Imaging techniques in inflammatory bowel disease: recent trends, questions and answers

Imagerie des maladies inflammatoires chroniques intestinales

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Summary

Imaging techniques have undergone substantial progress in recent years and contribute significantly in the diagnosis of inflammatory bowel diseases in conjunction with patient history, clinical and laboratory examination. Modern cross-sectional imaging modalities such as computed tomography and magnetic resonance imaging allow an evaluation not only of the complete bowel wall of the small intestine, but also of extraluminal structures. They constitute a major diagnostic component in the initial workup, in stricturing or fistulizing disease and in suspected abscess. Transabdominal ultrasonography has been re-appreciated in these settings as an easy- and ready-to-use tool yielding real-time information. Positron emission tomography was found useful to add functional diagnosis of inflammation. Colonoscopy techniques still represent the gold standard for evaluation of inflammatory activity and for cancer surveillance. Here, chromoendoscopy has proven efficacy for enhanced detection of flat intraepithelial neoplasias in ulcerative colitis and has been incorporated into recent surveillance guidelines. Narrow band imaging may provide virtual chromoendoscopy in the future, but confirmatory studies are still on the way. Confocal endomicroscopy allows \textit{in vivo} microscopy at high resolution and with excellent accuracy in first trials to predict histology of inflammatory and neoplastic lesions. The current data from endoscopic studies should result in an integrated approach to both identify and characterize a suspicious lesion during ongoing endoscopy for reliable, accurate diagnosis and targeted, immediate therapy.

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Amazing progress has been achieved in imaging techniques for inflammatory bowel diseases (IBD) in recent years. However, one still has to keep in mind that no single finding alone is pathognomonic for IBD, neither for Crohn’s Disease (CD) nor for Ulcerative Colitis (UC). Initial diagnosis of IBD usually relies on a combination of the patient’s history, clinical and laboratory findings in conjunction with findings from imaging techniques. Imaging results may also be needed to determine inflammatory activity in the course of the disease. They are further required to screen for complications associated with IBD or their therapy. And in the long run imaging techniques are mandatory for adequate surveillance of patients with long-standing disease. The following review addresses imaging techniques to evaluate small and large bowel involvement in IBD from a clinical point of view with a focus on novel developments, but also with a re-encounter of “old friends”, such as ultrasonography.

Imaging of small bowel involvement

Initial screening for small bowel involvement facilitates the differential diagnosis of CD, where small bowel involvement is common, from UC, where apart from a back-wash ileitis from pancolitis, no small bowel involvement is found. Since in 80 percent of patients, the distribution pattern of CD remains stable over the course of 10 years [1], initial diagnosis should also screen for a potential small bowel involvement to anticipate complications. In addition, isolated small bowel manifestation proximal of the terminal ileum accounts for approximately 10 percent of patients with CD, and cannot be detected upon routine upper or lower endoscopy. Endoscopy often also fails to detect complications of CD such as fistulising disease or abscess formation. The imaging techniques discussed here for small bowel diagnosis may in part also be used to evaluate colonic disease. Wireless capsule endoscopy will be discussed separately in this issue of “Gastroentérologie Clinique et Biologique”.

Ultrasonography (US)

Advantages of transabdominal ultrasonography of the bowel are its rapid availability and the lack of radiation in conjunction with a combined direct evaluation of morphological (e.g. thickened bowel wall) and clinical findings (e.g. localized pain) by the gastroenterologist. In experienced hands, the sensitivity of US in CD has been reported to be as high as 80-90% [2, 3] for small bowel involvement or diagnosis of strictures, with a significant learning curve and investigator dependence. Data on the detection of fistulizing disease are less satisfying, with a sensitivity of 50-87% [4]. Adding Doppler US to quantify hyperperfusion in splachnic vessels or increased flow in the intestinal wall to evaluate for inflammatory activity did not correlate well with other imaging techniques or clinical indices [5]. The most obvious reason for this lack of correlation might be the high variability of intestinal perfusion. High resolution US after enema with 1-1.5 l of water (hydrocolonic sonography) has been shown to further improve diagnostic accuracy [6], but has been largely abandoned due to the strenuous patient preparation. New US techniques, using intravenous or oral contrast agents, may further improve US applicability, but have not been tested in larger series so far [7, 8]. Although the role of US in the initial diagnosis and evaluation of disease activity shows a significant examiner variability, specificity and positive predictive value

Résumé
Les progrès des techniques d’imagerie, associés aux données cliniques et biologiques, ont significativement contribué à l’amélioration du diagnostic des maladies inflammatoires chroniques intestinales au cours des dernières années. L’amélioration consécutive de la définition des images obtenues en tomodensitométrie ou en imagerie par résonance magnétique nucléaire permet une évaluation non seulement de la paroi digestive (en particulier celle de l’intestin grêle), mais aussi une étude précise des structures extra-digestives. L’apport de ces techniques est essentiel pour la prise en charge initiale des complications, de sténoses, de fistules, ou encore d’abcès. Dans ces situations cliniques, l’échographie abdominale constitue également, surtout depuis la mise à disposition des sondes de haute fréquence et du doppler, un outil d’évaluation fiable, facile d’accès et d’utilisation, permettant le plus souvent une réévaluation morphologique en temps réel. Enfin, les développements actuels et à venir de la tomographie par émission de positrons permettent d’entrevoir une utilisation potentielle à court terme. Bien sûr, la coloscopie demeure, dans la plupart des cas, l’examen de référence pour évaluer l’importance de l’atteinte muqueuse ou dans le cadre du dépistage de la dysplasie ou du cancer colorectal. Dans ce domaine, la chromo-endoscopie a montré son intérêt dans la visualisation des lésions planes dans la rectocolite hémorragique, et fait désormais partie des recommandations en matière de dépistage de la dysplasie ou du cancer colorectal. La chromoendoscopie virtuelle par « Narrow Band Imaging » est susceptible de remplacer les colorations, mais des études complémentaires restent nécessaires pour le démontrer. Enfin, l’endomicroscopie confocale permet une analyse microscopique à haute résolution in vivo, avec des résultats initiaux très prometteurs concernant l’analyse « histologique» des lésions inflammatoires ou dysplasiques.

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of US have been reported to be consistently over 90% after adequate training [2], making repeated US a valuable tool to follow-up on patients with known CD and established manifestation pattern (Figure 1), even after previous surgery [9].

Computed Tomography (CT) and Magnetic Resonance Imaging (MRI)

CT and MRT compete with and may complement conventional radiologic techniques such as small bowel enteroclysis (SBE, Figure 2) or small bowel follow through (SBFT). Whereas the latter seem to offer a slightly more accurate depiction of fine mucosal detail [10, 11], cross-sectional imaging techniques permit evaluation of the complete bowel wall and of extraluminal structures and have largely replaced conventional x-ray techniques in IBD centres. Both CT and MRI usually combine oral and intravenous contrast with the use of spasmyotics for bowel distention and to minimize peristalsis. CT is mostly used for detection of extraluminal complication of CD, such as abscess formation, or for evaluation of prestenotic colonic segments. CT shows a high specificity of over 90% in higher grade inflammation, whereas sensitivity has been reported ranging from 70-80% [12] with endoscopy serving as the gold standard, because minute mucosal alterations are not detected. Three-dimensional reconstruction methods (virtual CT-endoscopy) have so far not significantly enhanced assessment of disease activity. Because CT scan utilizes ionizing radiation and the mostly young patients often need repeated examinations, we prefer MRI for evaluation of small bowel wall and extraenteric structure. As in CT, segmental wall enhancement after intravenous contrast injection indicates inflammatory

Figure 1 A: In a patient with a prolonged flare, transabdominal ultrasonography of the ileocecal valve showed a mild transmural inflammation of the terminal ileum (right, D1 = 2.7 mm) and a significant inflammation of the cecum (left, D2 = 7.7 mm). Note that the hyperechogenic layer (submucosal, arrow) is not clearly delineated and contributes considerably to bowel wall thickening, indicating transmural inflammation.

B: In another section, a small retrocecal abscess of 8 mm is seen (arrow).

C: Colonoscopy confirms the severe inflammation of the cecum.

A : échographie abdominale au cours d’une poussée de maladie de Crohn, montrant une inflammation transpértale modérée de l’ileon terminal (droite, D1 = 2,7 mm) et un aspect inflammatoire marqué du caecum (gauche, D2 = 7,7 mm). On peut noter que la couche hypéchogène (sous-muqueuse, flèche) n’est pas bien délimitée et contribue clairement à l’épaississement pariétal constaté ; cette image indique la présence d’une inflammation transmurale.

B : abcès rétro-caecal de 8 mm (flèche).

C : la coloscopie confirme une atteinte inflammatoire sévère au niveau du caecum.

Figure 2 The radiograph shows a conventional Small Bowel Enteroclysis (Sellink) in a patient with longstanding Crohn’s Disease. She had suffered from postprandial abdominal pain increasing over several weeks, and presented with a suspected flare refractory to high-dose steroids. However, SBE showed two high grade stenoses of the terminal ileum with light prestenotic dilatation. A trial of intensified anti-inflammatory therapy was not initiated, but the patient referred to surgery where a fibrotic stenosis was resected.

Transit du grêle par entérolyse (Sellink) chez une malade ayant une maladie de Crohn ancienne, souffrant de douleurs abdominales postprandiales s’accentuant depuis quelques semaines, faisant suspecter une poussée de sa maladie, réfractaire à un traitement par corticoïdes à forte dose. Le transit du grêle montre deux sténoses serrées de l’ileon terminal et une légère dilatation du grêle présténotique. L’intervention chirurgicale a permis la résection d’une sténose fibreuse serrée.
hyperperfusion. MRI in our experience is especially useful for the evaluation of strictures (Figure 3), if their nature is ambiguous (fibrous vs. inflammatory), impacting greatly on further management strategies [13]. However, both MRI and CT seems to underdiagnose mild or mucosal inflammation, resulting in a lower sensitivity compared to endoscopy [14].

In summary, current data suggest that cross-sectional imaging by MRI or CT seems to be of clinical value for the initial diagnosis of small bowel involvement, for assessment of stenotic segments and for detection of extraintestinal complications. MRI and CT have not been found adequate for assessing grade and extent of colonic inflammation [15], of inflammation restricted to the mucosa in small and large intestine, not necessarily resulting in bowel wall thickening and contrast enhancement, and for cancer surveillance (flat lesions, see below).

Positron Emission Tomography (PET)

Positron emission tomography with 18-Fluorodeoxyglucose (FDG-PET) is a functional imaging modality originally used in oncology to detect areas of enhanced glucose metabolism which is also seen in inflammation. In a first study in IBD patients [14], sensitivity of FDG-PET was superior while specificity was comparable (85% and 89%, resp.) to MRI (67% and 93%, resp.) or antigranulocyte scintigraphy (41% and 100%, resp.). However, spatial resolution by PET is lower than by cross sectional techniques. Therefore, FDG-PET has been combined with CT scan in a recent study [16]. The sensitivity for detection of severe endoscopic lesions (deep ulcers and strictures) was 100%, the overall sensitivity of affected bowel segments 73%. FDG-PET therefore seems a promising tool to add functional imaging of higher grade inflammation to cross-sectional modalities (Figure 4), but has to be evaluated in prospective studies.

**Figure 3** In a patient recurrence of Crohn’s symptoms after ileocecal resection, MRI revealed a stenosis at the anastomosis site (arrow). Note that the stenosis region enriches contrast as a sign of inflammation, whereas the rest of the large or small bowel wall does not show inflammatory hyperperfusion.

**Figure 4** In a patient with Crohn’s disease of the transverse colon, 18F-FDG-PET shows significantly higher glucose uptake in the inflamed region (arrows). Serial sections are used to reconstruct a three-dimensional image of abdomen, and coronal (A), transaxial (B) and sagittal (C) sections are given. Note that kidneys, urinary bladder and heart show a physiological contrast after FDG administration (Image courtesy of A. Helisch, Clinic and Polyclinic of Nuclear medicine, University of Mainz).

Chez un patient présentant une récidive clinique après résection iléo-caecale, l’IRM montre une sténose anastomotique (flèche). On peut noter une augmentation de la densité au niveau de la région sténosée, signant la reprise du processus inflammatoire, alors qu’ailleurs la paroi intestinale ne présente pas de signes d’hyperperfusion.

**Double Balloon Enteroscopy (DBE)**

Double balloon enteroscopy (push-and-pull enteroscopy) is a newly developed endoscopic technique that allows full length non-surgical endoscopy of the small bowel by a peroral or peranal route under conscious sedation. In experienced centres, a median 240 cm and 140 cm were accessible by this approach perorally or peranal, resp. [17], and adverse events such as pancreatitis associated with the peroral route are below 0.5% [18]. However, one ileal perforation in CD has been described even after diagnostic DBE [19]. DBE is more sensitive in evaluating mucosal lesions in suspected or known CD than radiologic methods [19]. In contrast to video capsule endoscopy, which is discussed elsewhere, biopsy sampling and therapeutic interventions such as balloon dilation are possible. In a recently reported series of 39 patients with CD-associated stenosis of the small bowel or ileocolonic anastomosis, dilation was technically successful in 95%. 62% of patients required a repeat intervention (dilation or surgery) after a median of 21 months. However, surgery could be avoided in 75% of patients after...
36 months. Two perforations and one episode of severe bleeding were seen in 73 procedures [20]. In a similar study, dilation of symptomatic small bowel stenoses resulted in sustained relief in 6/10 patients, thereby avoiding surgery. Differences in the percentage of patients are explained by the fact that only small bowel strictures (and not strictures at the anastomosis site) were treated. Balloon dilation was technically feasible and safe under fluoroscopic guidance in selected patients. These show a short fibrotic stenosis in the absence of severe inflammation, and with favourable anatomy [21]. Patients not meeting these criteria should be evaluated for intensified medical therapy in the presence of severe inflammation or for surgery.

Colonic imaging

The objective of colonic imaging is to establish a diagnosis based on macroscopic and microscopic findings and to estimate grade and extent of involvement. This is especially important in UC, where topical therapy might be adequate for a subset of patients with localized distal disease, but also in CD in the light of new findings indicating that mucosal healing under therapy may be a therapeutic goal. Besides, colonic imaging has to provide cancer surveillance by screening for intraepithelial neoplasias (IN) in long-standing UC, before colorectal cancer develops. An important decision in surveillance is based on the distinction of sporadic adenomas from dysplasia associated lesions or masses (DALM). DALM arise from inflamed areas, do not follow the classical adenoma-carcinoma sequence, often show a multifocal and flat growing pattern and are therefore easily overlooked. While conventional polypectomy is adequate for adenomas, proctocolectomy should be recommended in UC patients, when DALM with high grade dysplasia is diagnosed.

The large bowel is in principle accessible with the above mentioned techniques for small bowel imaging. However, colonic imaging in IBD patients still strongly relies on endoscopic techniques which serve as a gold standard to evaluate cross-sectional imaging techniques, have consistently provided a higher diagnostic yield and accuracy for inflammation and flat IN of the colon, and enable biopsy sampling and therapeutic interventions. Whenever possible, high definition (HD) video-colonoscopy should be used regardless of additional contrast enhancement techniques (e.g. chromoendoscopy or narrow band imaging), since use of HD per se seems to result in a significant increase in detected lesions in screening colonoscopy [22]. All the below mentioned colonoscopy techniques need thorough training of a dedicated endoscopist. Motivating patients to achieve optimal bowel preparation further improves diagnostic yield.

Chromoendoscopy

Chromoendoscopy or intravital staining is an endoscopic technique to enhance contrast between normal and abnormal mucosa. Absorptive or contrast dyes are sprayed onto the mucosa. Circumscription lesions are most often described by the pit pattern classification in combination with magnification or zoom endoscopy [23] and differentiated from diffuse alterations. A modification of this pit pattern classification is often used for endoscopic prediction: Neoplastic lesions usually show a type III - V pit pattern, whereas type I and II usually indicate non-neoplastic tissue (Figure 5). In long-standing UC where lesions often show a flat or depressed growing pattern, repeat colonoscopy surveillance is recommended for IN screening. Guidelines have been published to augment patient selection and preparation [24]. Recommendations include absence of active inflammation, excellent bowel preparation, reduction of peristalsis and targeting of biopsies. These recommendations are also applicable to other enhanced imaging techniques (see below).

Figure 5 Chromoendoscopy in Ulcerative colitis.
A: after panchromoendoscopy with methylene blue 0.1% for surveillance of a patient with longstanding ulcerative colitis, multiple polyposus lesions displayed a type II pit pattern (star-shaped crypt openings), indicating regenerative tissue. Histopathology confirmed post-inflammatory pseudopolyps.
B: in contrast, this circumscribed lesion in another UC patient showed a type III s (central) and III L pit pattern. Histopathology showed low-grade dysplasia.

Chromoendoscopy au cours d’une rectocolite hémorragique ancienne.
A : après coloration pancolique au bleu de méthylène (0,1 %) au cours d’une-coloscopie de surveillance, de multiples lésions polyoides ayant un aspect endoscopique (« pit pattern ») de type II (ouverture étoilée des cryptes) sont observées, indiquant une muqueuse régénérative. L’examen anatomopathologique confirme qu’il s’agit de pseudopolypes cicatriciels.
B : en revanche, une lésion circonscrite chez un autre malade ayant une rectocolite hémorragique, montre un « pit pattern » de type III s au centre, et de type III L ailleurs. L’examen histologique montre qu’il s’agit d’une dysplasie de bas grade.
In screening colonoscopy, flat and depressed lesions have long been considered an asian phenomenon, until Fujii et al. [25] and Rembacken et al. [26] impressively demonstrated the detection of an equal proportion of such lesions in a UK population by the use of chromoendoscopy. Since IN in UC often show a similar growing pattern, up to now five prospective studies have evaluated chromoendoscopy with methylene blue or indigo carmine for enhanced detection of IN in UC [27-31]. These trials including over 1,000 patients have demonstrated an approximately 4fold increase in the detection of IN in UC by the use of intravital staining. Lesions that were frequently not found by conventional white light endoscopy (WLE) showed a flat or depressed pattern. Using the modified pit pattern classification, accurate prediction of non-neoplastic vs. neoplastic lesions was possible in 93% [28]. Concern has been raised about inflammatory lesions mimicking neoplastic staining patterns [32], therefore patients should be surveilled in clinical remission. Diagnostic yield for IN is higher, if chromoscopically targeted biopsies are investigated (8% or 49 of 644 biopsies), as compared to only 0.14% or 18 of 12,482 random biopsies in the control group undergoing conventional WLE [31]. This has led to the incorporation of chromoendoscopical surveillance for patients with longstanding UC in recent guidelines for appropriately trained endoscopists [33].

**Narrow Band Imaging (NBI)**

Although chromoendoscopy is easy to perform after adequate training, and classification systems are well established especially in the lower GI tract, it is time consuming [31], and the staining of the mucosa cannot be reversed once performed. Therefore, narrow band imaging (NBI; Olympus Corp., Japan) has been introduced which sequentially illuminates the mucosa by light narrowed around to the haemoglobin absorption band. NBI emphasizes the vessels of the mucosa and submucosa, which are displayed in cyan and brown, resp. This illumination is available by simply pushing a button on the endoscope, thereby providing reversible “virtual chromoendoscopy” (Figure 6). Most published date on the use of NBI has been gathered from screening colonoscopy. Here, adenoma detection by chromoendoscopy and NBI seem to comparable [34], and potentially superior to white light endoscopy [35]. However, since some early studies compared NBI (which is integrated into a HD scope) with conventional endoscopy (using low resolution scopes), conflicting data is now presented as to whether the increased adenoma detection rate is attributable to NBI [35] or rather to high resolution [22].

In the only available study in high risk patients with longstanding UC, the additional use of NBI did not result in a higher diagnostic yield of intraepithelial neoplasias (IN) as compared to WLE alone. A significant increase in the number of false positive lesions was found, but not of true IN, and both NBI anad WLE missed 4 of 12 patients with dysplasia, which were detected by random biopsies [36]. These results might be attributable to the use of a lower resolution NBI prototype, or to the fact that IN in UC arise from formerly inflamed areas. These may show vascular alteration at the lesions’ margins, inhibiting clear-delineation of such lesions. Follow-up studies with high resolution scopes in comparison to chromoendoscopy in this high risk patient group are awaited. NBI still lacks a uniformly used classification system based on the vessel architecture. This classification should be easy to use and show a high inter- and intraobserver agreement, similar to the pit pattern classification [23]. It should be applicable to other vessel enhancement techniques that have not yet been tested in IBD, such as FICE (Fujinon) or EPKi (Pentax, Japan), which both use post-image acquisition processing modes rather than rotating light filters.

Figure 6 Narrow band imaging of a small slightly elevated lesion with a central depression (type II a-c) emphasizes the vessels and by that results in a better delineation of the lesion’s border. Superficial vessels and small amounts of blood leaking from the central depression are displayed in a brownish colour. Histology revealed a T1 carcinoma arising from a sporadic adenoma (Image courtesy of D. Schilling, Med. Clinic II, Mannheim).
Confocal Endomicroscopy

Confocal endomicroscopy is a novel technique enabling subsurface microscopy at a 1,000 fold magnification during ongoing endoscopy after the intravenous application of a fluorescent dye (fluorescein). This has been achieved by the integration of a miniaturized laser scanner into the head of a conventional video-colonoscope (Pentax, Japan). This scanning head is targeted to suspicious lesions, and microscopic images are available in real time at subcellular resolution (Figure 7). Video endoscopic and microscopic images are displayed simultaneously on two separate screens. In a first study, confocal endomicroscopy has been shown to reliably predict histology with a simple classification based on crypt and vessel architecture, and normal tissue, regenerative tissue and neoplasia could be differentiated with a high accuracy of 99% in patients scheduled for screening colonoscopy [37]. In a following randomized trial, confocal endomicroscopy was combined with chromoendoscopy and compared with standard WLE for surveillance of patients with longstanding UC [30]. In this setting, chromoendoscopy was used to unmask lesions, as described in detail above, and endomicroscopy for targeted microscopy of suspicious circumscribed lesions. In 174 lesions in 80 patients, prediction of IN was possible with an accuracy of 97.8%. If only suspicious lesions as identified by the combination of chromoendoscopy and confocal endomicroscopy would have been biopsied, a mean number of 3.9 per patient would have been possible without reducing the detection of IN, whereas 42.2 biopsies per patient were taken in the WLE group. As importantly, normal appearing mucosa upon in vivo confocal examination correlated with healthy mucosa upon histopathological examination in 99.1%. The presence or absence of inflammation could be reliably predicted. If the encouraging results from this study is confirmed in multicentre trials, confocal endomicroscopy could significantly impact on immediate patient management and lead to a paradigm shift in UC surveillance to abandon random biopsies and instead take only microscopically targeted biopsies. A combination with molecular imaging after application of fluorescently labelled probes which is already possible in animal studies [38] could further ameliorate patient surveillance.

Conclusion

Imaging techniques have undergone substantial progress in recent years and contribute significantly in the diagnosis of IBD. Modern cross-sectional imaging modalities such as CT and MRI allow an evaluation not only of the complete bowel wall of the small intestine, but also of extraluminal structures. They constitute a major diagnostic component in the initial workup, in stricturing or fistulizing disease

Figure 7 In vivo imaging by confocal endomicroscopy is achieved by a blue laser light scanning the region of interest (see Fig. 4B, left lower corner). A: In normal colonic mucosa, face optical sections below the epithelial layer show a regular array of single crypts (arrow) surrounded by capillaries in a honeycomb pattern. Capillaries are rendered in white after intravenous injection of fluorescein as a contrast agent. Single black dots within the capillaries correspond to red blood cells (arrowhead). B: In severe inflammation in UC, the mucosal architecture is significantly altered: Crypts demonstrate a varying diameter and an increased distance due to oedema and inflammatory infiltration of the lamina propria. Fluorescein leaks from dilated capillaries (arrow), and crypt abscesses are found (arrowhead). C: The surface of a neoplastic lesion is tubular, the epithelial cells show an irregular height (arrow), but the basal membrane is still intact and displayed as a clear line between the epithelial layer and the lamina propria (arrowhead). Confocal images represent an area of 500 x 500 μm, approximating a 500 fold magnification on a 19 inch screen.

L’analyse histologique in vivo au cours d’une endomicroscopie confocale est obtenue par l’étude de la région d’intérêt à l’aide d’un faisceau laser en lumière bleue (voir Fig. 4B, coin inférieur gauche). A : La muqueuse normale, analysée le faisceau laser étant dirigé perpendiculairement à la surface muqueuse, montre des cryptes (flèche) isolées les unes des autres, entourées d’un réseau de capillaires, et disposées en nids d’abeille. Une injection intraveineuse de fluorosépine permet de rehausser le contraste au niveau des capillaires. Les images punctiformes noires au sein des capillaires sont des érythrocytes (tête de flèche). B : En cas d’inflammation sévère au cours d’une rectocolite hémorragique, les cryptes sont davantage séparées les unes des autres du fait de l’œdème et de l’infiltration inflammatoire de la lamina propria, et leur lumière est de diamètre variable. On constate des fuites de fluorosépine du fait de l’augmentation de la perméabilité des capillaires (flèche), et on peut voir des abcès cryptiques (tête de flèche). C : La surface d’une lésion dysplasique est tubulaire, les cellules épithéliales sont de hauteur variable (flèche), mais la membrane basale reste intacte comme en témoigne la persistance d’une ligne de séparation nette entre l’épithélium et la lamina propria (tête de flèche). Chaque image explore une surface de 500 x 500 μm, correspondant approximativement à une résolution de 500 fois.
and in suspected abscess. Transabdominal ultrasonography has been re-appricated in these settings as an easy- and ready-to-use tool. FDG-PET adds a functional diagnosis of inflammation.

Colonoscopy techniques still represent the gold standard for evaluation of inflammatory activity and for cancer surveillance. Here, chromoendoscopy has proven efficacy for enhanced detection of flat IN. Narrow band imaging may provide virtual chromendoendoscopy in the future, but confirmatory studies are still on the way. Confocal endomicroscopy allows in vivo microscopy at high resolution and with excellent accuracy in first trials. The current data from endoscopic studies should result in an integrated approach to both identify and characterize a suspicious lesion during ongoing endoscopy for reliable, accurate diagnosis and targeted, immediate therapy.

Conflict of interest:

Martin Goetz has no conflict of interest. Markus Neurath is consultant for Giuliani. He carried out clinical trials as main investigator and as co-investigator for Abbott, UCB and Essex. He did expert reports and gave advisory services for Abbott, UCB and Essex. He attended conferences organized by Abbott, Centocor, Essex and Giuliani as audience member.

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