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REVIEW ARTICLE

# Diagnostic performance of Fluorine-18-Fluorodeoxyglucose positron emission tomography in patients with chronic inflammatory bowel disease: A systematic review and a meta-analysis

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Positron emission tomography;
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$^{18}$F-FDG;
Inflammatory bowel disease;
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**Abstract**

*Objective:* To systematically review and meta-analyze published data about the diagnostic performance of Fluorine-18-Fluorodeoxyglucose ($^{18}$F-FDG) positron emission tomography (PET) and PET/computed tomography (PET/CT) in patients with chronic inflammatory bowel disease (IBD).
*Methods:* A comprehensive computer literature search of studies published through May 2012 regarding $^{18}$F-FDG-PET and PET/CT in patients with IBD was performed. All retrieved studies were reviewed and qualitatively analyzed. Pooled sensitivity, specificity, positive and negative likelihood ratio (LR+ and LR−) and diagnostic odd ratio (DOR) of $^{18}$F-FDG PET and PET/CT in patients with IBD on a per segment-based analysis were calculated. The area under the ROC curve was calculated to measure the accuracy of $^{18}$F-FDG PET and PET/CT in patients with IBD.
*Results:* Nineteen studies comprising 454 patients with suspected IBD were included in the qualitative analysis (systematic review) and discussed. The quantitative analysis (meta-analysis) of seven selected studies (including 219 patients with IBD) provided the following results on a per segment-based analysis: sensitivity was 85% [95% confidence interval (95%CI) 81–88%], specificity 87% (95%CI 84–90%), LR+ 6.19 (95%CI: 2.86–13.41), LR− 0.19 (95%CI: 0.10–0.34), and DOR 44.35 (95%CI: 11.77–167.07). The area under the ROC curve was 0.933.

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*Conclusions:* In patients with suspected IBD $^{18}$F-FDG PET and PET/CT demonstrated good sensitivity and specificity, being accurate methods in this setting. Nevertheless, the literature focusing on the use of PET and PET/CT in IBD remains still limited; thus, further large multicenter studies will be necessary to substantiate the diagnostic accuracy of these methods in patients with IBD.


**Contents**



## 1. Introduction

The diagnosis of chronic inflammatory bowel disease (IBD) is usually performed by a combination of data obtained by a detailed patient history, physical examination, laboratory tests, radiologic studies (including CT, magnetic resonance imaging [MRI], ultrasonography [US]), and endoscopic evaluation.[1,2] A challenge for the clinicians in managing IBD is determining whether symptoms are related to the inflammation in the intestinal tract. Therefore, a noninvasive test able to detect active inflammation in the intestinal tract may be useful in the evaluation and management of IBD.[2,3]

Fluorine-18-Fluorodeoxyglucose ($^{18}$F-FDG) positron emission tomography (PET) and PET/computed tomography (PET/CT) have been proposed as noninvasive imaging methods to assess extent, location, and disease activity in patients with IBD. $^{18}$F-FDG PET allows the identification of areas of increased metabolic activity by measuring the uptake of $^{18}$F-FDG, a glucose analogue, both in inflammatory diseases and in malignancies. In fact, not only neoplastic cells but also inflammatory cells, such as neutrophils and macrophages, may accumulate high levels of $^{18}$F-FDG.[2,4,5]

Moreover, hybrid PET/CT device allows enhanced detection and characterization of abnormal intestinal findings, by combining the functional data obtained from $^{18}$F-FDG PET with morphological data obtained from CT.[6,7]

Several studies have evaluated $^{18}$F-FDG PET and PET/CT in assessing IBD, reporting different values of sensitivity and specificity in this setting. The purpose of our study is to systematically review and meta-analyze published data on the diagnostic performance of $^{18}$F-FDG PET or PET/CT in patients with suspected IBD.

## 2. Methods

Our meta-analysis was performed according to the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) statement which describes an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses.[8]

### 2.1. Search strategy

A comprehensive computer literature search of the PubMed/MEDLINE, Embase and Scopus databases was conducted to find relevant published articles on the diagnostic performance of $^{18}$F-FDG-PET and PET/CT in patients with IBD. We used a search algorithm that was based on a combination of the terms: a) "PET" OR "positron emission tomography" AND b) "IBD" or "inflammatory bowel disease" or "Crohn" or "ulcerative colitis". No beginning date limit was used; the search was updated until May 31st, 2012. No language restriction was used. To expand our search, references of the retrieved articles were also screened for additional studies.