent results in patients with perianal fistulizing CD. Although these findings do not seem to relate to clinical parameters indicating disease activity, further insight in the pathophysiology might be gained using DCE-MRI, such as heterogeneity of the tissue response to the inflow of the contrast agent. Further research regarding the clinical significance of DCE-MRI findings is warranted.

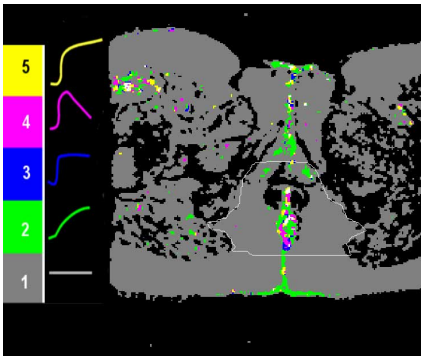


Figure 1: A color-coded map of the TIC patterns. Colors in the image correspond to the TIC shape in the legend. The numbering was chosen according to ref 1

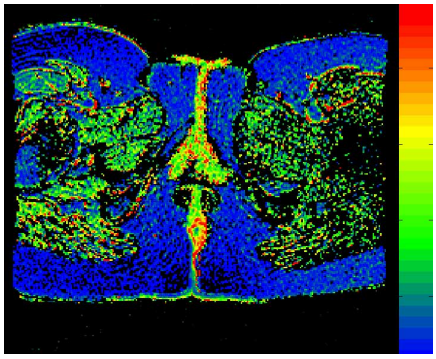

Figure 2: A Maximum enhancement map in a patient with perianal fistulizing CD

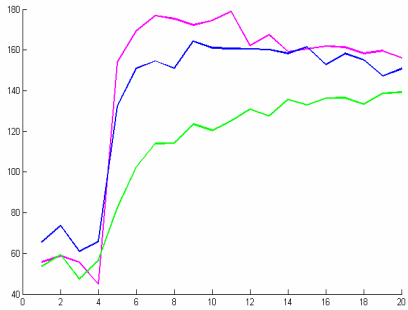


Figure 3: Example of the encountered TICs

## References:

1. Van Rijswijk CSP, Hogendoorn PCW, Taminiau AHM, Bloem JL. Synovial sarcoma: dynamic contrast-enhanced MR imaging features. Skeletal Radiology 2001; 30:25-30.