Les Maladies Inflammatoires Chroniques Intestinales (MICI) des carnivores domestiques sont des affections intestinales chroniques se caractérisant par une infiltration de la lamina propria de l’intestin grêle et/ou du côlon par différentes populations de cellules inflammatoires. Elles sont responsables de la majorité des troubles digestifs des carnivores domestiques. Les observations histopathologiques, la réponse à une thérapeutique immunodépressive suggèrent l’intervention d’un mécanisme dysimmunitaire. Leur diagnostic repose sur l’exclusion des affections présentant un tableau clinique semblable et sur la confirmation histologique d’une inflammation de la muqueuse intestinale. L’utilisation d’un index clinique d’activité, les recommandations des comités de standardisation clinique et histopathologique des maladies digestives (WSAVA) devraient permettre au clinicien une meilleure gestion de la maladie au quotidien.

Mots clés : chien, chat, intestin, inflammation.
INTRODUCTION

Chronic inflammatory bowel diseases (CIBD) in domesticated carnivores compose a fairly heterogeneous group of chronic and idiopathic bowel diseases characterised by a probably immunemediated inflammation of the mucosa (Jergens et al. 1992a et b; Hart et al. 1994; Lecoindre & Chevalier, 1997; Lecoindre et al. 1998; Strombeck & Guilford, 1996a, 1996b; Craven et al. 2004). The diagnosis of these diseases is exclusively histological and based on the identification of an infiltrate of inflammatory cells of the intestinal mucosa’s lamina propria (small bowel and/or colon) (Roth et al. 1990a, 1990b; Van Der Gaaq & Happe, 1990b; Willard et al. 2002). The most common forms of IBD in dogs and cats are lymphoplasmacytic, eosinophilic and granulomatous enterocolitis (Jergens et al. 1992a et b, Craven et al. 2004). The most common clinical signs associated with these intestinal diseases are not very specific. They are predominantly chronic diarrhoea, vomiting, weight loss and anorexia (Jergens et al. 2003). They are the main cause of chronic digestive disorders in domesticated carnivores. These intestinal diseases affect middle-aged animals, but young cats and dogs may also develop IBD (Lecoindre & Chevalier, 1997).

It is important to specify that the term CIBD in human medicine stands for cryptogenic inflammatory bowel disease, such as ulcerative colitis and regional enteritis or Crohn’s disease (Harvey & Bradshaw, 1980). While some inflammatory bowel diseases in domesticated carnivores present similarities with cryptogenic inflammatory diseases in humans, the terms CIBD and IBD in veterinary medicine stand for a more heterogeneous group of chronic and idiopathic diseases (Van Kruiningen 1972). A clinical and histopathological standardisation of IBD is ongoing and is expected to be presented in the next few months by a WSAVA committee for the standardisation of gastrointestinal diseases in domesticated carnivores made up of an international group of clinicians, gastroenterologists and anatomical pathologists (Jergens 2004).

ETIOPATHOGENESIS OF IBD IN DOMESTICATED CARNIVORES

Etiopathogenesis of IBD: immunologic base and predominant role of the intestinal microflora in the appearance and continuation of IBD

Very often, the causes of IBD are not identified and the term ‘chronic inflammatory bowel diseases’ designates a group of idiopathic diseases. The histopathological observations in animals, the response to immunodepressive therapy, suggest the intervention of an immune mechanism, as observed in humans (Strombeck & Guilford, 1996a,1996b). Recent studies employing animal bowel inflammation models show the major role played by genetic (predisposition of certain breeds) and environmental factors as well as the direct interrelation between these two factors and the immune system associated with the digestive mucosa of the GALT (Gut Associated Lymphoid Tissue) (Stonehewer et al. 1998; Garden et al. 1999; German et al. 2000a, 2000b; Jergens et al. 2001; German et al. 2001). Commensal microflora and its production are predominant among the environmental factors that play an essential role in the appearance and continuation of IBD and these animal bowel inflammation models show that the antigens of bacterial origin are the main actors in an abnormal immune response (Batt et al. 1983; Hart et al. 1990; Rutgers et al. 1995; Rath et al. 1999; Rath et al. 2001; Hendrickson et al. 2002). In German’s study (2000b) on a population of German Shepherd dogs with IBD and bacterial overgrowth an antibiotic treatment helped significantly reduce the transcription of some cytokines responsible for inflammation (TNF-alpha, TGF-B1, mRNA expression) without modifying the quantity of bacteria in the intestinal lumen. On the basis of these results it may be concluded that there is a direct interrelation between intestinal microflora and the dysregulation of the immune response.

According to recent theories, these inflammatory bowel diseases are the consequence of hypersensitivity reactions to antigens from the lumen (bacterial, parasitic, dietary antigens). It is claimed that these hypersensitivity phenomena are caused by the primary immunoregulation failure (suppressive function) of the GALT (Stonehewer et al. 1998; Garden et al. 1999; German et al. 2000a, 2000b; Jergens et al. 2001; German et al. 2001). But it is also possible that an increase in the intestinal permeability, primary (genetic?) or secondary to a lesion, could favour the dispersal of antigens through the lamina propria, leading to the overflow of the immunoregulator activity (Hall & Batt, 1990; Strombeck & Guilford, 1996a, 1996b). An obscure pathogen that has not yet been identified could cause an immune response and the appearance of inflammatory infiltrate of the lamina propria (Hart et al. 1990). In any event, the mucosal inflammation will result from the intervention of cell actors (appearance of cloned active B and T lymphocytes) and the chemical mediators of inflammation (leukotrienes, pro-inflammatory cytokines, Tumour Necrosis Factor TNF, Leukocyte proteases) (Garden et al. 1999; German et al., 2000a, 2000b; Jergens et al. 2001; German et al. 2001). Studies have shown for example the role of TCD4+ lymphocytes, TNF and interleukin (IL)-12 in the mediation of bowel inflammation and the response to antigen stimulation from the lumen (Hendrickson et al. 2002; Garden et al. 1999).

Some authors feel that there is an association with this incompetence of the GALT immune system, an autoimmune basis (Snook 1990)). In humans, the involvement of autoimmune mechanisms is highly probable in the event of ulcerative colitis. Sixty to 70% of patients suffering from this type of IBD present circulating antibodies targeted against the colon tissue, compared with 10% in the normal population (Strober & James, 1986; Snook 1990). It would also appear that these patients present a predisposition to other autoimmune diseases such as primary sclerosing cholangitis (Strober & James 1986). The intervention of autoimmune mechanisms is unknown in domesticated carnivores and their importance would require sup-
IBD and breed-related predispositions

The family predisposition to cryptogenic inflammatory bowel disease (regional enteritis and ulcerative colitis) in humans is well known. These types of IBD are said to present a polygenic hereditary that induces a genetic predisposition to these diseases.

In the feline species it would appear that there is no breed-related disposition to the occurrence of an IBD. Only colitis in histrionic species would appear to affect specifically Siamese cats, but this IBD is rare (Lecoindre & Chevallier, 1997).

In dogs this genetic influence is accepted especially in Boxers that develop a histiocytic ulcerative colitis (Gomez et al. 1977; Hall et al. 1994). The hereditary abnormalities of the mucosa of the large intestine would associate abnormal cell regeneration kinetics and an abnormality in the physicochemical barrier of the mucosa surface favouring the non-specific attack of the microorganisms of the commensal flora in the colon (Hall et al. 1994). The work of Gomez (1977) has also shown the possibility of a histocytic enzyme abnormality leading to lysosomal hydrolysis trouble and in inability to destroy bacteria and phagocyte cell elements. Lastly, the intervention of immune mechanisms in the pathogenesis of the Boxer's histiocytic ulcerative colitis similar to those described in human regional enteritis is now strongly suspected (Hall et al. 1994). However, the response to a quinolone antibiotic treatment also shows that this histiocytic colitis is probably induced by an as yet unidentified pathogen.

Gluten induced enteropathy in Setter dogs is hereditary and presents major similarities with Celiac disease in humans (Strombeck & Guilford, 1996c).

Forms of most probably genetic IBD have been described in other breeds. Immunoproliferative enteropathy in Basenji dogs is a hereditary IBD of the lymphocytic plasmacytic type characterised by a hypergammaglobulinemia associated with an increase in blood IgA (Breischwerdt et al. 1980). This IBD presents analogies with immunoproliferative enteritis in humans. It is probably hereditary and may be autosomal recessive. Lundehunds and the Soft-Coated Weaten Terriers suffer from IBD and serious protein-losing enteropathies in which a hereditary aspect is also strongly suspected (Flesja & Yri, 1977; Littman & Giger, 1990).

Lastly, it is important to mention the high incidence of blood and mucosal IgA immunodeficiency in German Shepherd and Shar Pei dogs, which may explain the clear predisposition of these breeds to the development of IBD (Batt et al. 1983; German et al. 2000a).

Table 1: Differential diagnosis of IBD in domesticated carnivores.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Dog</th>
<th>Cat</th>
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<tr>
<td>Intolerance, food allergy</td>
<td></td>
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<tr>
<td>Irritable intestine syndrome</td>
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<tr>
<td>Celiac disease</td>
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<tr>
<td>Bacterial overgrowth syndrome</td>
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<tr>
<td>Lymphangectasia</td>
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<tr>
<td>Intestinal parasitism</td>
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<tr>
<td>Liver or metabolic disorders</td>
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<td>Infectious intestinal or systemic diseases</td>
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<td>Systemic disorders</td>
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<td>Intestinal tumours</td>
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<tr>
<td>Neuromuscular disorders</td>
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</table>

IBD DIAGNOSIS

There are generally three criteria for a IBD diagnosis in domesticated carnivores (Strombeck & Guilford, 1996c; Lecoindre, 2003; Jergens, 2004):

- presence of digestive symptoms (vomiting, diarrhoea) or unexplained weight loss for at least three weeks or an incomplete response to a diet change and symptomatic treatments;
- identification by an histological test of a diffuse or located infiltrate of inflammatory cells in the lamina propria confirming the diagnosis of inflammatory bowel disease;
- demonstration of the idiopathic nature of the disorder by excluding other causes of bowel inflammation and clinical response to immunomodulator therapy.

This diagnosis often excludes other disorders that may be responsible for an inflammatory bowel reaction or that imitate the clinical signs of IBD (table 1) (Leib 1966; Van Der Gaag et al. 1980c; Rutgers et al. 1995; Regnier et al. 1996; Lecoindre 2003).

The histological lesions observed (infiltrate of inflammatory cells) are not actually pathognomonic of an IBD and may be signs of a non-specific inflammatory response appearing in some digestive (food intolerance or allergy, infectious, parasitic or even neoplastic bowel diseases) or extradigestive disorders (organ deficiency, hypothyroidism, infectious diseases, FIV, FeLV) (Davenport et al. 1987; Lenspach 2005). Lastly, the digestive disorders presenting a clinical table similar to that observed in IBD (chronic bowel bacterial overgrowth or antibiotic-sensitive diarrhoea, enteropathies caused by food, functional bowel complaints, digestive lymphoma) and a rigorous diagnostic approach can only confirm the idiopathic and inflammatory nature of the disorder.

History

In dogs, a description of the animal may assist the diagnosis. As mentioned above, some breeds are predisposed to the development of IBD, such as Lymphoplasmonic Enteritis (LPE) in German Shepherd and Shar Pei dogs (German et al. 2000a), LPE and protein-losing or immunoproliferative enteropathy in such breeds as the Ludenhund and the Basenji (Flesja & Yri, 1977; Littman & Giger, 1990) and ulcerative colitis in Boxer dogs (Hall et al. 1994).

- Intolerance, food allergy
- Irritable intestine syndrome
- Celiac disease
- Bacterial overgrowth syndrome
- Lymphangectasia
- Intestinal parasitism
- Liver or metabolic disorders
- Infectious intestinal or systemic diseases
- Systemic disorders
- Intestinal tumours
- Neuromuscular disorders
COMMUNICATION

Anamnèse

Chronic vomiting, unexplained weight loss, chronic or recurrent diarrhoea and malassimilation are signs of IBD, especially when symptomatic treatments have given only transitory results.

Clinical diagnosis

Chronic inflammatory bowel diseases are common in dogs and cats, and they are responsible for more than 50% of the digestive symptoms observed in these species (Jergens et al. 1992a; Hart et al. 1994; Lecoindre & Chevalier, 1997; Strombeck & Guilford, 1996c; Lecoindre et al. 1998). The clinical signs associated with an IBD are diarrhoea, vomiting, weight loss and changes in appetite ranging from bulimia to anorexia (Jergens 2004).

Diarrhoea is the most common symptom in dogs. The diarrhoea observed in dogs suffering from IBD in the small bowel exhibits the characteristics of a small bowel diarrhoea: profuse, liquid, normal or slightly higher frequency. IBD in the colon produces the traditional symptoms of colon syndrome (shredding of slimy non-faecal matter with or without blood, tenesmus, higher shedding frequency) (Lecoindre 1992). Haematochezia may be important, particularly in the event of Histoiocytic Ulcerative Colitis (HUC) in dogs (Hall et al. 1996c). The appearance of diarrhoea in cats is often the result of a series of chronic digestive problems much more often dominated by vomiting (Lecoindre, 1993; Lecoindre & Chevalier, 1997). These vomiting episodes alternate with phases of apparent recovery when the animal presents normal behaviour. In cats diarrhoea most often presents all the characteristics of bowel diarrhoea. However, as we showed in a recent study among 51 cats suffering from IBD (Lecoindre & Chevalier, 1997), there is a lack of specificity in the correlation between digestive symptoms and impaired digestive area, a large frequency of diffuse impairment throughout the digestive tract and the clear underestimation of colopathies. As a consequence, a cat presenting a diarrhoea with characteristics of small bowel diarrhoea may suffer from diffuse and sometimes serious colitis.

The vomit of animals with IBD is often watery and less commonly hollow. Haematemesis is rare, but may characterise the presence of ulcerations, especially in the duodenum (Jergens et al. 1992b).

These chronic inflammatory bowel diseases may develop over several weeks, or even several months or years in cats. In our series of 51 cats with IBD, the average development was around 6 months (Lecoindre & Chevalier, 1997).

There is a very clear correlation between the severity of IBD and the occurrence of weight loss (Jergens and al. 1992a; Lecoindre & Chevalier, 1997). This is probably due to the loss of mucosa integrity in the small bowel (sometimes major atrophy) leading to malassimilation. Lastly, some cats with IBD may exhibit no signs of gastrointestinal impairment but sometimes severe isolated weight loss (Jergens et al. 1992a).

A pettite changes are often observed in animals with IBD, ranging from bulimia to total anorexia during acute episodes. Some cats may present changes in behaviour (excitability, aggressiveness, unexplained anxiety, defecation in unusual places). In dogs, increase appetite is more commonly observed in relation to malassimilation accompanying chronic diarrhoea.

Some severe types of IBD may be complicated by protein-losing enteropathy and the protein loss can lead to oedemas in the lower areas and abdominal or thoracic effusion (Flesja & Yri, 1977; Littman and Giger, 1990; Lecoindre, 2003).

Lastly, in cats there is now a strong suspicion that IBD may develop simultaneously with cholangiohepatitis or pancreatitis, expressed clinically in some cases by the occurrence of jaundice, abdominal pain, aggravation of digestive signs and sudden weight loss (Jergens et al. 1992a; Lecoindre 1993; Lecoindre & Chevalier, 1997). A full clinical examination is important as it can provide information on the nature, seriousness and source of the IBD. A abdominal palpation very often reveals major rigidity of the bowel together with often very intense wall thickening, particularly in the feline species. This palpation will also help assess any hypertrophy of the mesenteric ganglions and hepatomegaly.

IBD activity index

The activity index of digestive diseases and particularly the activity index of regional enteritis, which is based on the evaluation of clinical and biological parameters, are very often used in human gastroenterology. They help evaluate the severity of the disease at time 0, then monitor its development during treatment and evaluate the efficacy of this treatment (Hayre & Bradshaw, 1980). Jergens was the first to propose an activity index based on the evaluation of different clinical parameters for gastroenterology in domesticated carnivores (Jergens & Schreiner, 2003; Jergens 2004). He demonstrated the reliability of this index by comparing it to the variation of C- reactive protein before and after treatment. The essential advantage of this index is that it provides the clinician with a means to evaluate the seriousness of the disorder and so establish a therapeutic strategy and then monitor the efficacy of the chosen treatment.

Laboratory examinations

• Haematological examination

The haematological abnormalities in an animal suffering from IBD are very often highly vague. A slight aregenerative normocytic normochromic anaemia may be observed during chronic inflammation of the digestive tract (Strombeck & Guilford, 1996c). A peripheral eosinophilia is observed in 50% of cases of eosinophilic gastro-enteritis and in 100% of cases of hypereosinophilic syndrome (Hayden & Van Kruiningen 1973; Regnier et al. 1996). Leucocytosis and lymphopenia are generally signs of stress and are not very significant in this disorder. Thrombocytopenia is also reported in several studies (Craven et al. 2004).
Hyperproteinaemia may be observed in some immunoproliferative enteropathies in dogs (Flejä & Yri, 1977) and fairly frequently in IBD of cats. It is important to establish the albumin/globulin ratio, as hypoalbuminaemia and a hyperglobulinaemia are often observed in these cases of hyperproteinaemia. H yperglobulinaemia is generally due to a polyclonal gammopathy caused by chronic inflammatory phenomena.

Hypocholesterolaemia and hypocalcaemia may be associated with hyperproteinaemia and characterise the existence of protein loss in the bowels observed in the case of IBD complicated by protein-losing enteropathy (Tams & Twedt, 1981).

An abnormal rise in hepatic parameters (ALAT, AST) may be observed in some cats suffering from IBD. This has been reported in several studies (Jergens et al., 1992a; Lecoindre & Chevalier, 1997) and was observed in four cats in our series. Three cases of suppurative cholangiohepatitis and one case of idiopathic hepatic lipoidis were diagnosed in several studies using a hepatic biopsy on these four cats (Lecoindre & Chevalier, 1997). The presence of cryptic abscesses in the colon and abscessed lesions of the same nature in the hepatic parenchyma were observed in several studies in a cat suffering from granulomatous colitis (Lecoindre & Chevalier, 1997). The pathogenesis of the bacteriaemia of the portal system could possibly be implicated in this case. In humans, the overall frequency of hepatic lesions (pericholangitis, chronic active hepatitis, lipoidis), particularly during ulcerative rectocolitis, varies between 40% and 80% of cases. In cats, while the concomitant development of a hepatic disorder and IBD has been described (Hart et al. 1994), it is very risky to conclude that any immunological phenomenon is responsible for such an association. For most authors, the lesions of suppurative or lymphocytic plasmacytic cholangiohepatitis are probably the consequence of an ascendant bacterial contamination through the hepatic ducts or a bacteriaemia of the portal system favoured by an increase in bowel permeability due to inflammatory bowel lesions. Furthermore, bowel disorders without histological hepatic lesions may be the cause of a moderate increase of ALAT and alkaline phosphatase concentrations (Leib et al. 1986; Jergens et al. 1992a).

Some work has described diffuse and serious enterocolitis lesions associated to an FIV infection (Strombeck & Guilford, 1996c). Many authors feel it is highly unlikely that this virus is responsible for the development of IBD in cats (Jergens et al. 1992a; Lecoindre & Chevalier, 1997).

A determination of the level of free T4 in blood is essential especially in ageing cats with suspected hyperthyroidism, leading in 50% of cases to chronic digestive problems (Strombeck & Guilford, 1996c). It is described that hyperthyroidism may favour the occurrence of lymphocytic plasmacytic enterocolitis (Strombeck & Guilford, 1996c).

**Functional biological tests**

The measurement of folate and vitamin B12 (cobalamin) concentrations in the blood represent a very interesting advancement in the study of malassimilation in the bowel, although it seems that the specificity and sensitivity of these tests are random when it comes to locating and identifying bowel disorder and that it is apparently arbitrary to give them a diagnostic value (Gorman et al. 2003a; Allen Spach, 2005).

Proximal and distal disorders of the small bowels are responsible for defective absorption of dietary folate and cobalamin respectively. They are therefore detectable by measuring the concentrations of these two vitamins in the blood, which will be reduced. In the opinion of the author, a reduced folate concentration is often associated with minor to moderate lesions in the proximal small bowel, although a simultaneous drop in folate and vitamin B12 blood concentrations is much more negative, as it is mostly associated with severe lesions in the small bowel (Lecoindre 2003).

Chronic bacterial overgrowth in the small bowels, which very often complicates or promotes the appearance of IBD, can result in an increase of the folate concentration in the blood (norm = 4ng/ml<folates<13ng/ml) and/or a reduction in the cobalamin concentration in the blood (norm = 200ng/l<B12<600ng/l) (Batt et al. 1983). This is explained by the capacity of many intestinal bacteria to synthesise folates, before absorbing them in the jejunum. Conversely, these same bacteria are able to trap cobalamin and so inhibit its absorption. Normal results do not rule out bacteria overgrowth however. There are various factors that can modify the blood concentration of these vitamins (lesions of the intestinal mucosa that may alter the absorption of folates, the nature and quantity of bacteria, etc.). These tests are considered to have average specificity and low sensitivity (Gorman et al. 2003a; Allen Spach, 2005).

**Other functional tests conducted at a specialised centre**

A number of functional tests that are not very practical at this time but that are offered by some specialised centres and universities represent reliable, non-invasive but sensitive and specific diagnosis methods. They are used in the exploration of bacterial overgrowth syndrome, IBD, protein-losing enteropathies and enteropathies caused by diet. A distinction is made between tests based on the analysis of expired gases (H2-breath test, carbon C13-breath test), on the blood concentration of non-conjugated biliary acids, on the concentration of alpha 1-antitrypsin in the stools and on the absorption and permeability by the intestinal mucosa of certain sugars.
An immediate examination of stools is sometimes worthwhile, as it is a means of observing inflammatory cells, the presence of any blood, parasites (toxocarosis, trichurosis) or cysts and protozoa trophozoites (coccidiosis, giardiosis). While it is traditionally accepted that giardiosis is responsible for the development of enteritis or enterocolitis (Strombeck & Guilford, 1996c), its diagnosis is often delicate whatever techniques are used (zinc sulphate spreading or floating, ELISA faecal test) and metronidazole treatment is often the best means of excluding such a disorder. Clinical toxoplasmosis may appear in immunodeicient cats with IBD (FelV, immunodepressants). The diagnosis of active toxoplasmosis can be made however by establishing the titre of IgG anti-toxoplasma gondii or establishing the presence of toxoplasma antigen (Strombeck & Guilford, 1996c). Other tests may be indicated or difficult, depending on the clinical and epidemiological context (Elisa cryptosporidium, toxin of Clostridium perfringens) (Marks & Kather, 2002).

Ultrasound (figure 1)

The appearance of the bowel wall varies depending on the nature, seriousness and extent of the inflammatory process. In IBD, there is an often symmetrical and diffuse wall thickening, generally with the conservation of the echostructure of the bowel wall (Baez et al. 1999; Lecoindre 2003). In some cases however localised segmented lesions are observed, accompanied by an alteration in the ultrasonic layers and it will be difficult to exclude neoplastic infiltration. Mesenteric adenopathy can be seen in some highly inflammatory or overinfected types of IBD. Wall thickening in the colon in the case of HUC in Boxer dogs is often considerable (>7mm) and is associated with abnormal rigidity of the organ (Lecoindre 2003). A n abdominal ultrasound showed the thickening of the wall through the small bowel, mesenteric adenitis, moderate effusion. Lymphocytic plasmacytict enteritis and duodenal ulcer in an 8-year-old Pointer dog presenting very profuse chronic diarrhea associated with severe weight loss, a fall in proteinemia (albumin 19g/l, N 27-38, globulins 24g/l, N 25-45), hypocholesteroleraemia (0.69g/l, N 1.10-3.20) and hypocalcaemia (59 mg/l, N 79-120) (case n°1).
ultrasound examination is a good means of observing any associated lesions (ascitis, peritonitis, digestive perforation, signs of cholestasis or cholangiohepatitis).

Endoscopy (figures 2, 4, 6, 8)

Endoscopy observations show lesions that are most often non-specific and it is striking that almost half of the cats and dogs suffering from IBD do not present any lesion. Erythema, mucosa friability, increased granularity, presence of erosions or ulcers, abnormal wall rigidity and disappearance of submucosal vascularisation in the colon are the most commonly observed abnormalities (Jergens et al. 1992 a,b; Hart et al. 1994; Baez et al. 1999; Lecoindre 2003). During HUC in Boxer dogs and in some cases of suppurative colitis, the endoscopic lesions are extremely severe, associated with many more or less extended ulcerations, covered with mucus or mucopus. Mucosa lumps are frequently observed that are generally qualified as pseudopolyps (Hall et al. 1994; Lecoindre 2003). The folds are highly hypertrophied and covered in a mucosa that is brownish in colour.

Our observations have shown a clear lack of a correlation between results from endoscopy and histology; so endoscopy must be considered in the context of these gastrointestinal disorders more as a means of conducting layered biopsies of the digestive tract than a full-fledged diagnostic technique (Loth et al. 1990; Roth et al. 1990a; Van Der Gag et al. 1990a, 1990b, 1990c; Lecoindre & Chevalier, 1997; Willard et al. 2002).

Histology (figures 3, 5, 7)

Histopathological lesions of IBD are characterised by a diffuse infiltration of the lamina propria by the inflammatory cells associated to a mucosal lesion (Strombeck & Guilford, 1996 a, 1996c).

Table 2: Causes of lymphocytic plasmacytic-type gastrointestinal inflammation.

- Bacterial infection (campylobacteriosis, helicobacteriosis)
- Small bowel bacterial overgrowth (SIBO)
- Parasites (giardiosis, toxoplasmosis)
- Enteropathy caused by diet (gluten hypersensitivity, food allergy)
- Neoplastic infiltration (lymphoma)
- Idiopathic diseases (IBD: LPE, LPC, LPEC)

Figure 5: Histology. The histology of the biopsies confirmed dilatation of the lymphatic vessels of the chorion and moderate inflammatory infiltrate. This lymphangiectasia is of indeterminate origin (from case n°2).

Figure 6: Endoscopy. Increased granularity and a slight erythema of the duodenal mucosa is observed. Severe lymphocytic plasmacytic enteritis in a 2-year-old Rottweiler dog presenting recurrent digestive signs with vomiting, diarrhoea, borborygmus and abdominal discomfort. Panhypoproteinaemia has also been identified (albumin 12 g/l, N 27-38, globulins 15 g/l, N 25-45) (case n°3).

Figure 7: Histology. The histology revealed a severe lymphocytic plasmacytic infiltrate with diffuse lesions of acute necrotic cryptitis and discrete lymphangiectasia (from case n°3).

Figure 8: Endoscopy. The mucosa is chafed or ulcerated. The ulcerations are deeper here, forming fissures in the mucosa. The main consequence of these ulcerations is the appearance of many pseudopolyps that cause the mucosa surface to jut out.

Ulcerative colopathy observed in a 18-month-old Boxer dog presenting very painful bloody diarrhoea since the age of 6 months (case n°4).
**Inflammatory infiltrate** is most often composed of lymphocytes and plasmocytes. Forms of enteritis, colitis and lymphocytic plasmacytic enterocolitis are the most common types of IBD in domesticated carnivores (table 2). In less common cases, the infiltrate is polymorphous, associated outside the plasmatic cells and the lymphocytes, a collection of different types of inflammatory cells (neutrophil or eosinophil granulocytes, histiocytes). The presence of neutrophils is not common in IBD lesions. It would be evidence of an inflammatory response to a microbe. Dominant neutrophil infiltration in the colon mucosa characterises chronic suppurative colitis (Leib et al. 1986; Van Der Gaaq et al. 1990a, 1990b; Loth et al. 1990; Roth et al. 1990a). A major monomorphous infiltration of lymphocytes always removes any doubts about the existence of a primary lymphoma and it is advisable during lymphocytic enteritis to renew the endoscopic biopsies or consider biopsies of the entire thickness of the intestine (Davenport et al. 1987). In some cases, immunohistochemistry is the only option to differentiate a lymphomatous infiltrate from a benign infiltrate evidencing an immunoproliferative syndrome. **Histiocytic infiltration** is the least common and characterises granulomatous IBD. These histiocytes can take on the colour of periodic acid Schiff (PA S+). This is the case with histiocytic infiltration of H UC in Boxer dogs (H all et al. 1994). In the event of granulomatous or regional enteritis (Van Der Gaaq et al. 1990a) the histiocytes are PAS and the presence of a polymorphous transmural infiltrate of lymphocytes, granulocytes and eosinophils is noted. Contrary to neutrophils, the presence of eosinophils is normal in the bowel mucosa of domesticated carnivores. The diagnosis of enteritis or eosinophilic colitis is based on the endoscopic observation of generally severe ulcerated inflammatory lesions and a predominance of eosinophilic leukocytes in an often polymorphous inflammatory infiltrate also composed of lymphocytes and plasmocytes. This infiltrate very often affects the thickness of the intestine and is responsible for a large wall thickness that can imitate a tumour process (Regnier et al. 1996).

Besides the presence of an inflammatory infiltrate of the lamina propria, various histological criteria are required to establish an unequivocal diagnosis of IBD: increase in the intraepithelial lymphocytes, alterations of the mucosa structure as villi fusion or atrophy, oedema, fibrosis, lymphatic dilatation or crypt cell hyperplasia (H art et al. 1994; G erman et al. 2001; J ergens 2003). Bowel villi lesions are more common in cats than in dogs and it is not uncommon to observe complete atrophy. These histological criteria, which are well described by various authors, also permit the grading of IBD as weak, moderate or severe, which is fundamental for the clinician who has to make a prognosis and develop a therapeutic strategy (table 3) (Roth et al. 1990b). Weak and moderate grades of IBD are the most common. A ging animals generally suffer more severe impairment.

In some cases there is a discordance between the clinical signs observed and the results of the histology, which does not confirm the supposed seriousness of the disease (J ergens 2004). These discrepancies are probably due to the incorrect localisation of the disease, a segmentary impairment that endoscopy cannot access, superficial biopsies and probably limits to conventional histology, which is unable to precisely assess the changes to the absorptive villous surface or severe impairments to the enterocytic brush border where the membrane digestion of nutrients takes place (Lecoindre et al. 1998).

In cats, the lack of digestive symptoms with respect to impaired digestive area, the frequency of diffuse intestinal impairments, the clear underestimation of feline organ colopathies and the varying seriousness of histological lesions between different anatomical sites on the same animal mean that it is wise and even essential to conduct biopsies on all layers of the digestive tract of the suspected IBD sufferer, thus mapping the histopathology of the entire digestive tract (Lecoindre & C hevalier, 1996, 1997; H art et al. 1994).

### Table 3: Histological evaluation of IBD in cats (Lecoindre & Chevalier, 1997).

<table>
<thead>
<tr>
<th>Histological lesion</th>
<th>weak</th>
<th>moderate</th>
<th>severe</th>
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<tbody>
<tr>
<td>cellular infiltrate</td>
<td>low to locally moderate</td>
<td>moderately diffuse to locally severe</td>
<td>severely diffuse</td>
</tr>
<tr>
<td>Intraepithelial lymphocytes rate</td>
<td>low</td>
<td>moderate</td>
<td>severe</td>
</tr>
<tr>
<td>villi atrophy</td>
<td>absent</td>
<td>subatrophy, villi fusion</td>
<td>atrophy and severe villi fusion, lymphatic dilatation</td>
</tr>
<tr>
<td>fibrosis, oedema</td>
<td>moderate oedema</td>
<td>fibrosis and oedema</td>
<td>severe fibrosis</td>
</tr>
</tbody>
</table>

### CONCLUSION

Despite many studies, IBD in domesticated carnivores represents a heterogeneous group of gastrointestinal disorders the etiopathology of which is unknown, although a dysimmunity process is in all probability the origin of the inflammation of the bowel mucosa. They are the main cause of chronic or recurrent digestive problems in these species. A clinical and histopathological standardisation of these pathologies should provide recommendations that can be easily adopted by clinicians and pathologists.
BIBLIOGRAPHY


