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Inflammatory bowel disease detection enhanced with PET/CT

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Inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, may be detected and monitored more effectively in the future with positron emission tomography/computed tomography (PET/CT), according to research published in the May issue of *The Journal of Nuclear Medicine*. Typically assessed by endoscopic and histologic evaluations, investigators demonstrated the ability of PET/CT to identify lesions along the complete intestinal wall that could be missed with traditional imaging techniques.

"Animal models of intestinal inflammation have contributed substantially to the current understanding of IBD; however, endoscopic examinations on the animals can be complicated, and full histological workup of the murine colon does not allow for serial assessment," said Dominik Bettenworth, MD, lead author of the study "Translational 18F-FDG PET/CT Imaging to Monitor Lesion Activity in Intestinal Inflammation." "In this study, we evaluated 18F-FDG PET/CT as a noninvasive approach to serially assess IBD activity in small animals and confirmed its utility by analyzing PET/CT scans conducted in patients with Crohn's disease."

For the first phase of the study, researchers induced dextran sodium sulfate (DSS) colitis in mice and assessed the 18F-FDG uptake in multiple sections of the colon. Compared with control mice, an increase in 18F-FDG uptake was clearly noted in the DSS mice, with the most intensive areas of uptake in the medial and distal colon. Significant correlation was found between the PET/CT and histologic evaluations.

The experiment also identified extraintestinal alterations, such as bone marrow activation, in the DSS colitis-induced mice.

Based on the results of the experiments in the colitic mice, researchers identified the extent of the mucosal damage as the parameter that correlated best to 18F-FDG uptake in the mice and in human patients with Crohn's disease. 18F-FDG PET/CT scans of 25 Crohn's patients were retrospectively analyzed, and the findings were then correlated to endoscopic procedures performed before or after the CT without any interfering treatments. In accordance with the results in the DSS colitis, an increased 18F-FDG uptake was found in 87 percent of deep mucosal ulcerations, whereas mild endoscopic lesions were detected in approximately 50 percent of patients assessed.

"In Crohn's disease patients, 18F-FDG PET/CT seems to accurately detect advanced inflammatory changes and also unmask subepithelial disease activity that might be missed by colonoscopy. Therefore, PET/CT might serve as an additional tool for evaluating disease activity in IBD patients, e.g., in defining complete remission," noted Bettenworth.

Michael Schäfers, MD, senior author of the study, added, "Using a clinically established tracer, the translation of this approach into daily clinical routine should benefit patients in the near future and will further promote the use of PET/CT for new indications in clinical algorithms."

Crohn's disease and ulcerative colitis are chronic-remittent, inflammatory conditions featuring characteristic mucosal lesions within the bowel leading to diarrhea, stricture formation, abdominal pain and weight loss. Crohn's disease may affect as many as 700,000 Americans, and ulcerative colitis may affect up to an additional 700,000; incidence rates for these diseases are on the rise worldwide.

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