GI pathology in immunosuppressed patients

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Which "immunosuppressed patients" ?

- HIV/AIDS patients
- Therapeutic immunosuppression
  - Oncology treatment
  - Transplantation:
    - Solid organ
    - Bone marrow
- [Not primary immunodeficiencies]

1. Antibody deficiencies
X -linked Agammaglobulinemia(XLA)
Common variable immunodeficiency(CVID)
Hyper IgM syndrome
Transient hypogammaglobulinemia of infancy(selected cases)
IgG subclass deficiency± Selected IgA deficiency (selected cases)
Impaired specific sntibody production with normal plasma immunoglobulin evel
2. Combined immunodeficiencies
All type of severe combined immunodeficiencies(SCID)
3. Other well-defined immunodeficiency syndromes
Wiskott –Aldrich syndrome
DNA repair defects; Ataxia-telangiectasia, Nijmegen breakage syndrome
Di George Anomaly
Primary CD4 deficiency
ICF syndrome
4. Diseases of immune dysregulation
X-linked lymphoproliferative syndrome (XLP)

Talk plan

- Diseases common to several immunosuppressed groups
  - Infection
  - Neoplasia
  - Drugs
- Diseases specific to certain immunosuppressed groups

Infection

- Bacteria
  - Infectious colitides

Colorectal disease in liver allograft recipients – a clinicopathological study with follow-up

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Objective To determine the spectrum and outcome of colorectal diseases occurring in adult liver allograft recipients.

Design A retrospective cohort analysis of clinical, microbiological and histopathological data regarding colorectal disease.

Patients Forty three out of 302 adult primary liver allograft recipients were transplanted and followed up (at median 42 months) at a tertiary referral centre/teaching hospital.

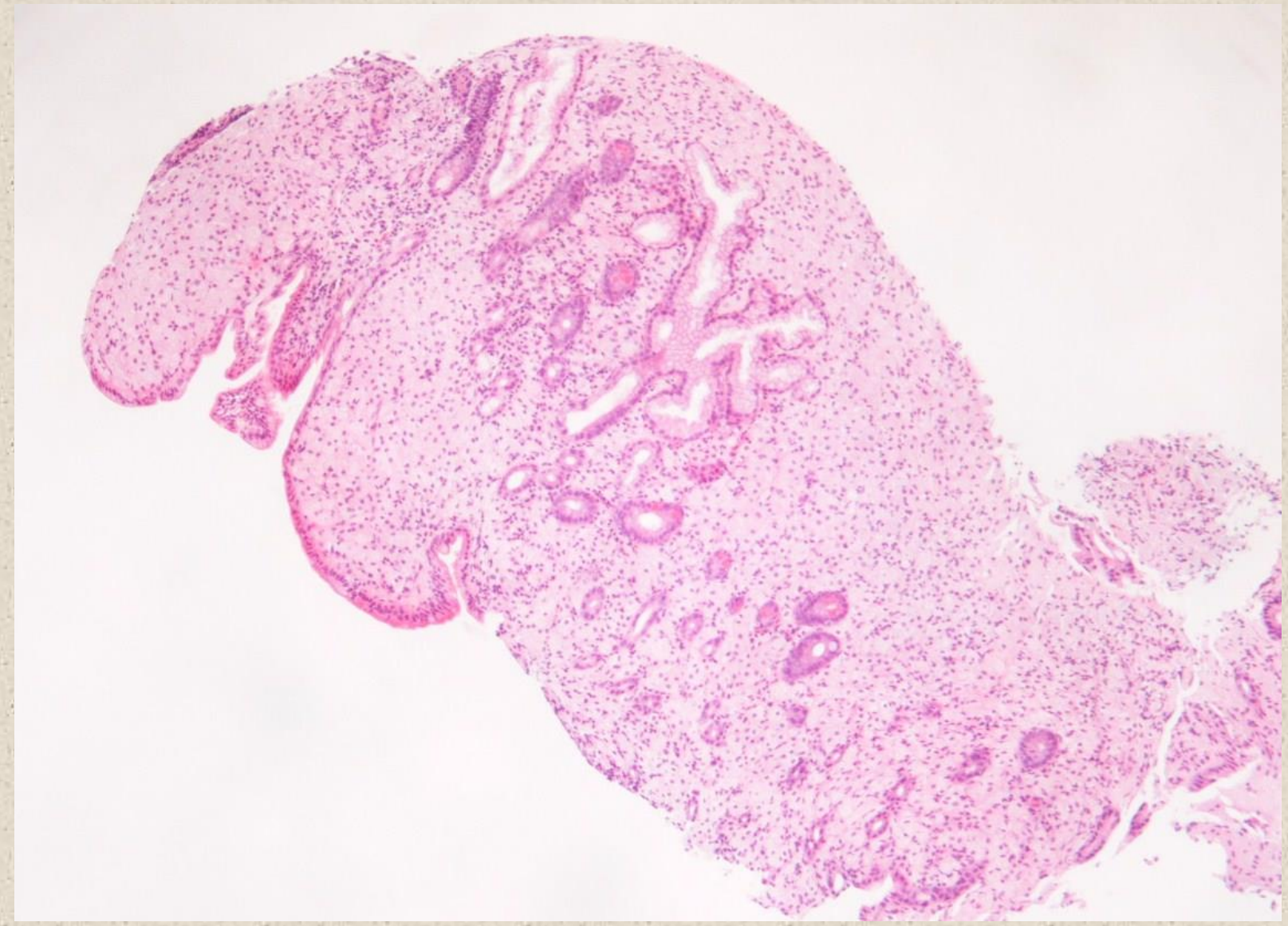
Results Out of 302 patients, 43 (14%) were investigated (by endoscopy and/or laparotomy) for symptoms of colorectal disease after orthotopic liver transplantation. The symptoms were: diarrhoea ($n = 31$); per-rectal bleeding ($n = 5$); and symptoms relating to pre-transplant activity of pre-transplant ulcerative colitis was unchanged or increased after orthotopic liver transplantation. Two further patients developed new-onset ulcerative colitis after orthotopic liver transplantation.

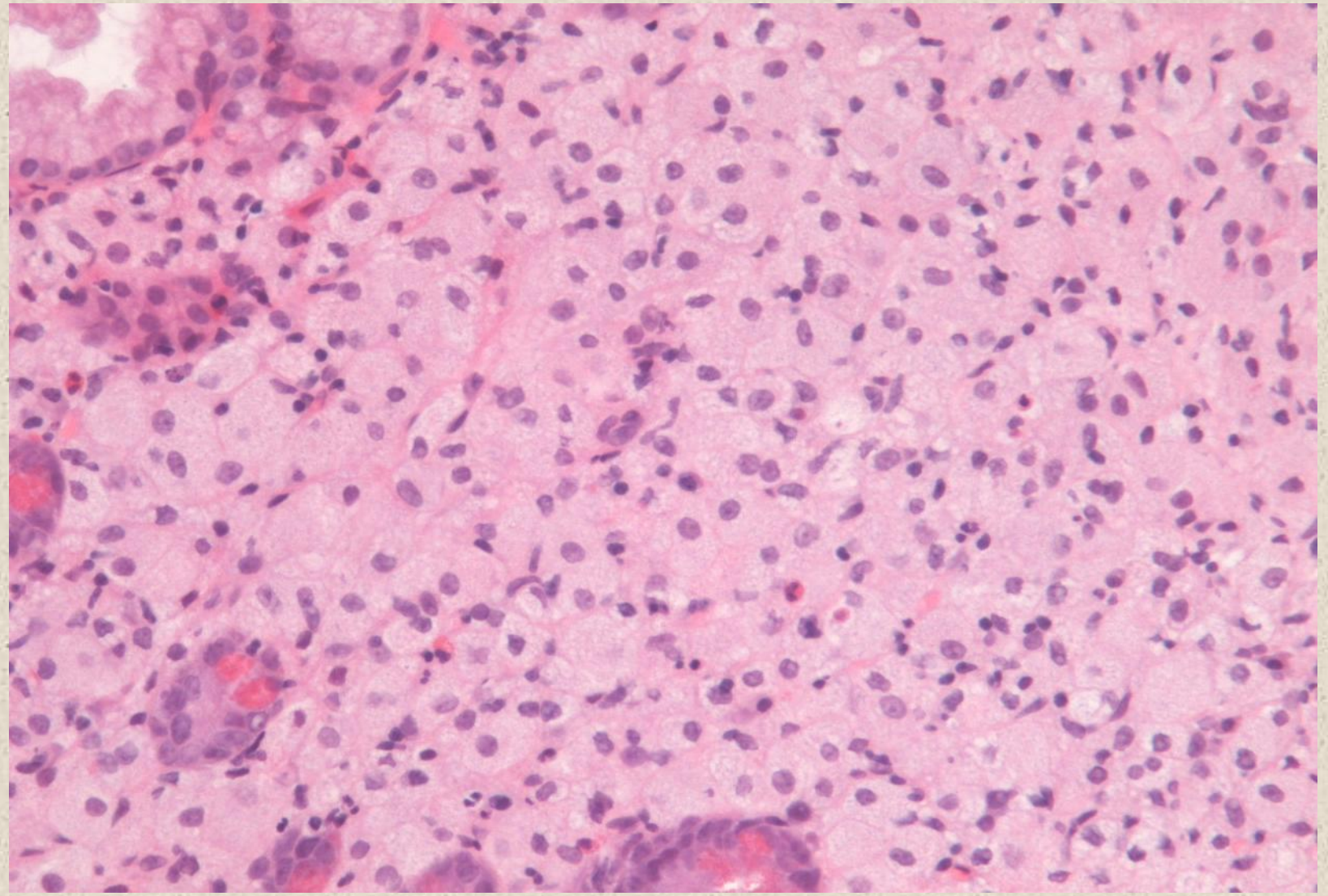
Conclusions Ulcerative colitis, *C. difficile*, cytomegalovirus infection and medications are the commonest colorectal causes of morbidity after orthotopic liver transplantation. Adult liver allograft recipients are, however, unlikely to show certain large bowel diseases encountered in other immunosuppressed groups. Amongst non-ulcerative colitis patients, those presenting with diarrhoea show a good outcome with appropriate management, whereas those with per-rectal bleeding have a more guarded prognosis. *Eur J Gastroenterol Hepatol* 14:231–236

Table 2 Causes of diarrhoea amongst 31 liver allograft recipients without pre-transplant ulcerative colitis

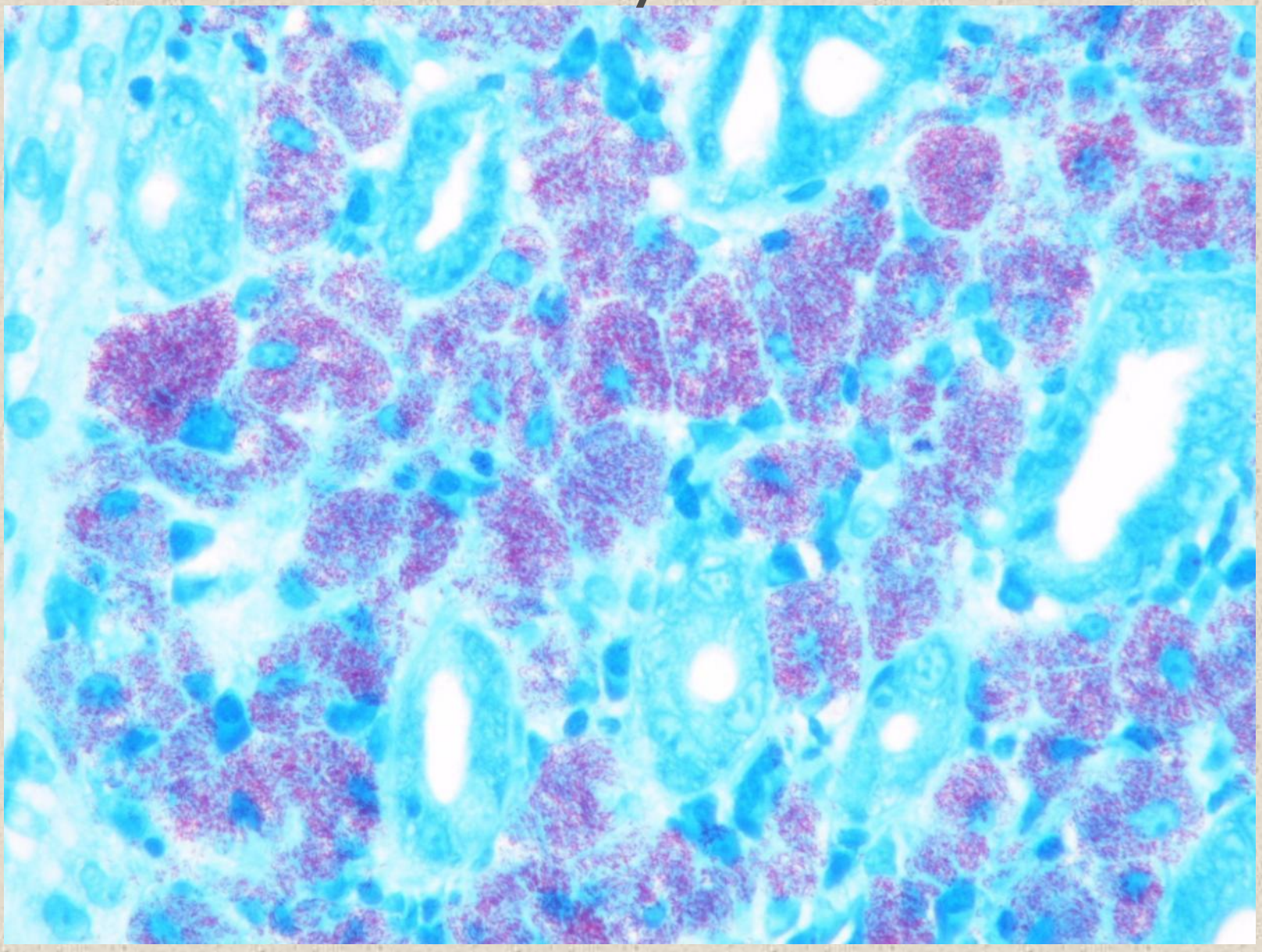
Cause of diarrhoea	Number of patients (%); total $n = 31$	Median (range) onset after orthotopic liver transplantation, in months
Clostridium difficile	10 (32%)	1 (1–11)
Medication*	6 (20%)	6 (< 1–38)
Cytomegalovirus	3 (10%)	1 (1–6)
Colorectal adenocarcinoma	1 (3%)	25
Pancreatic insufficiency	1 (3%)	9
De novo ulcerative colitis	2 (6%)	9.5 (5–14)
Uncertain diagnoses	8 (26%)	2.5 (1–11)

* Four antibiotics, one iron replacement therapy, one mycophenolate mofetil.

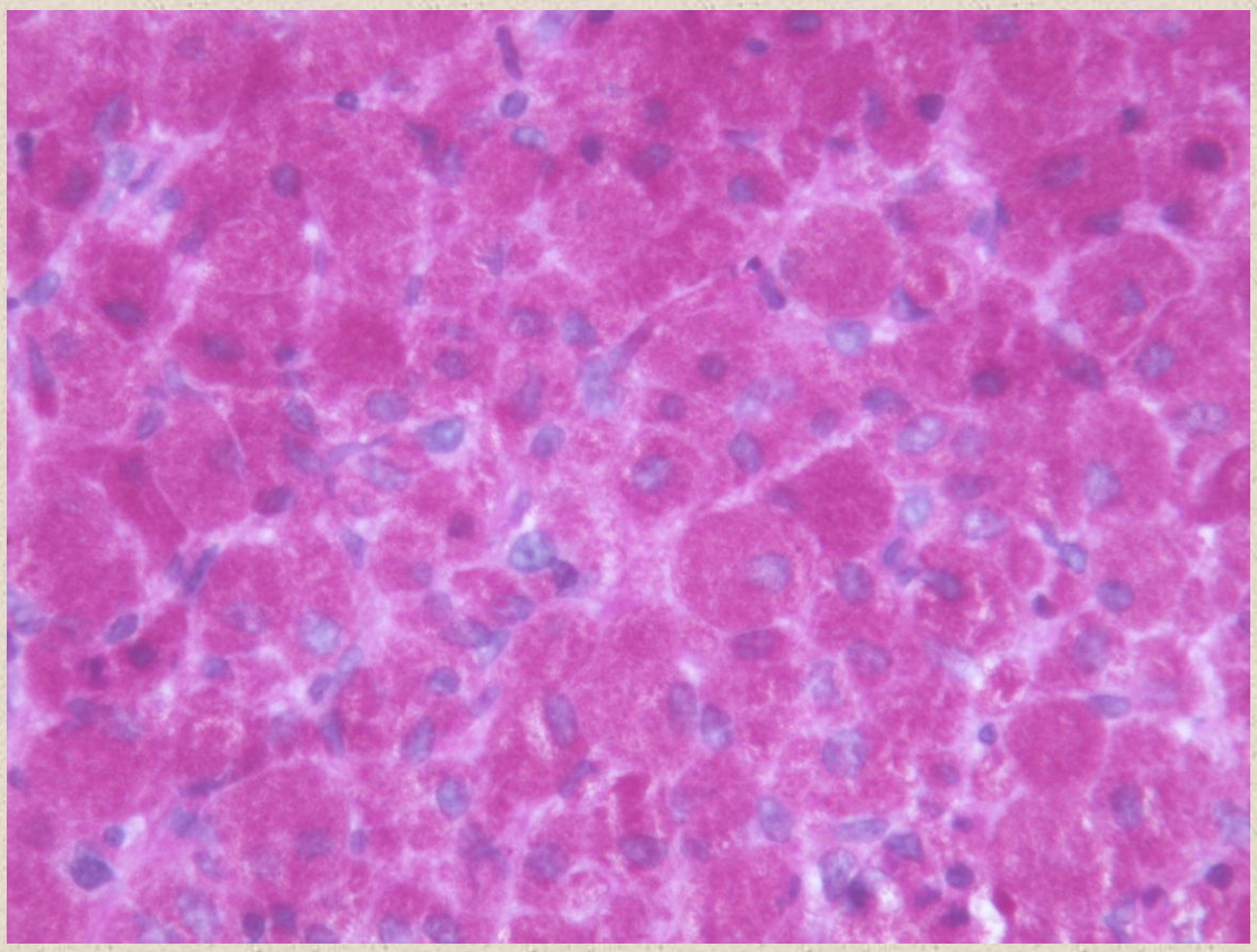




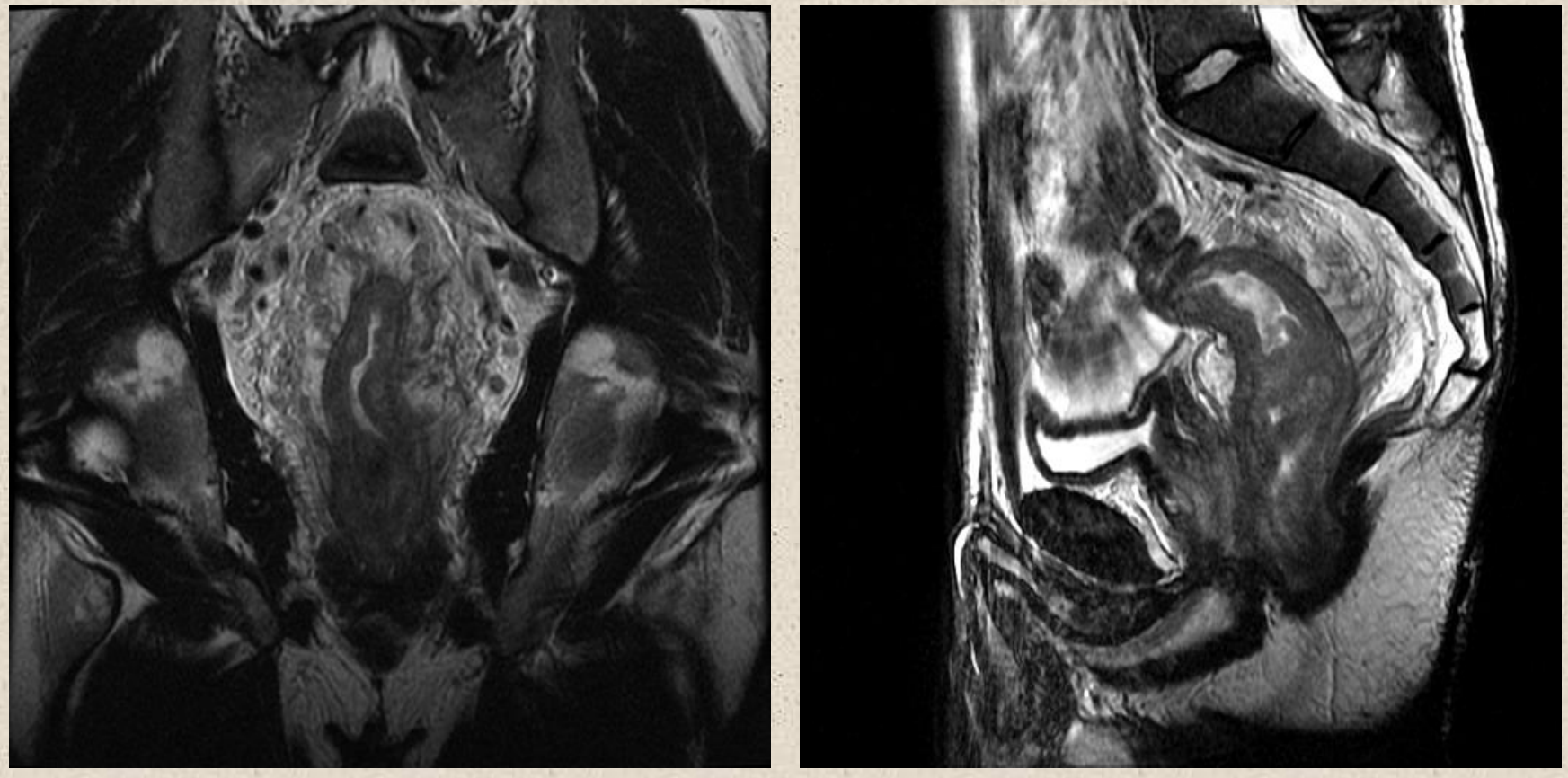
ZN+, thus: Mycobacteria



PAS +ve

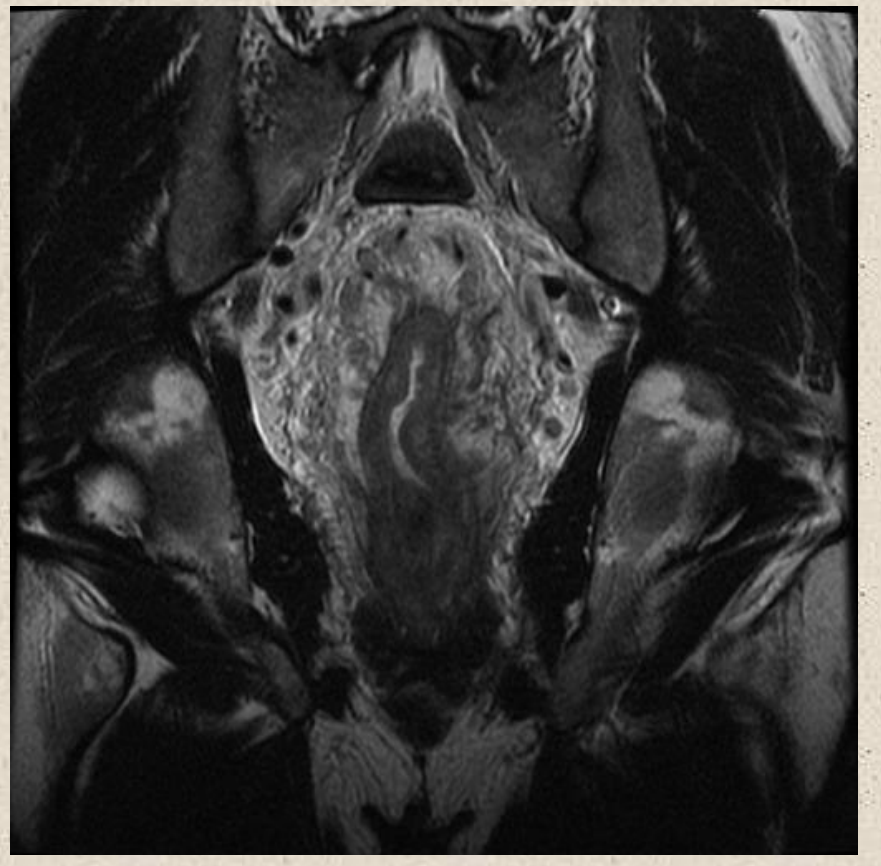


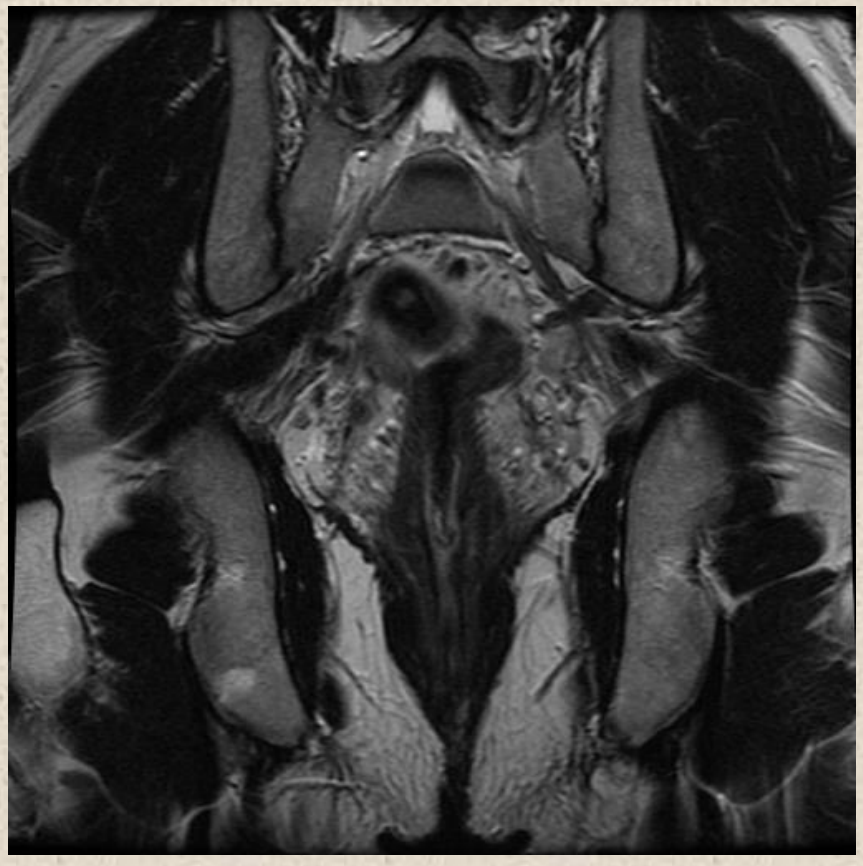
2. 23M. MSM. 10 cms long stricture in rectum and anus, clinically & radiologically malignant. The surgeon was sharpening his scalpel in the MDTM helped by the usual confidently expressed diagnosis by the radiologist. A total of 20 separate biopsies, in two settings, showed fibrinopurulent exudate, granulation tissue and inflamed fibromuscular connective tissue with no mucosa, no granulomas and no tumour.

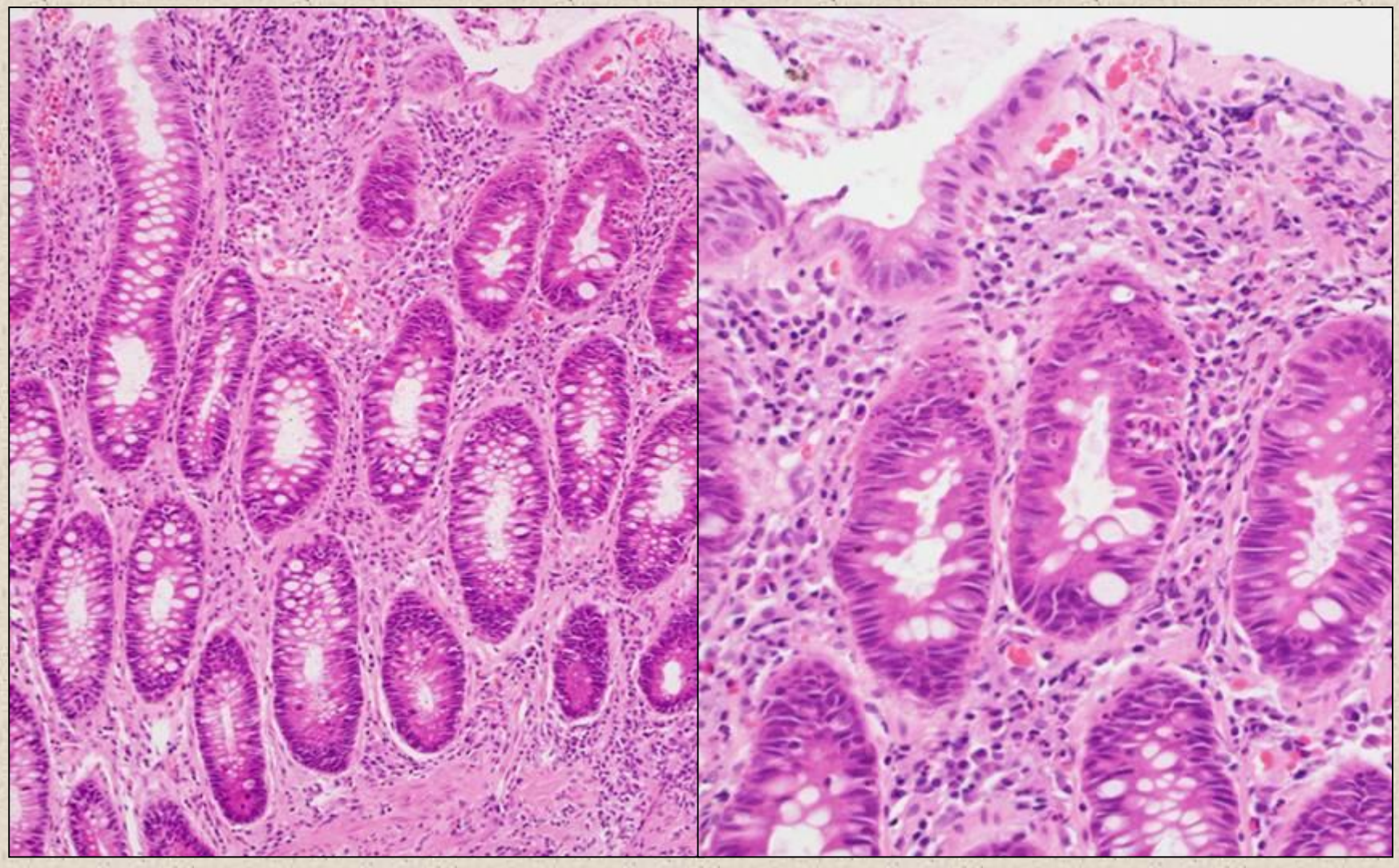


Coronal and sagittal MRI images of the pelvis

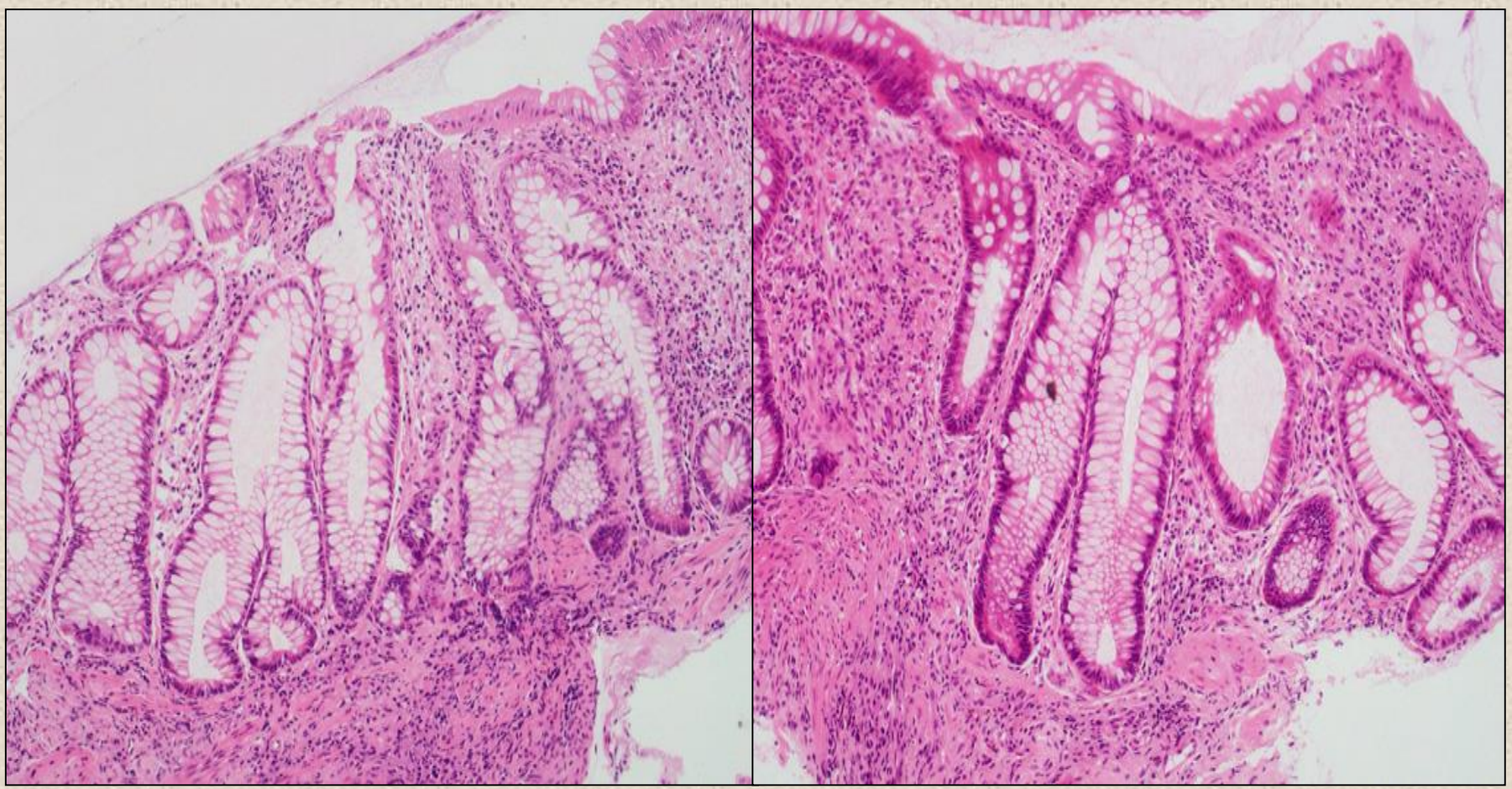
2. This is before and after treatment, with eight weeks separating them. Note the massively thickened rectum before treatment (left) and the normal calibre rectum after treatment (right). What's the diagnosis and what was the treatment?







32 year old male presented bloody diarrhoea
? IBD



Same patient 8 weeks later

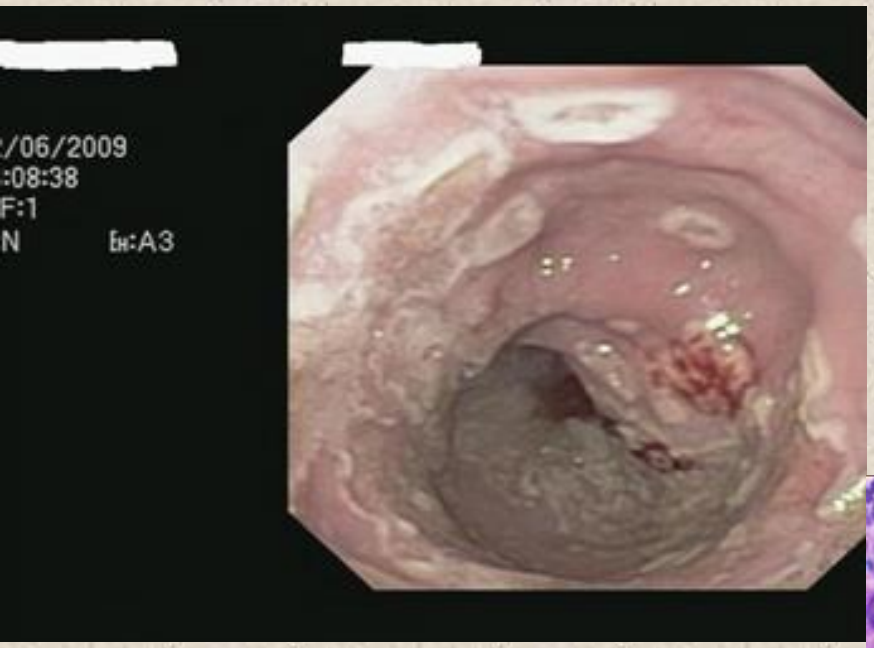
Table 2 | Summary of histological features of rectal biopsies and diagnostic timeline from 12 HIV positive men subsequently diagnosed with LGV proctitis

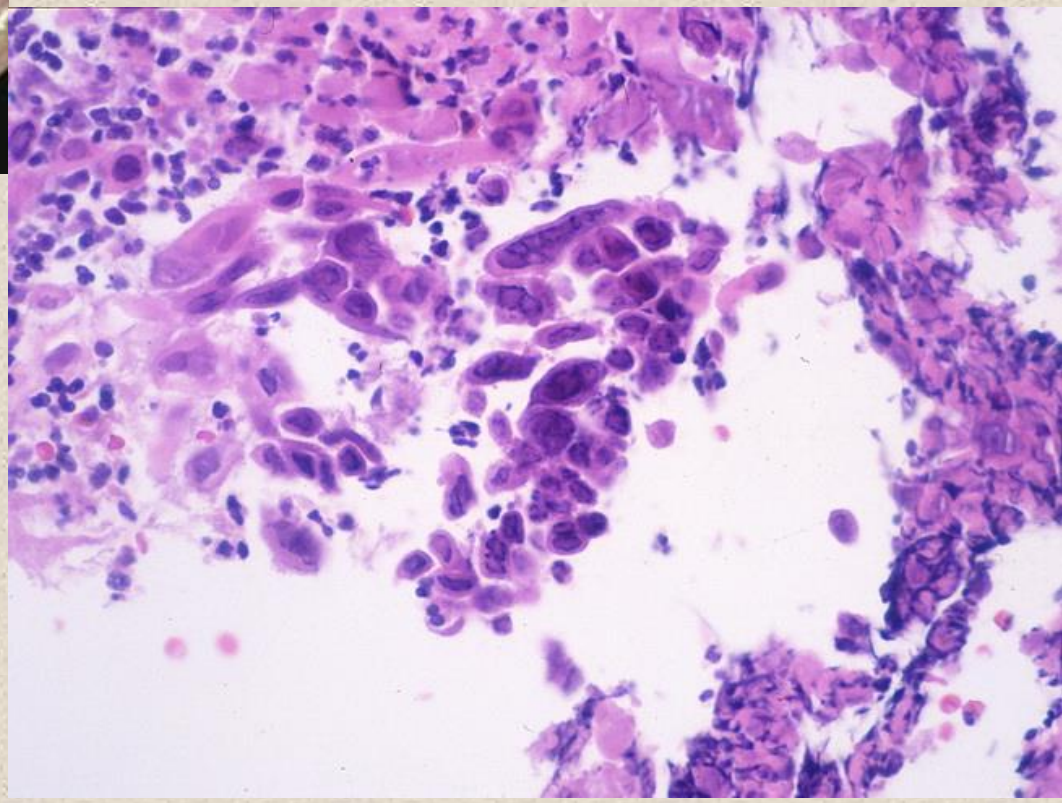
Histological features									Diagnosis		
Case no.	Time between biopsy & LGV diagnosis (months)	Mucosal ulcers	Cryptitis	Crypt abscess	Crypt distortion	Granuloma	Plasma cell infiltrate	Giant cells present	Initial histological diagnoses/suggestions	Mode of initial LGV diagnosis	LGV DNA results from biopsy (date of biopsy)
1	23		■	■	■ mild			■	Uncertain aetiology Possible IBD	Rectal swab LGV Positive	LGV Positive (September 2004) Negative (December 2002 & June 2003)
2	22		■	■		■			?IBD ?infective	Rectal swab LGV Positive	LGV Positive (May 03)
3	23		■		■ mild				?Due to prolapse ?IBD	Rectal swab LGV Positive	Negative
4	12	■	■				■		Uncertain aetiology	Clinical & Serology WIF titre = 1:4000	Negative (September 2004) Inhibitory (December 2003)
5	12	■				■	■		?Infective ?Crohn's	Rectal swab LGV Positive	Positive
6	3	■		■		■			Exclude LGV	Clinical Rectal swab CT detected, not sent for LGV testing	LGV Positive
7	9		■	■	■ minimal			■	Favours infective aetiology	Rectal swab LGV Positive	Negative (September 2004 and January 2005)
8	2	■	■	■	■ mild				?IBD. Exclude CT/LGV	Clinical & Serology CFT titre = 1:512 WIF titre = 1:4000	LGV Positive (March 2005) Negative (June 2005)
9	4	■	■	■		■	■		?Crohn's	Clinical & Serology CFT titre = 1:1280	LGV Positive (November 2005) August 2005 not tested
10	0	■					■		Diagnosed Crohn's 1999, thought to be recurrence	Rectal swab LGV Positive	Negative (November 2005)
11	0	■	■		■ mild	■			?IBD. Exclude LGV Concurrent Anal SCC present	Rectal swab LGV Positive	Negative (November 2005) December 2005 not tested
12	6		■				■		?Early ulcerative colitis	Rectal swab LGV Positive	Negative

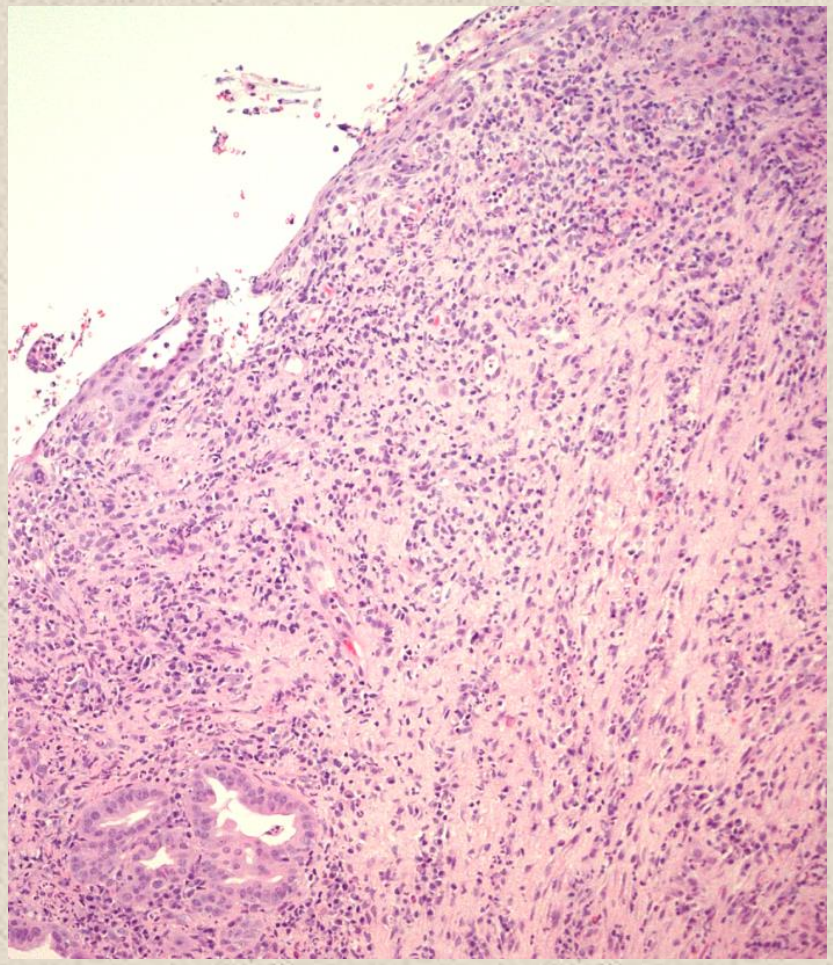
Soni S, Srirajaskanthan R, Lucas SB, Alexander S, Wong T, White JA. Lymphogranuloma venereum proctitis masquerading as inflammatory bowel disease in 12 homosexual men. Aliment Pharmacol Ther. 2010 Jul;32(1):59-65.

Viruses

Herpes simplex virus

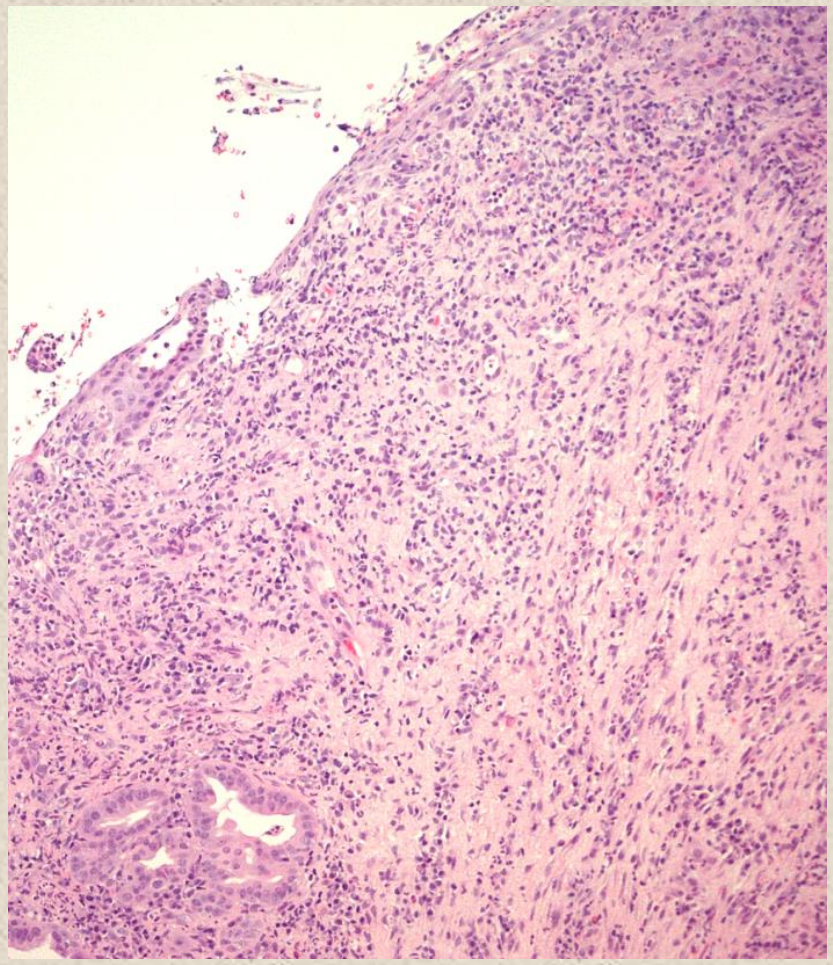


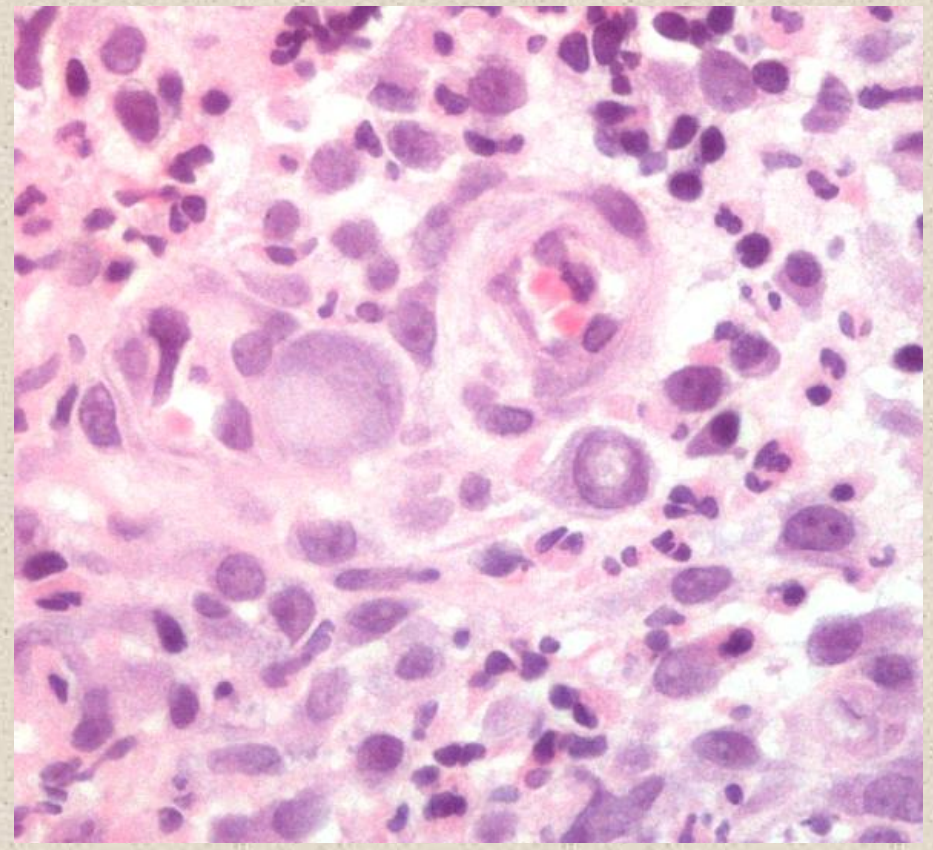


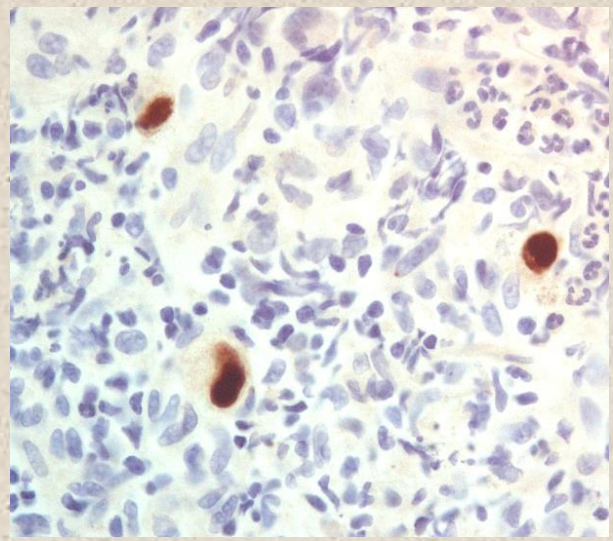


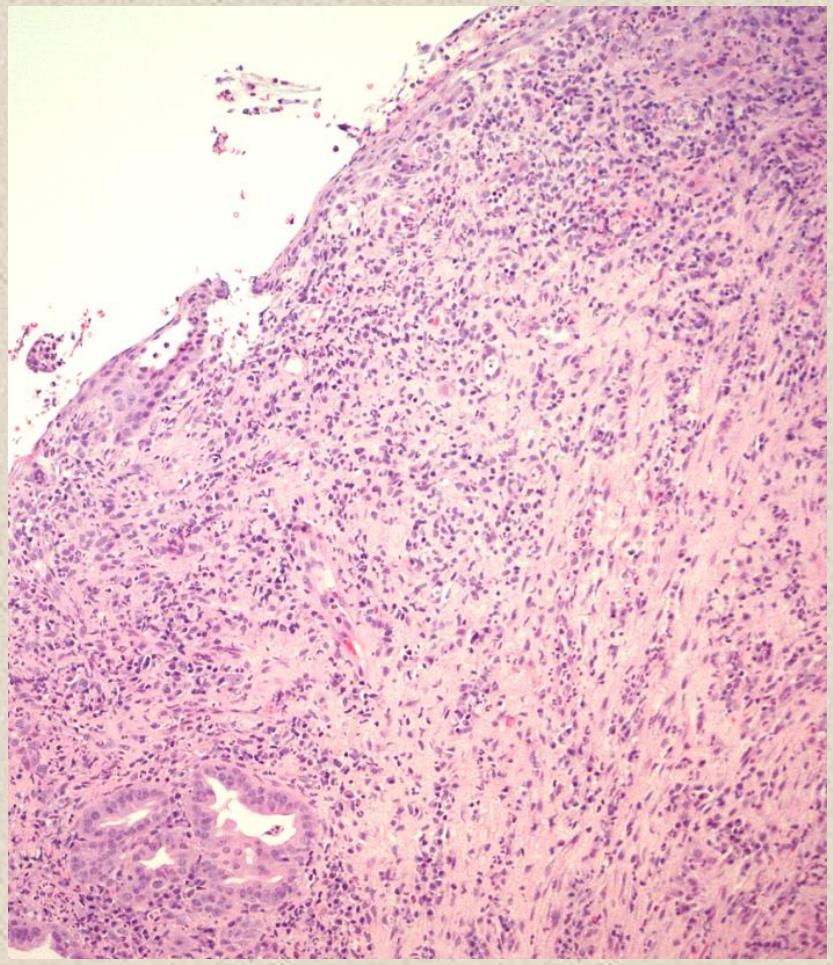
71 female with heartburn. Previous hx of resected CRC.

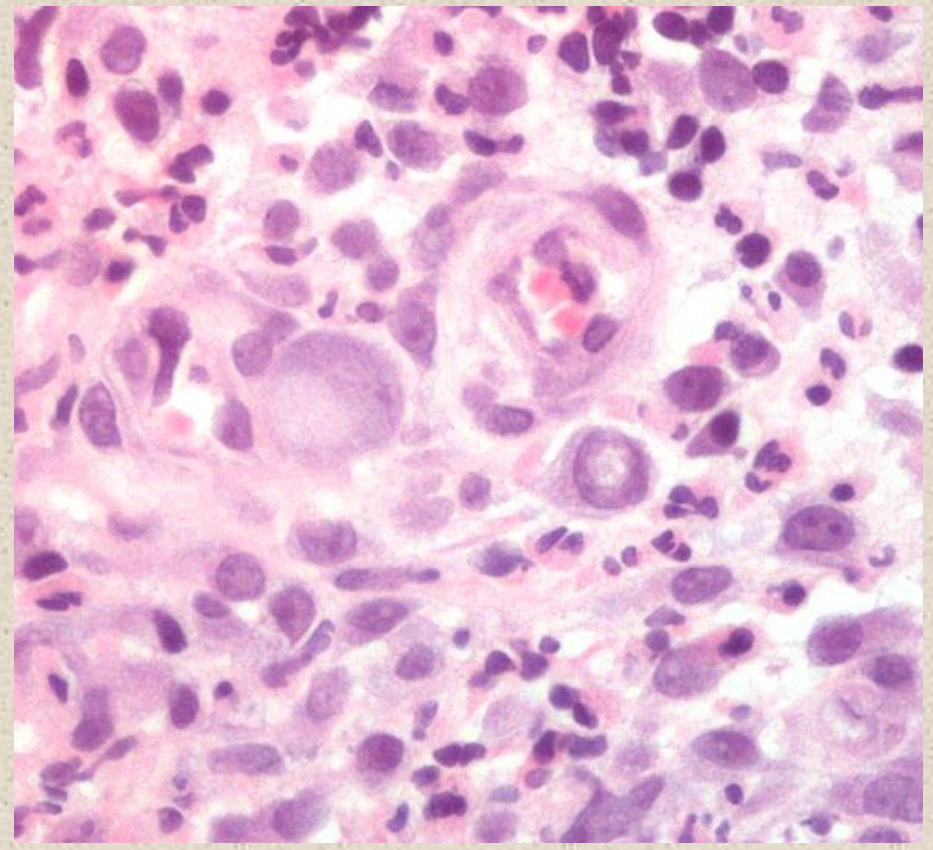
OGD: Severe oesophagitis

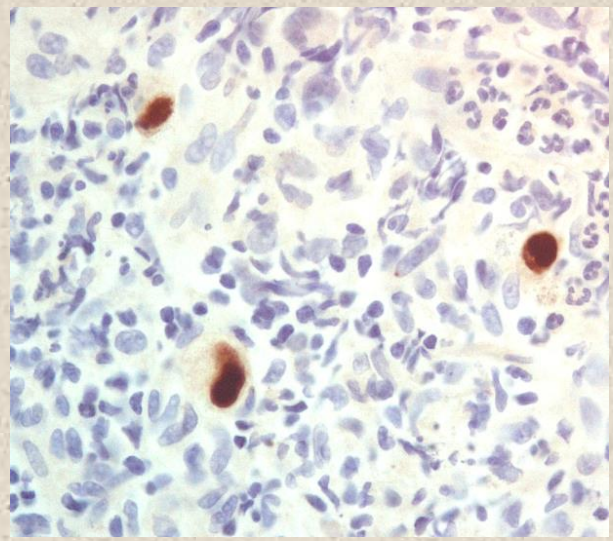










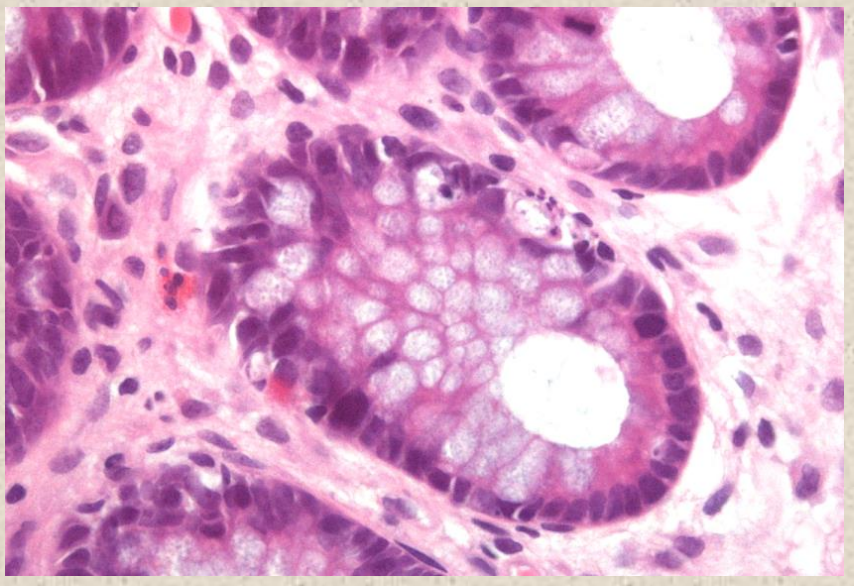


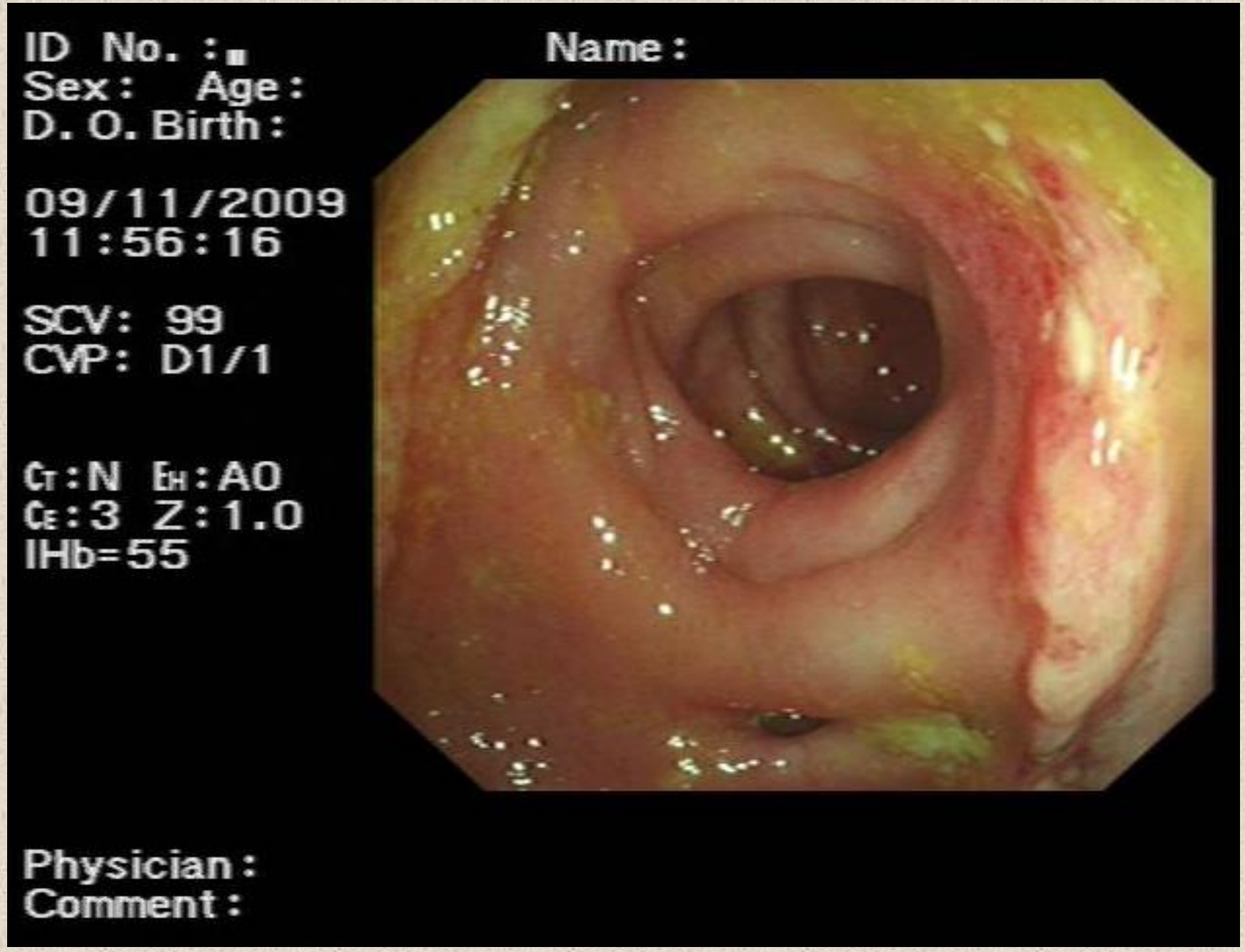
CMV oesophagitis

(Patient was receiving 5FU-based chemoRx)

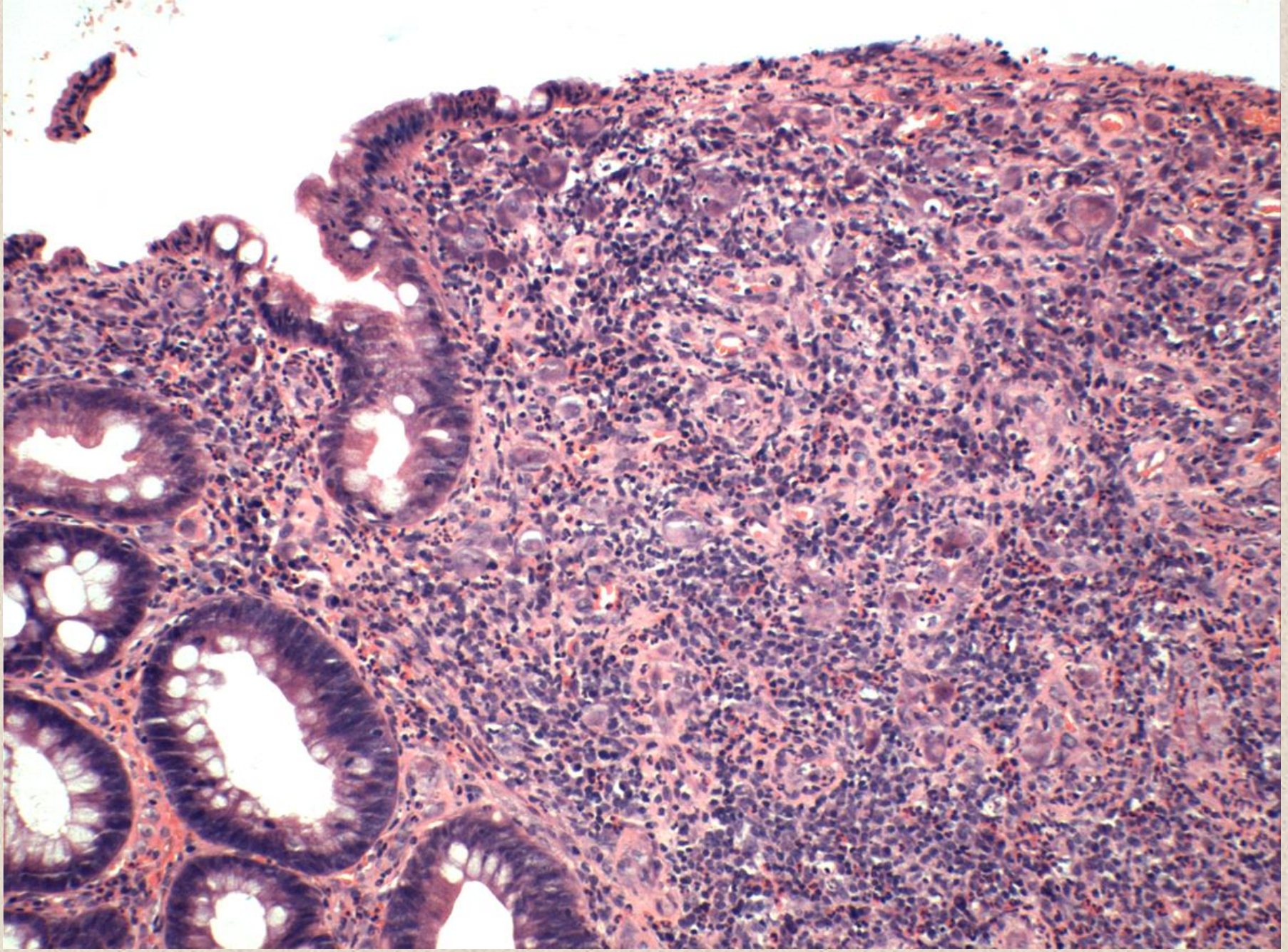
CMV

- HIV/AIDS, transplant and chemoRx patients:
  - Inflammation and viral inclusions
  - Crypt apoptosis alone

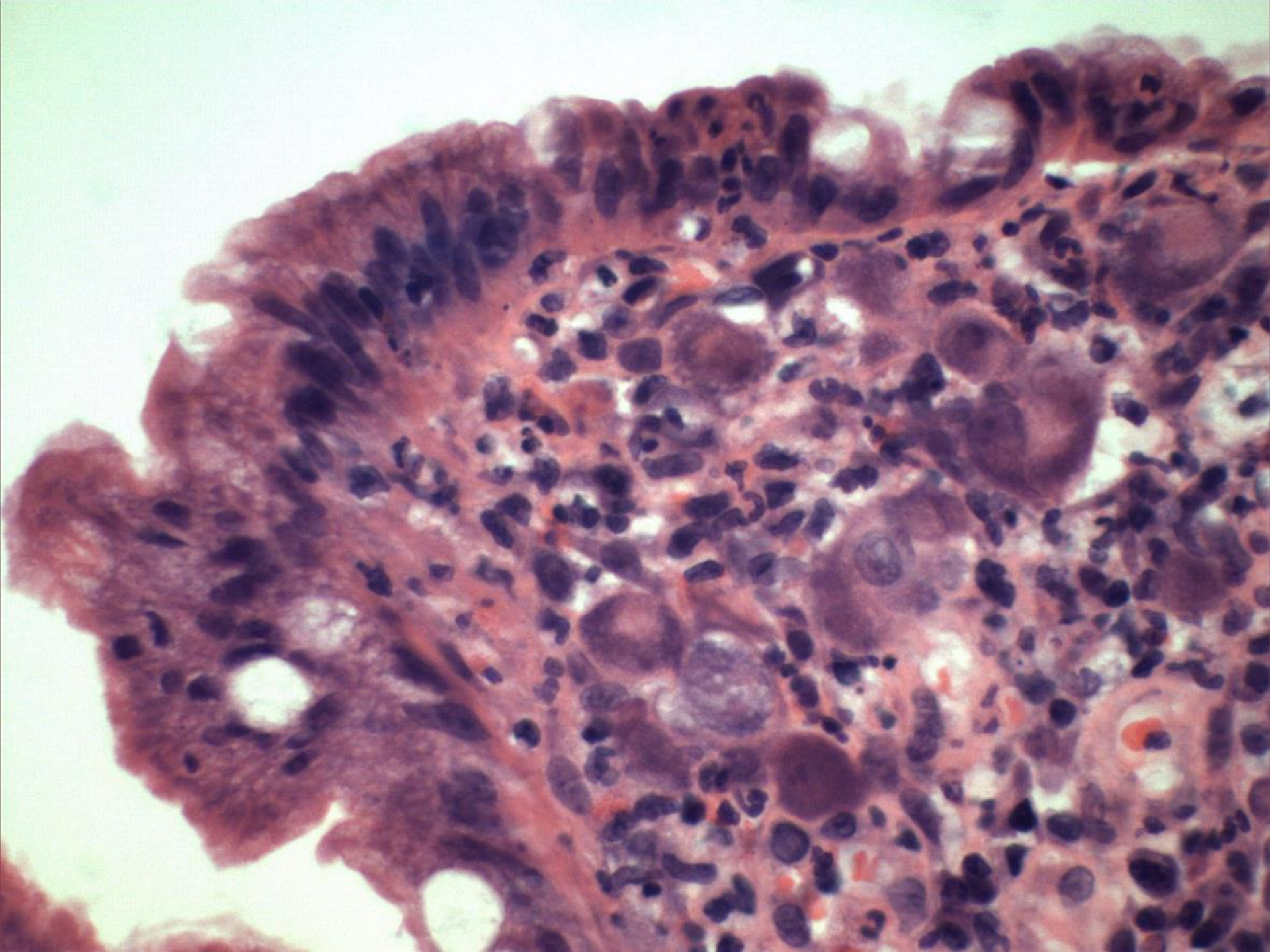




Sigmoid colonic tumour

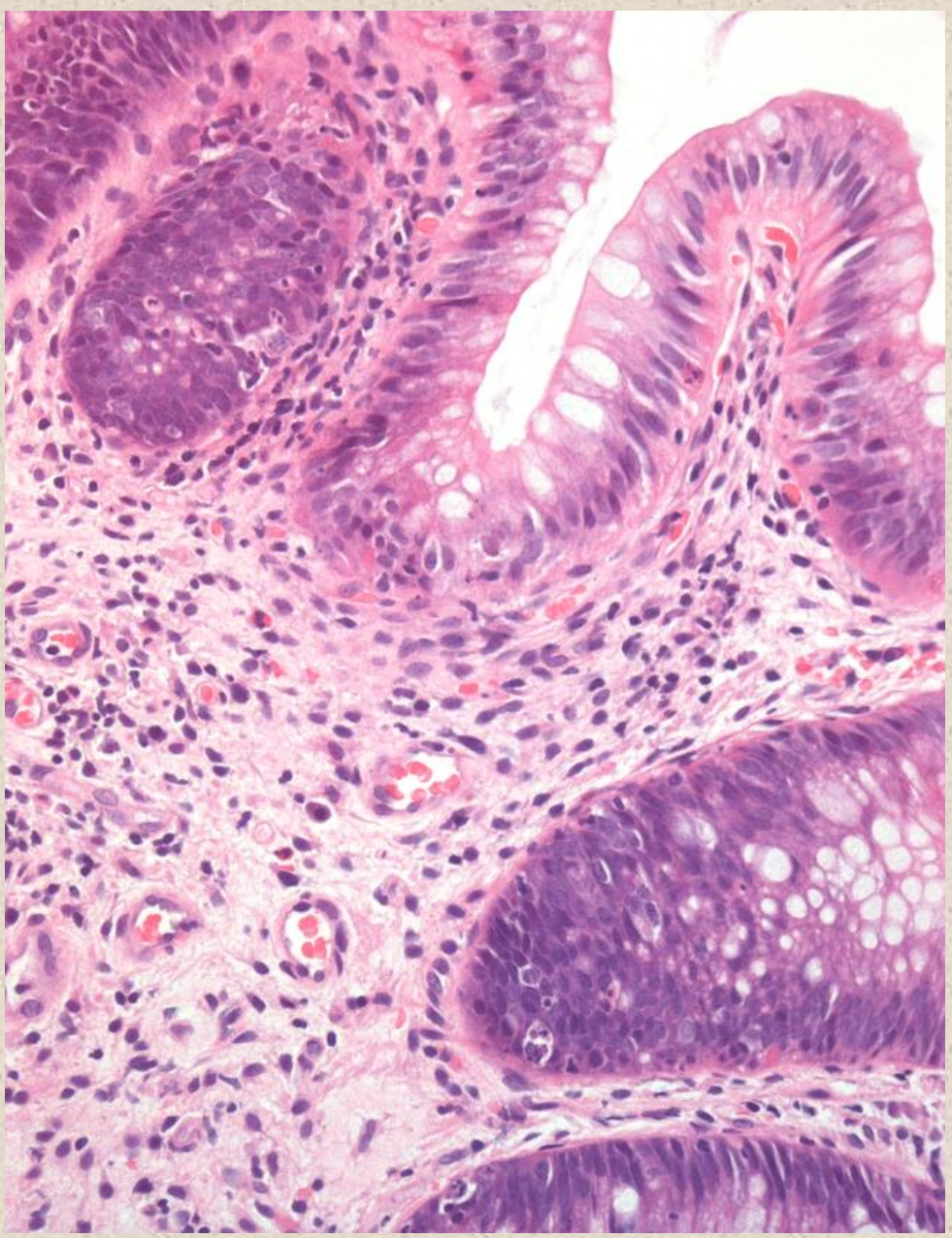


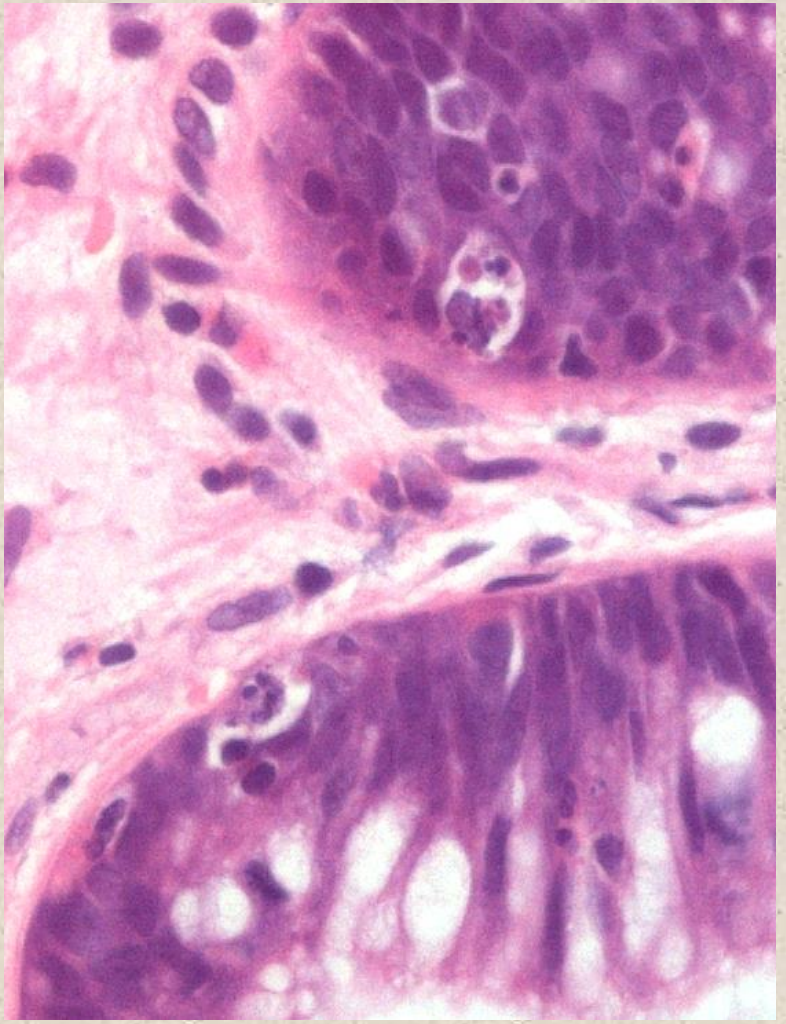
Biopsies of sigmoid colonic tumour

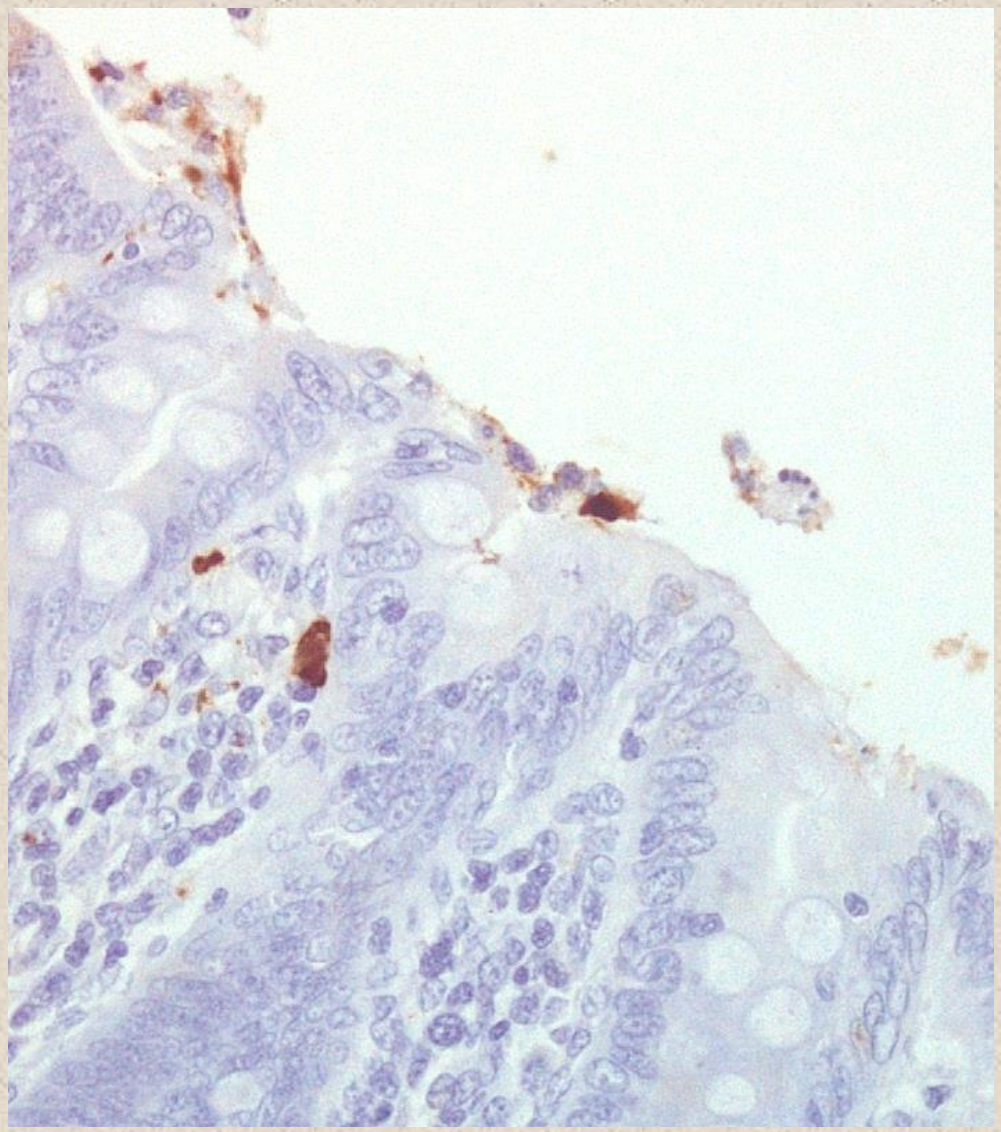


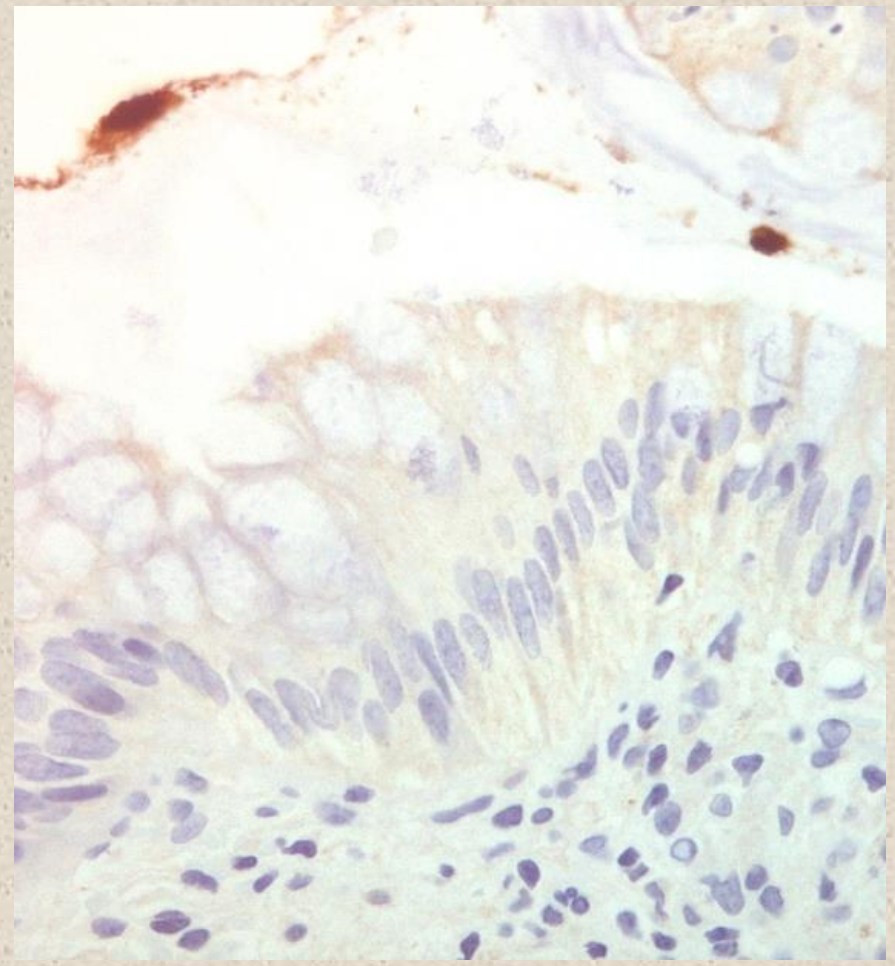
CMV

- HIV/AIDS, transplant and chemoRx patients:
  - Inflammation and viral inclusions
  - Crypt apoptosis alone
  - Present as a focal lesion

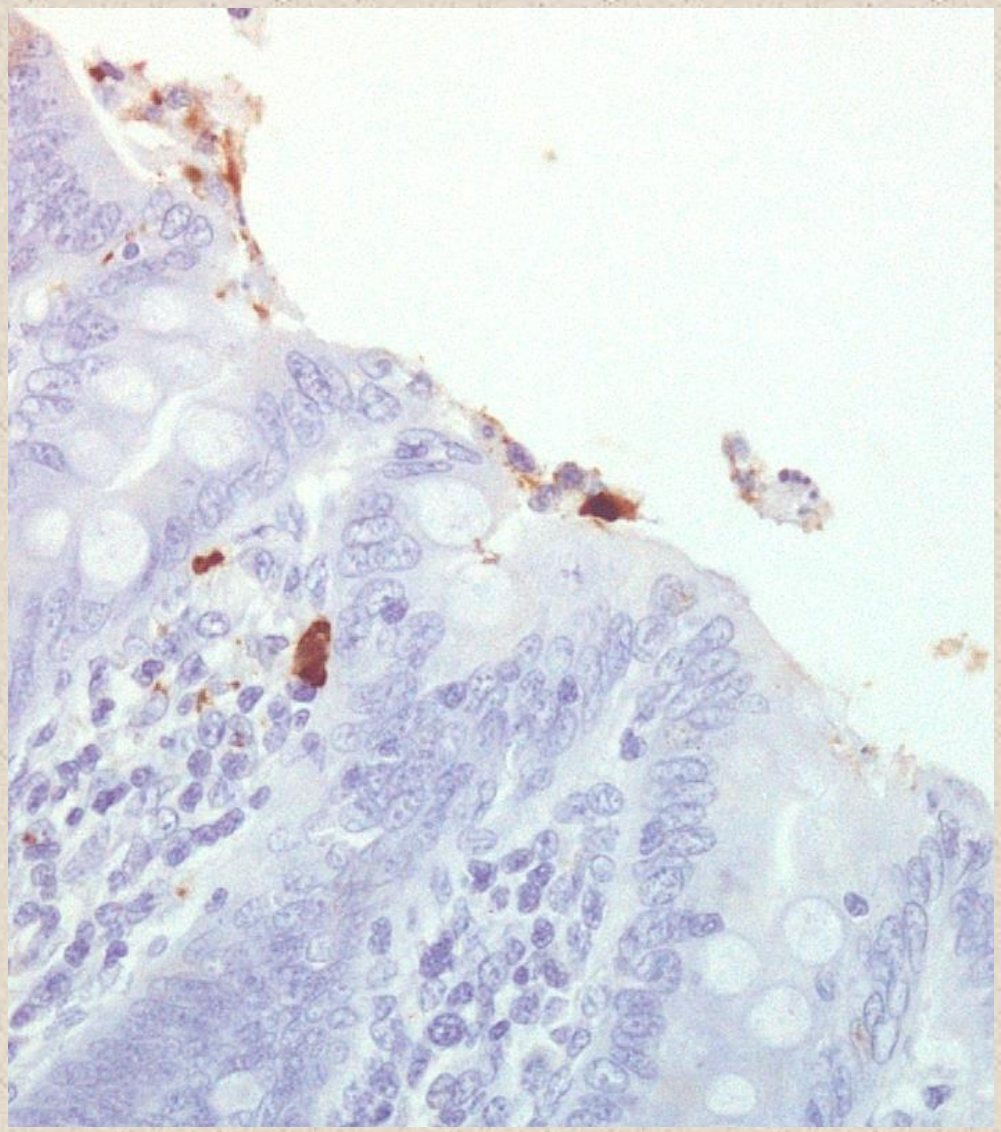


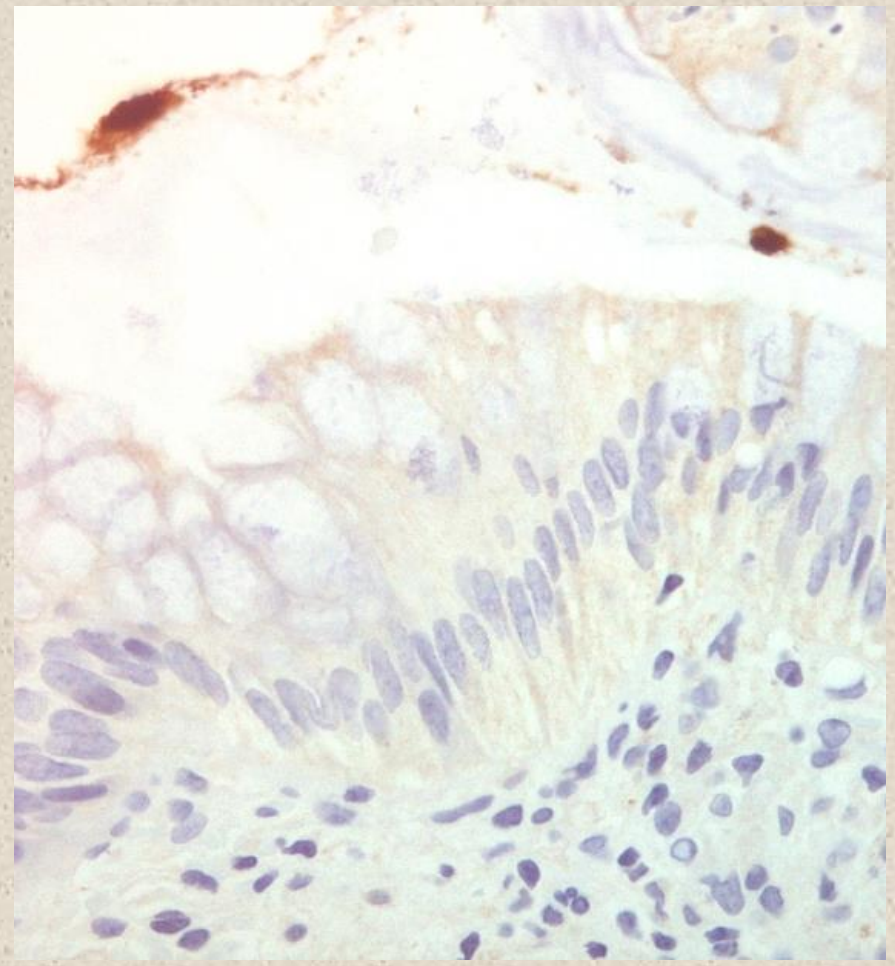






Adenovirus

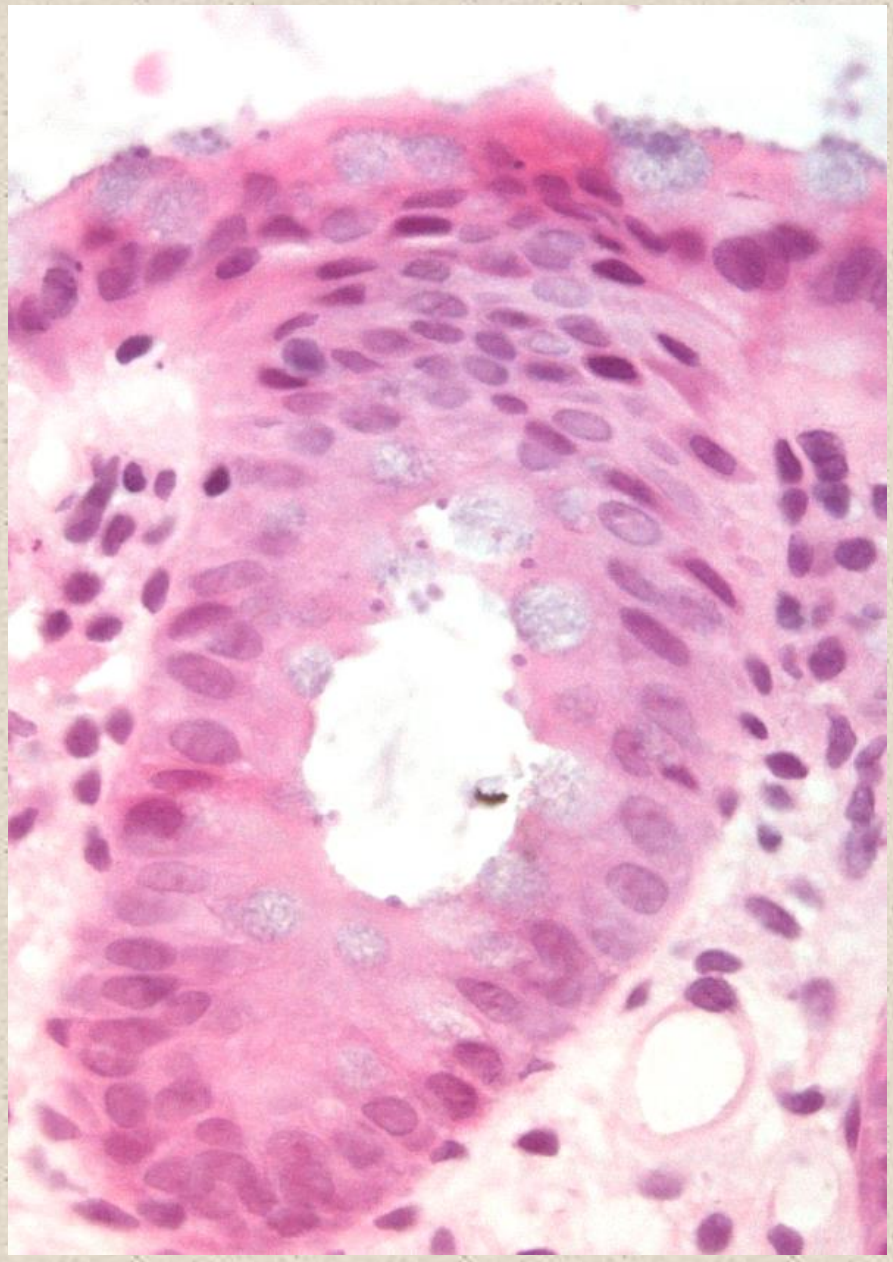


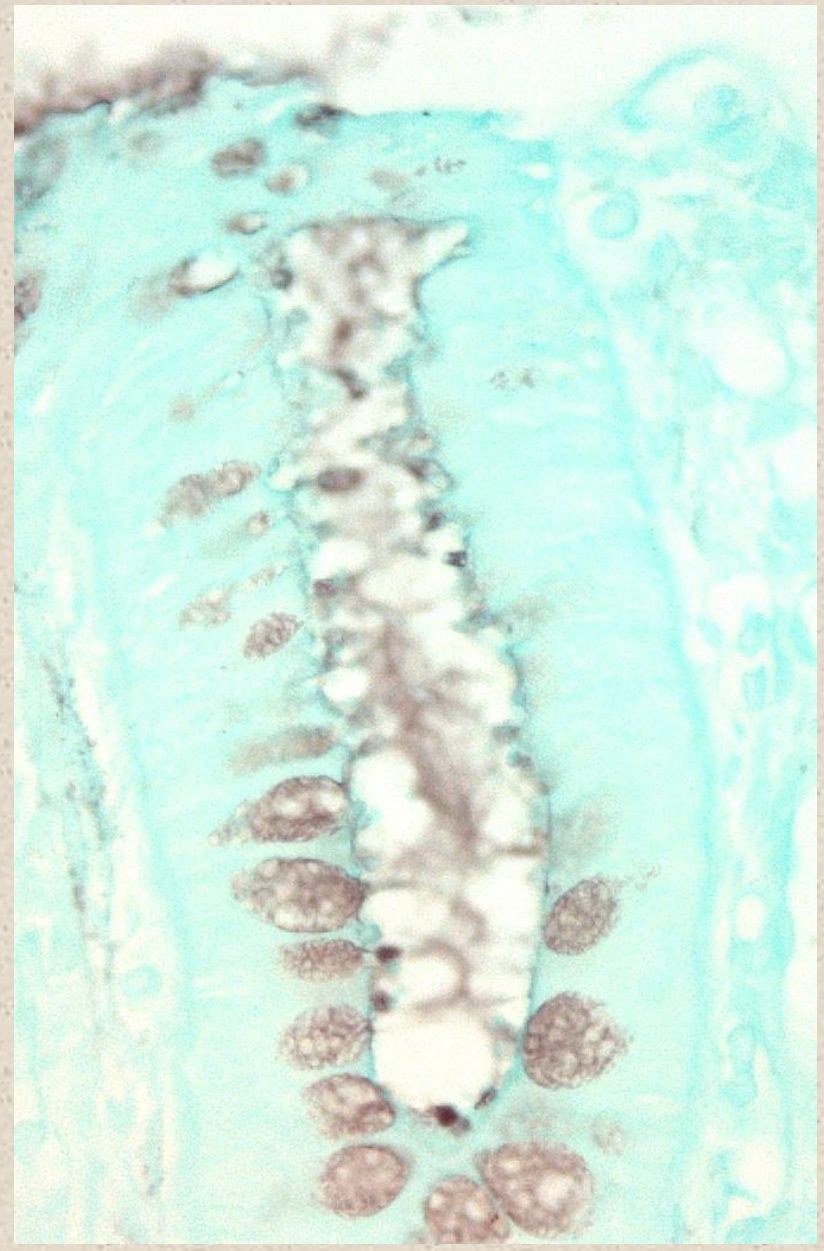


Viruses

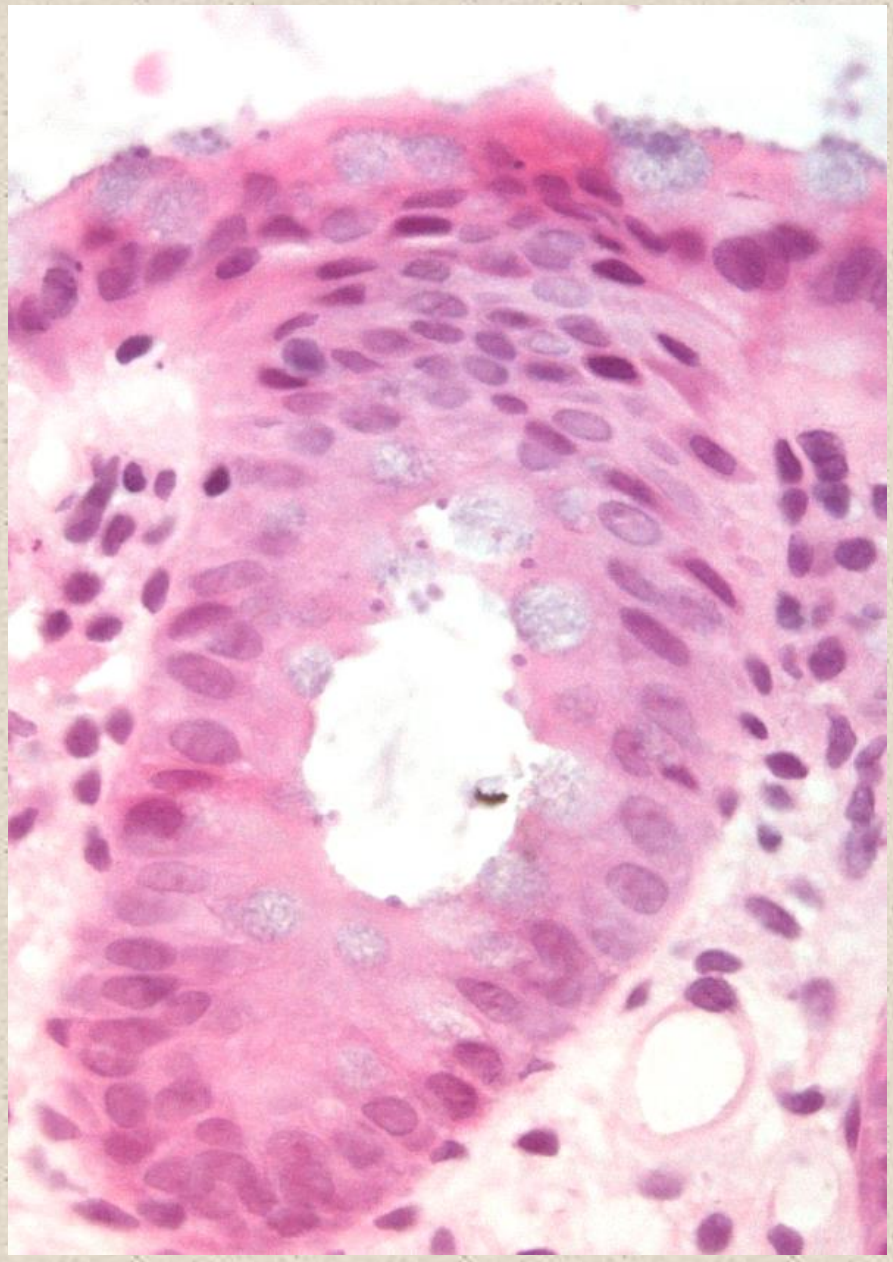
- EBV – PTLD and smooth muscle tumours
- HHV8 – Kaposi sarcoma
- HPV – anal squamous neoplasia

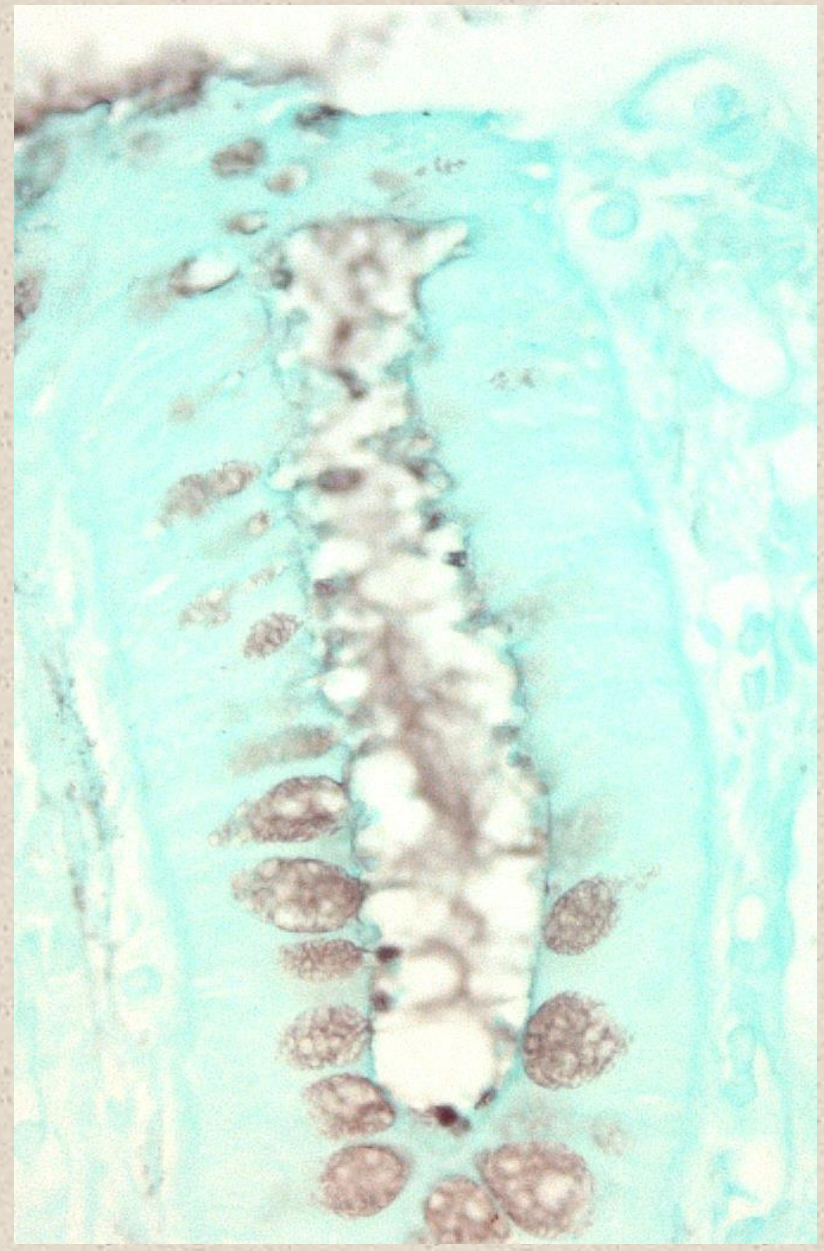
Fungi and parasites



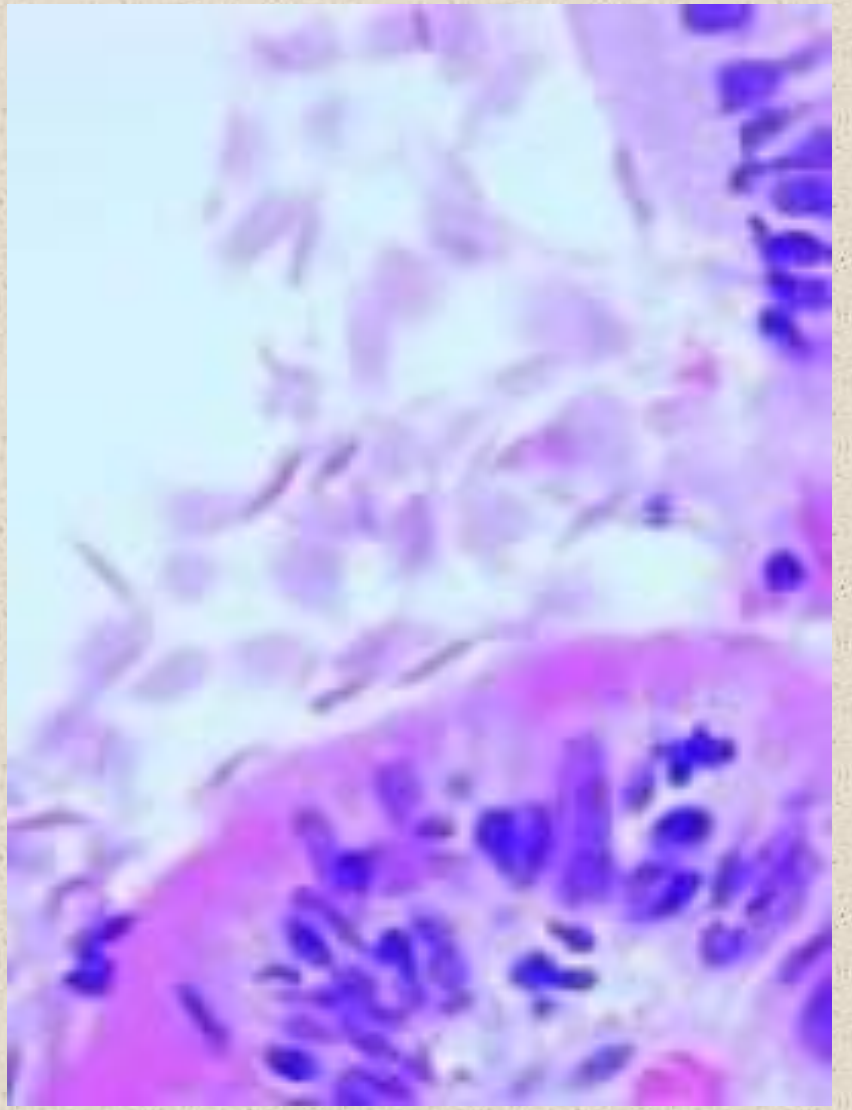


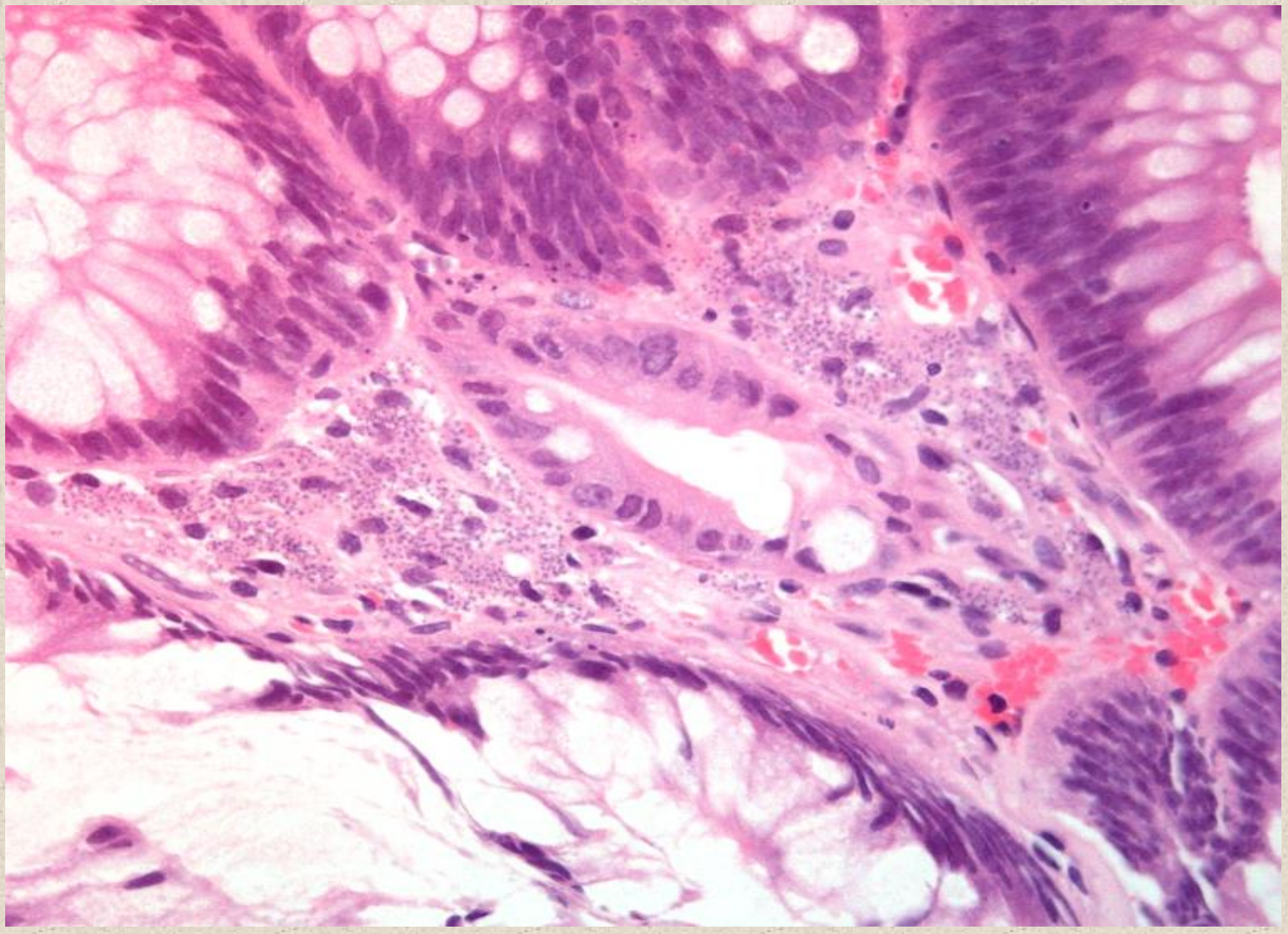
Cryptosporidia



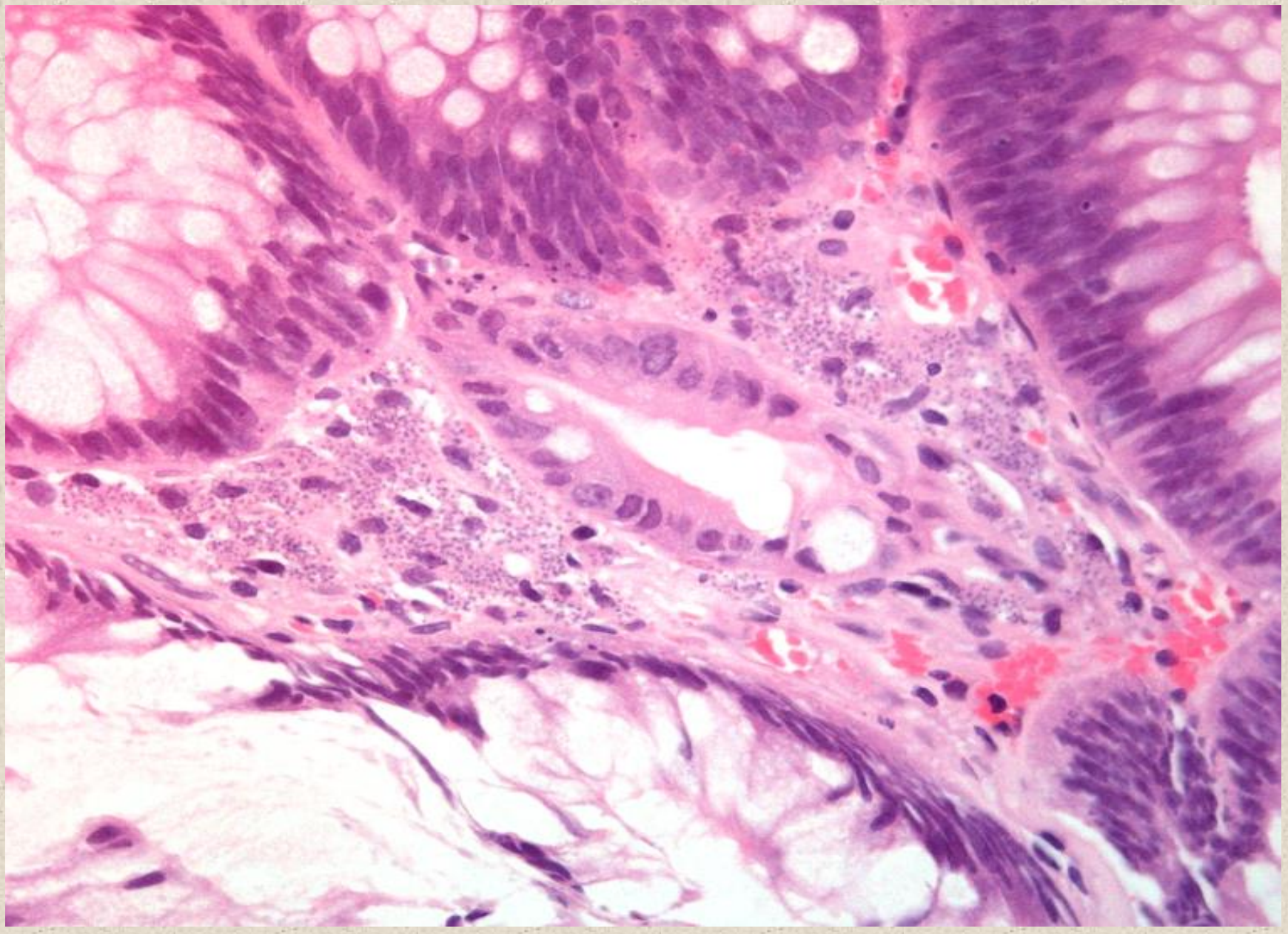


Giardia





Leishmania



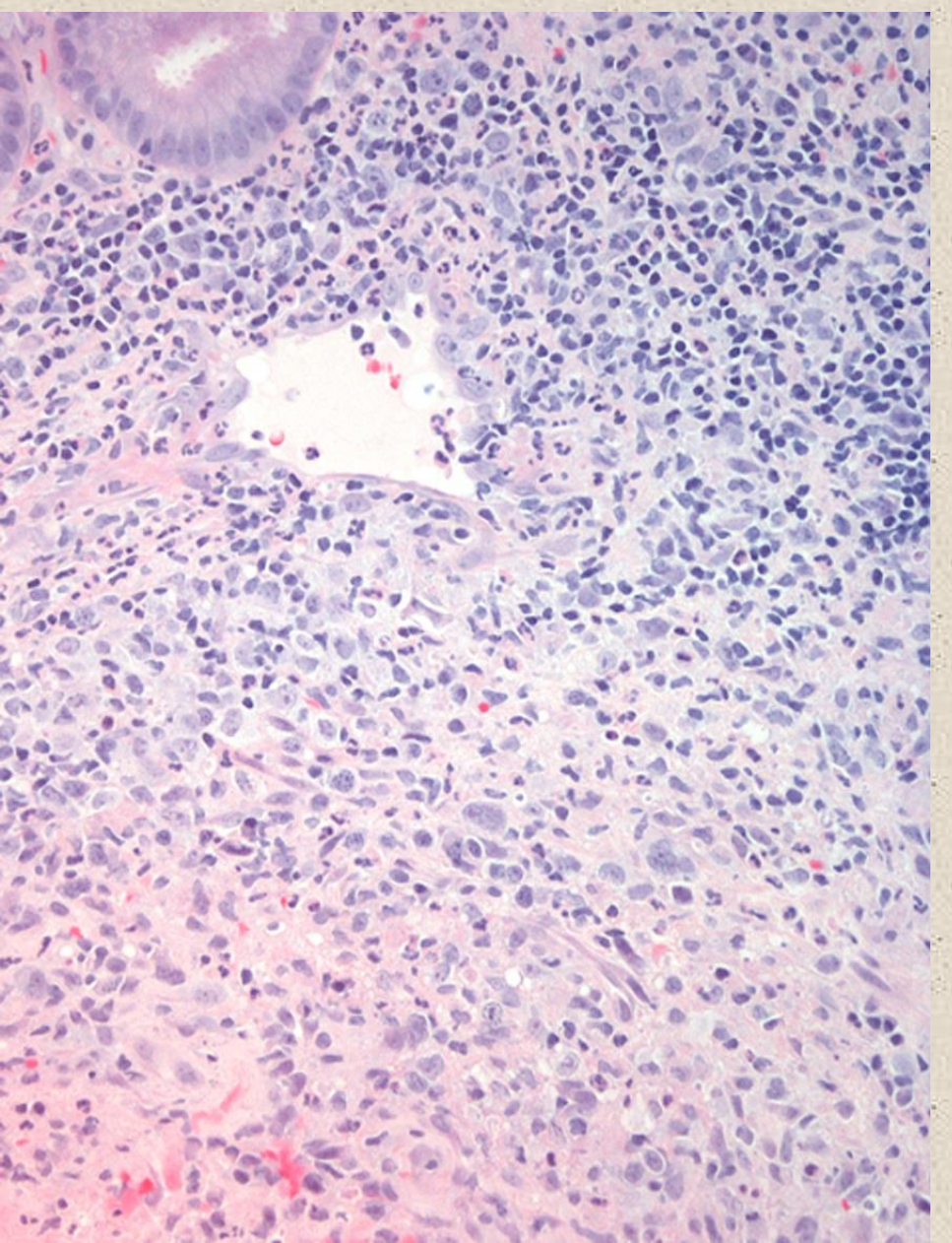
Neoplasia

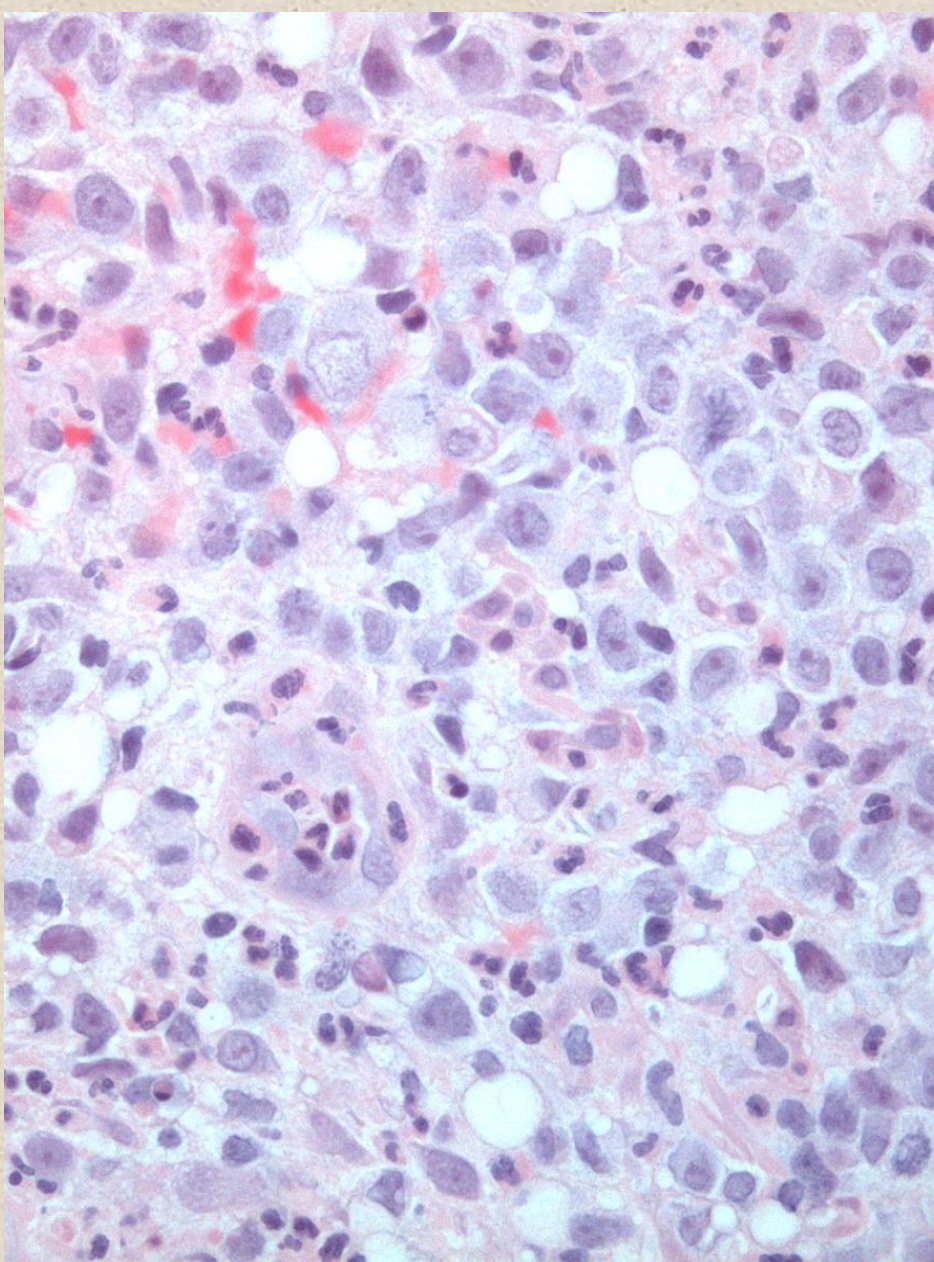
- Lymphoid
- Epithelial
- Mesenchymal

Epstein Barr virus & Post-transplant lymphoproliferative disease (PTLD)

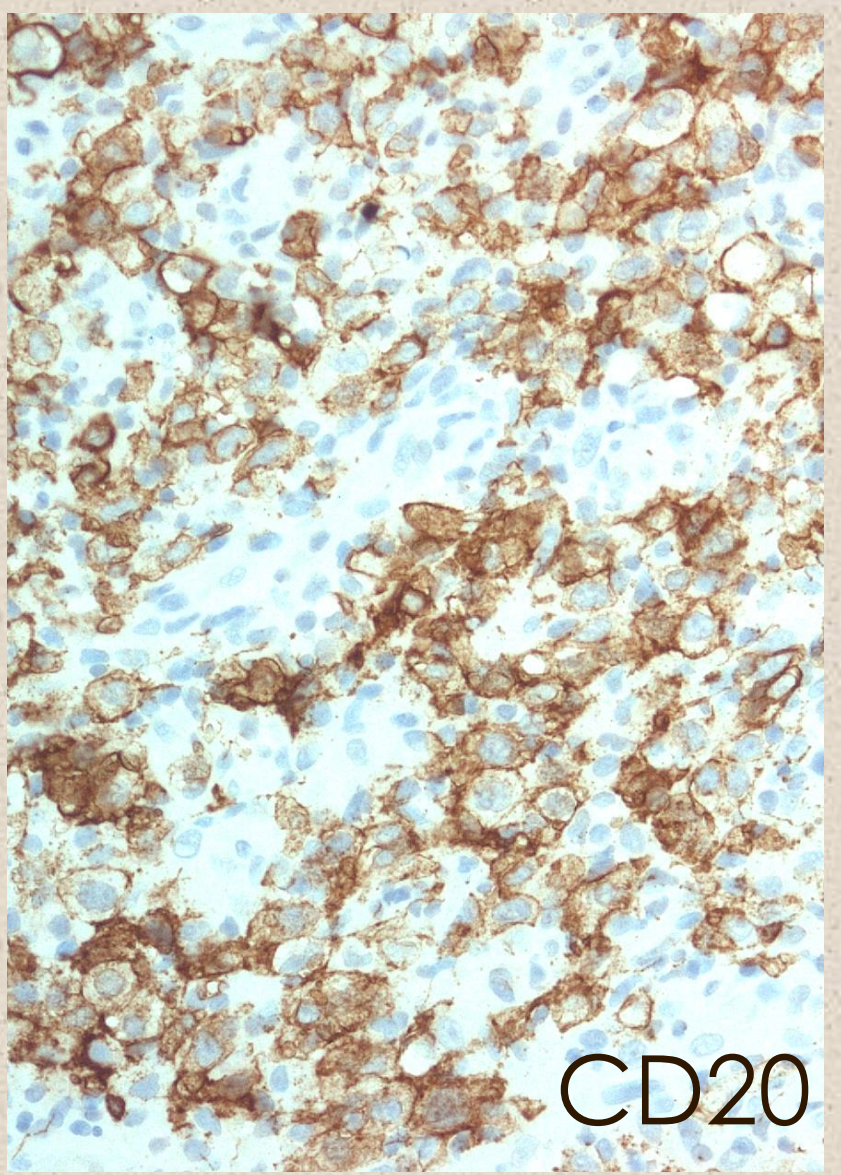
- Solid organ >> bone marrow

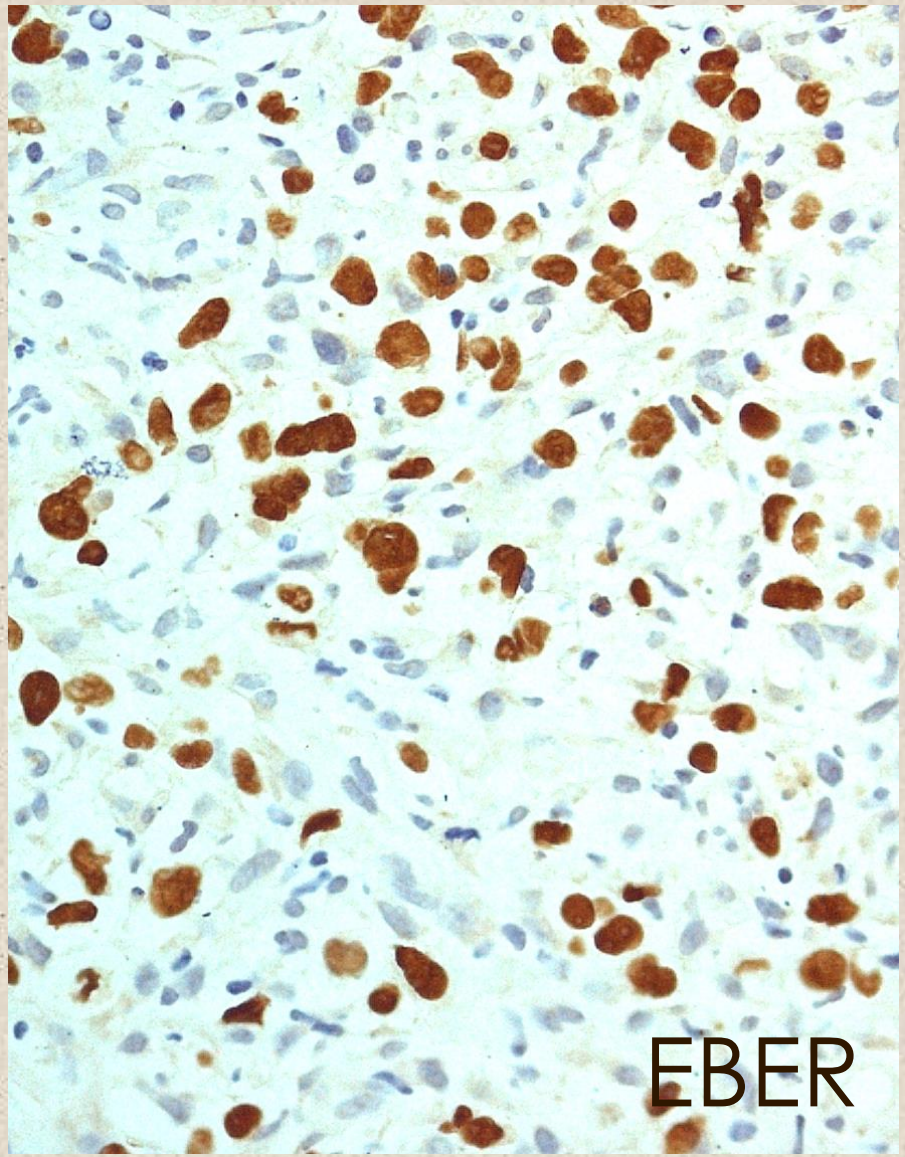
Monomorphic PTLD



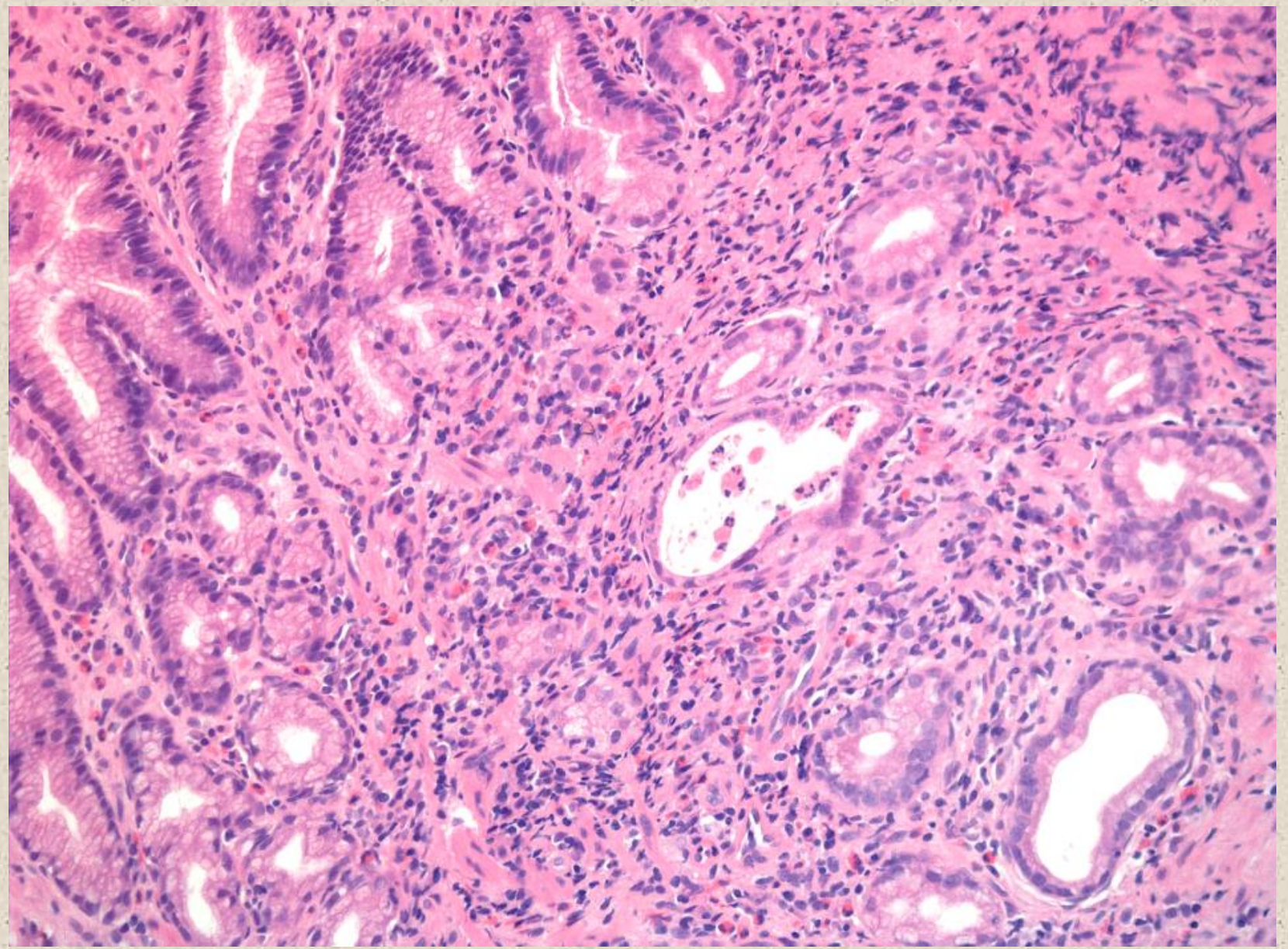


Monomorphic PTLD

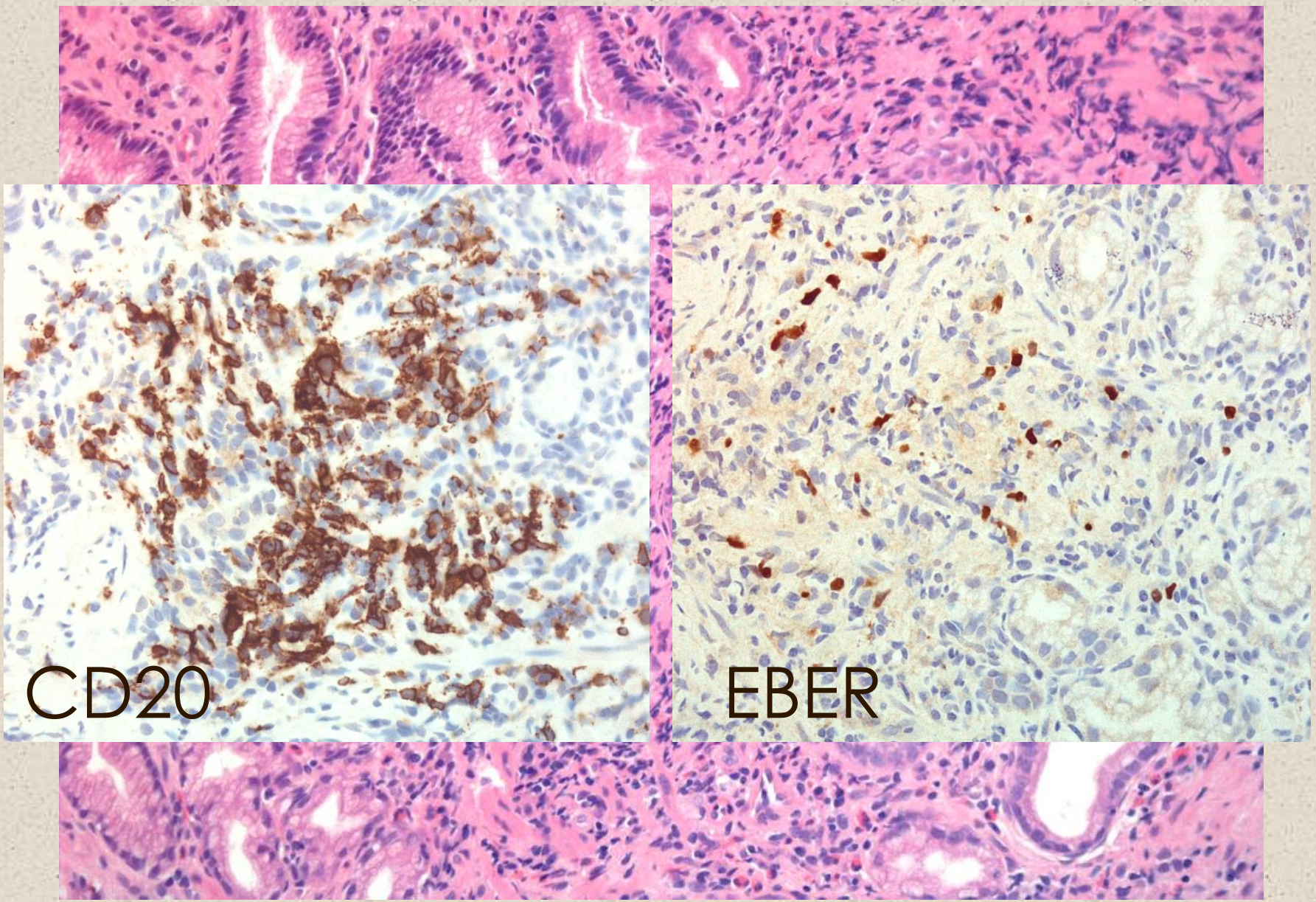




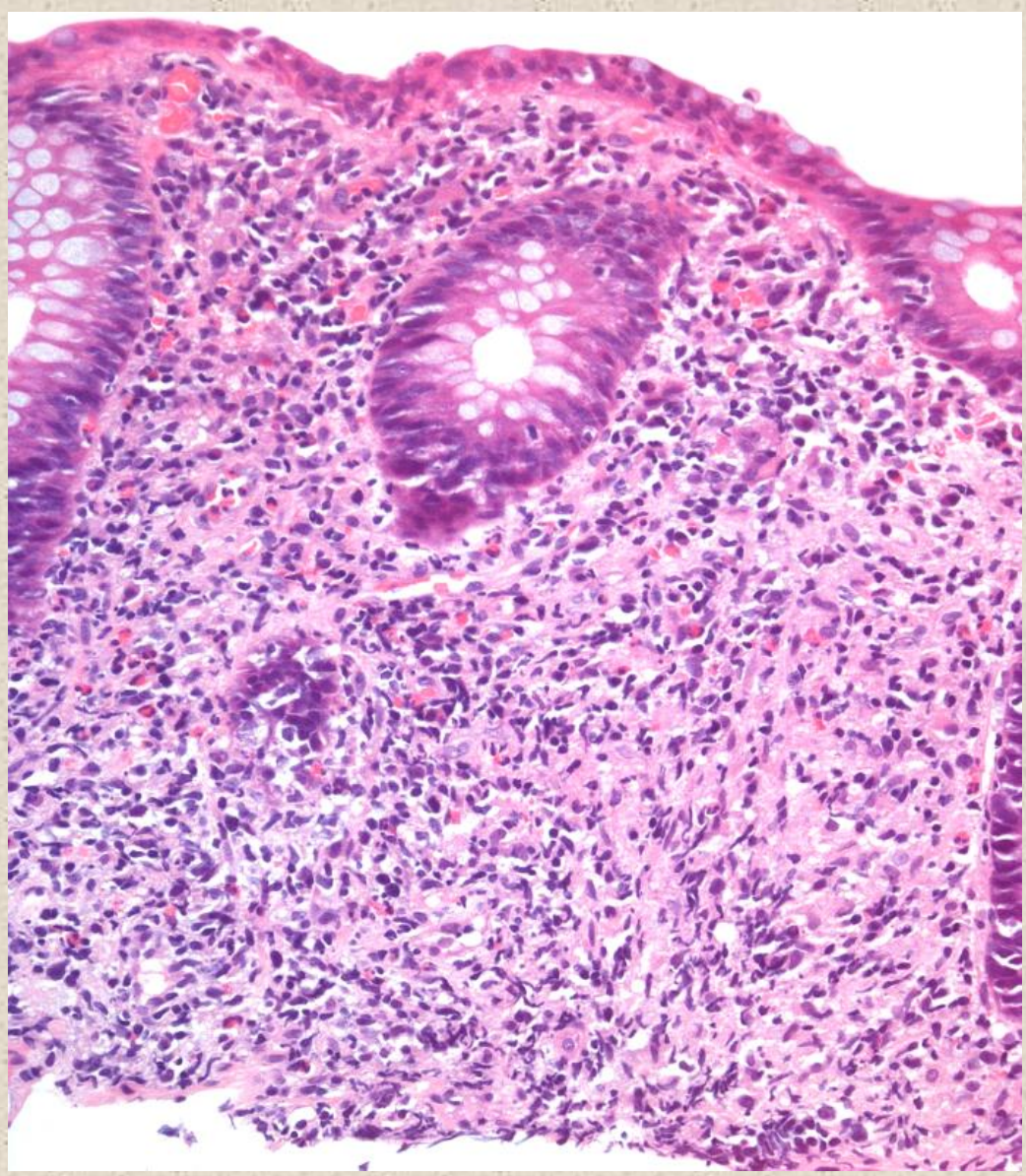
Polymorphic PTLD

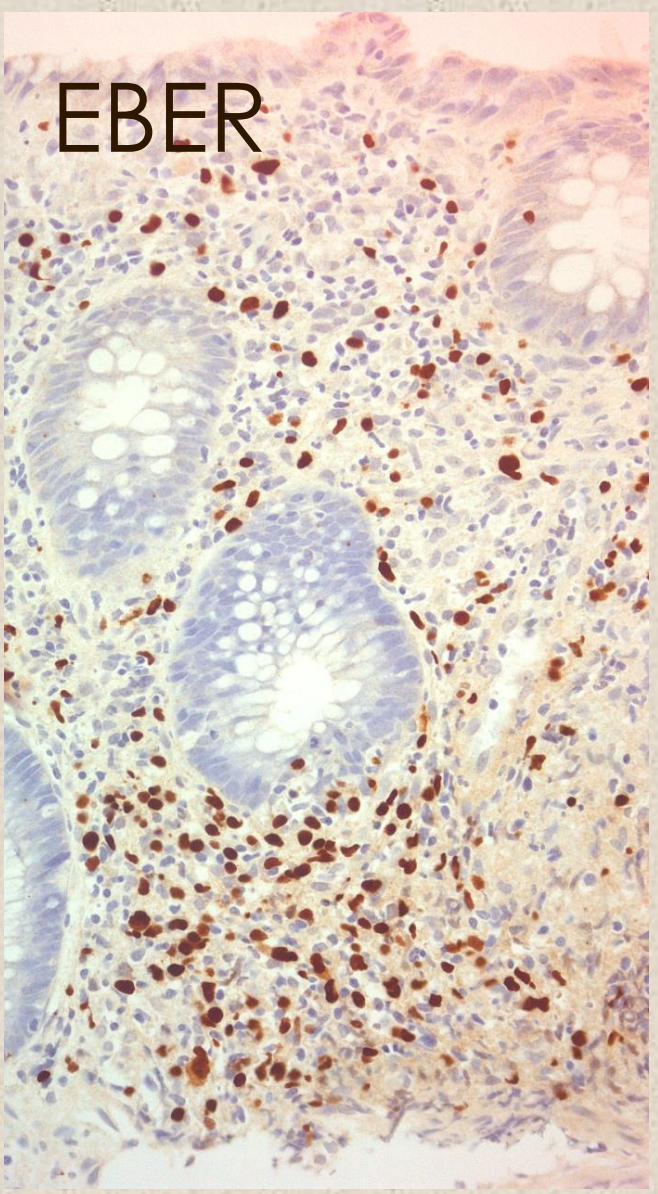


Polymorphic PTLD

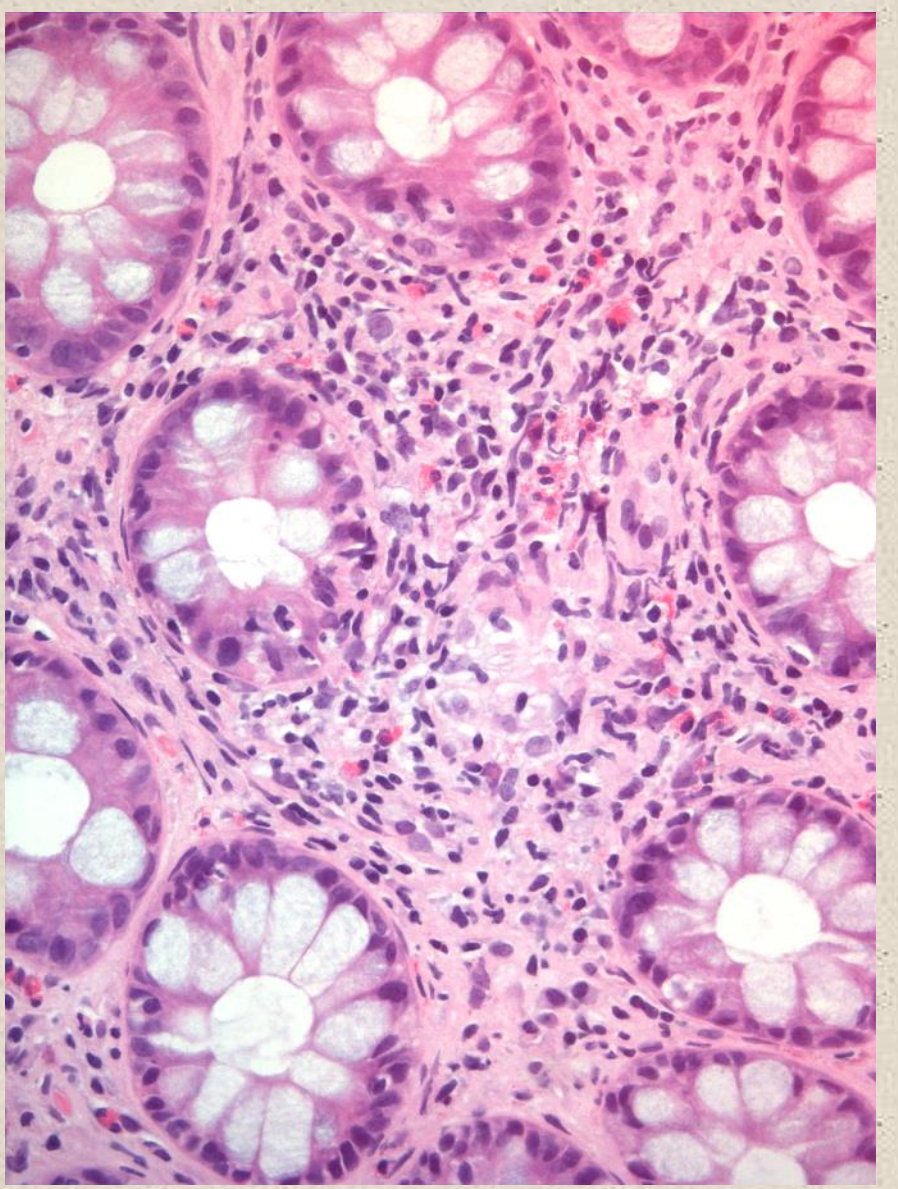


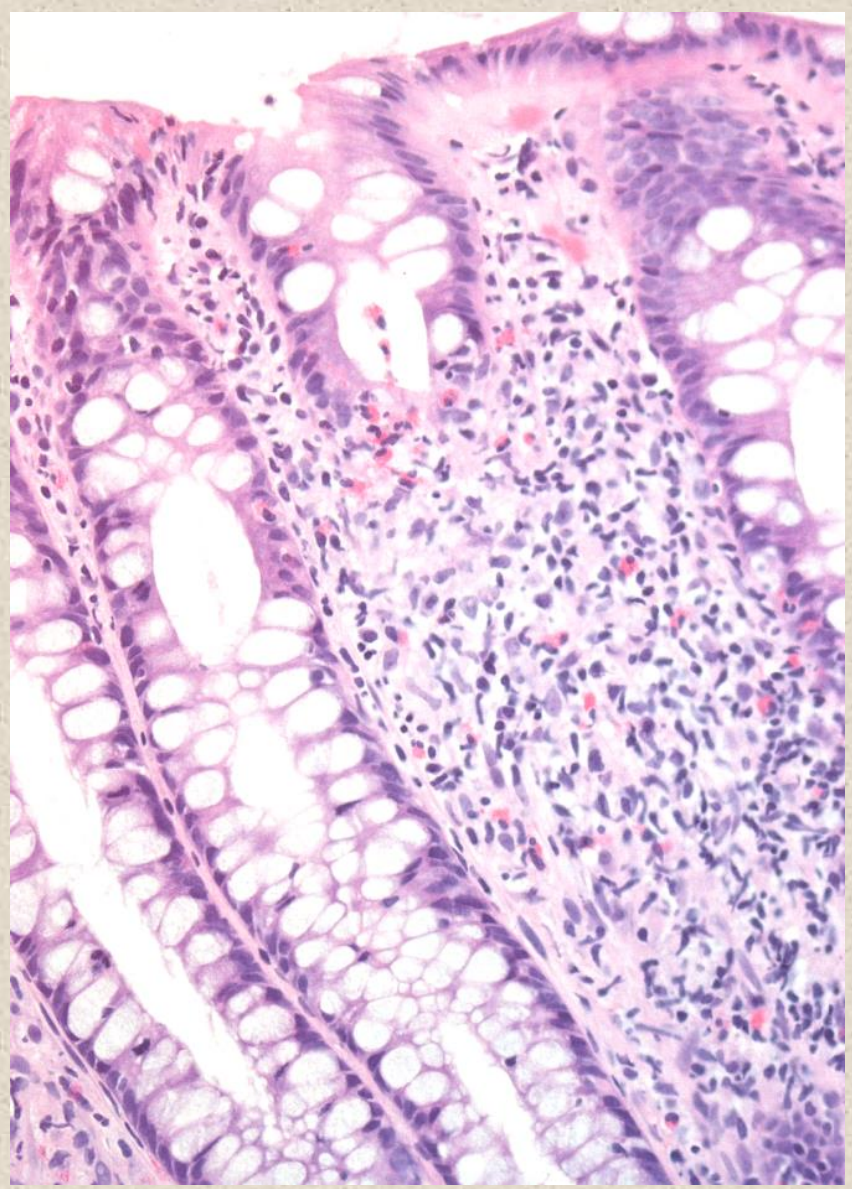
Polymorphic PTLD



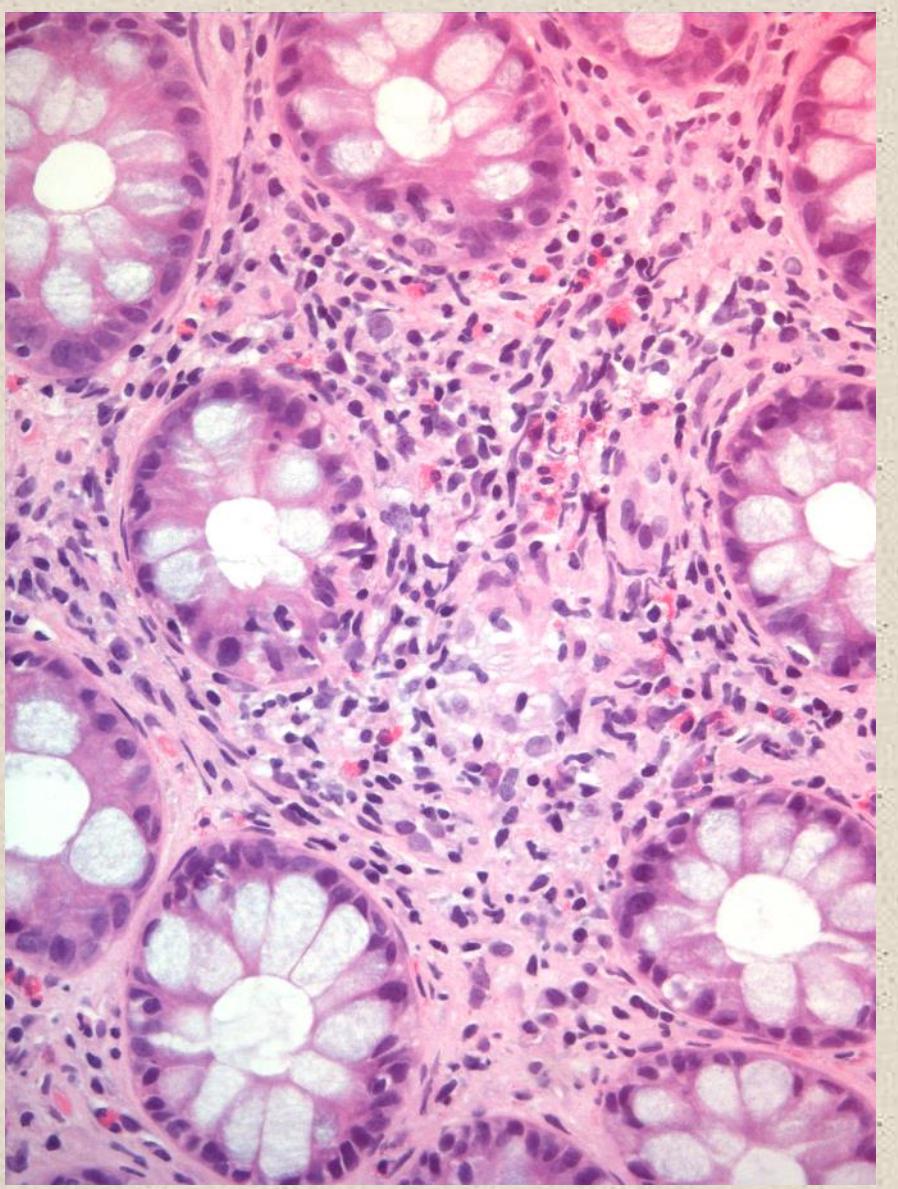


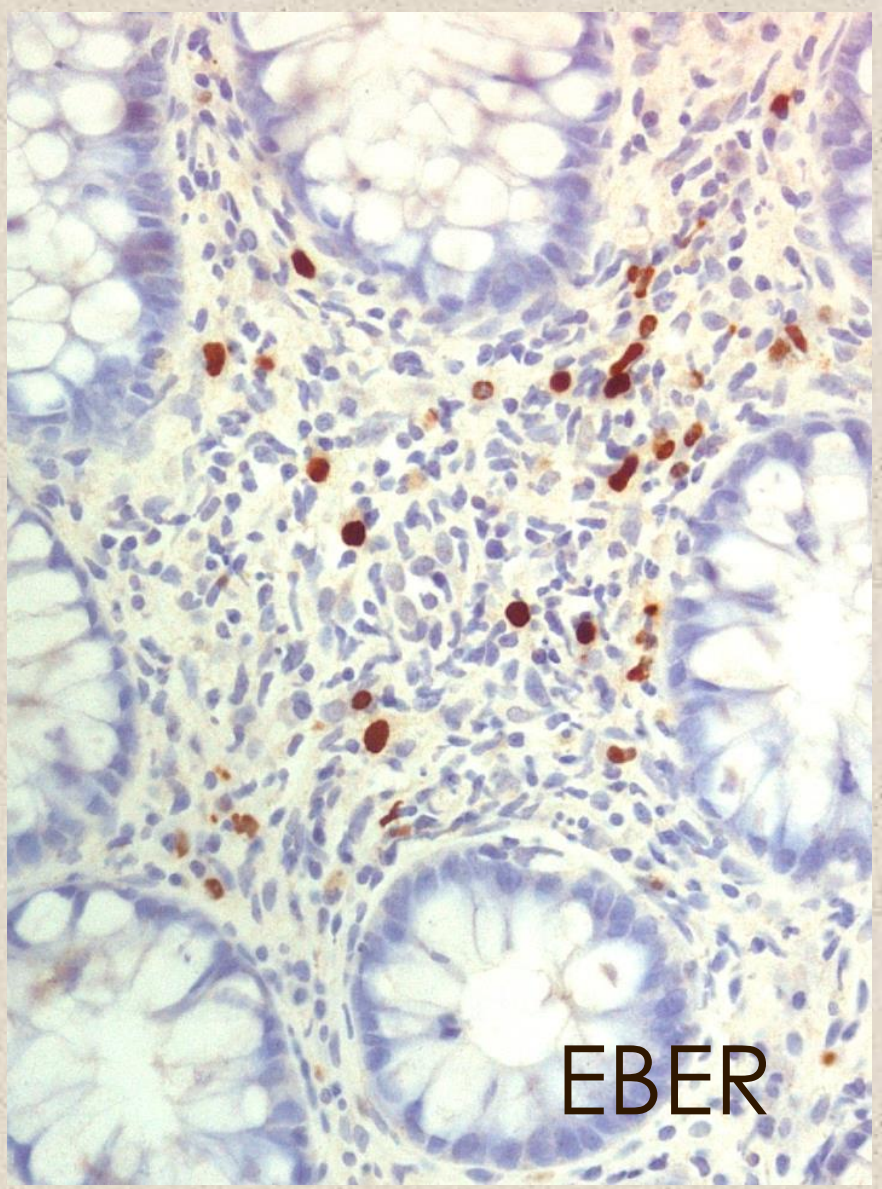
Polymorphic PTLD





Polymorphic PTLD





Neoplasia

- Lymphoid
  - PTLD (polymorphic type can mimic Crohn's disease)

Journal of Pathology
J Pathol 2003; **201**: 312–318.
Published online 16 July 2003 in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/path.1442

Original Paper

Epstein–Barr virus infection in colorectal neoplasms associated with inflammatory bowel disease: detection of the virus in lymphomas but not in adenocarcinomas

NACS Wong,[1]* H Herbst,[2] K Herrmann,[3] T Kirchner,[3] AS Krajewski,[1] M Moorghen,[4] F Niedobitek,[5] N Rooney,[6] NA Shepherd[7] and G Niedobitek[3]

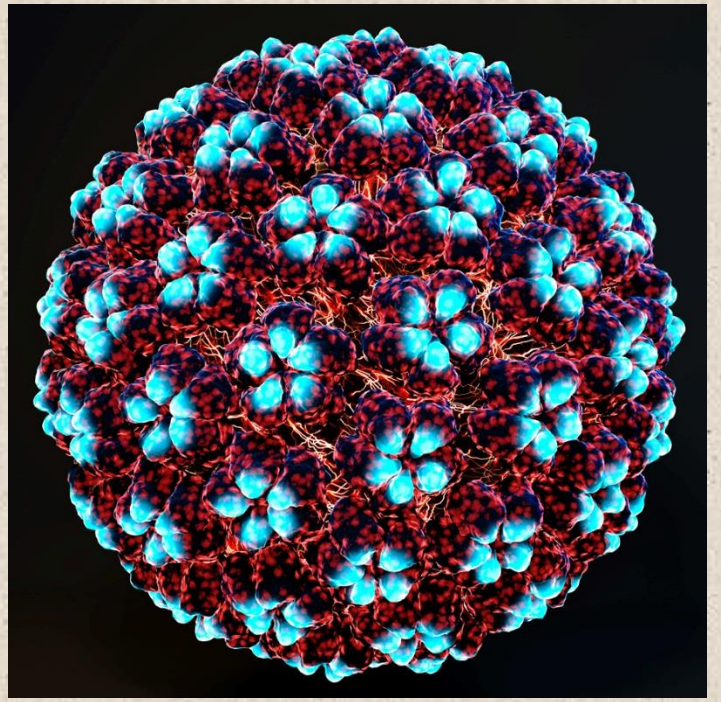
[1]*Department of Pathology, University of Edinburgh Medical School, UK*
[2]*Gerhard-Domagk-Institut für Pathologie, Universitätsklinikum Münster, Germany*
[3]*Pathologisch-Anatomisches Institut, Universität, Erlangen, Germany*
[4]*Department of Pathology and Microbiology, University of Bristol, Bristol Royal Infirmary, UK*
[5]*Institut für Pathologie, Auguste-Viktoria Krankenhaus, Berlin, Germany*
[6]*Department of Cellular Pathology, Southmead Hospital, Bristol, UK*
[7]*Department of Pathology, Gloucestershire Royal Hospital, Gloucester, UK*

Neoplasia

- Lymphoid
  - PTLD (polymorphic type can mimic Crohn's disease)
  - EBV driven GIT lymphomas and immunosuppression – e.g. IBD
  - HIV and lymphomas (primary effusion lymphoma – HHV8)

Neoplasia

- Epithelial
  - Anal squamous dysplasia and squamous cell carcinoma



Neoplasia

- Mesenchymal
  - Kaposi sarcoma (can be CD117 +ve but is DOG1 -ve)

Histopathology 2008, **52**, 816–823. DOI: 10.1111/j.1365-2559.2008.03034.x

Gastrointestinal Kaposi's sarcoma: CD117 expression and the potential for misdiagnosis as gastrointestinal stromal tumour

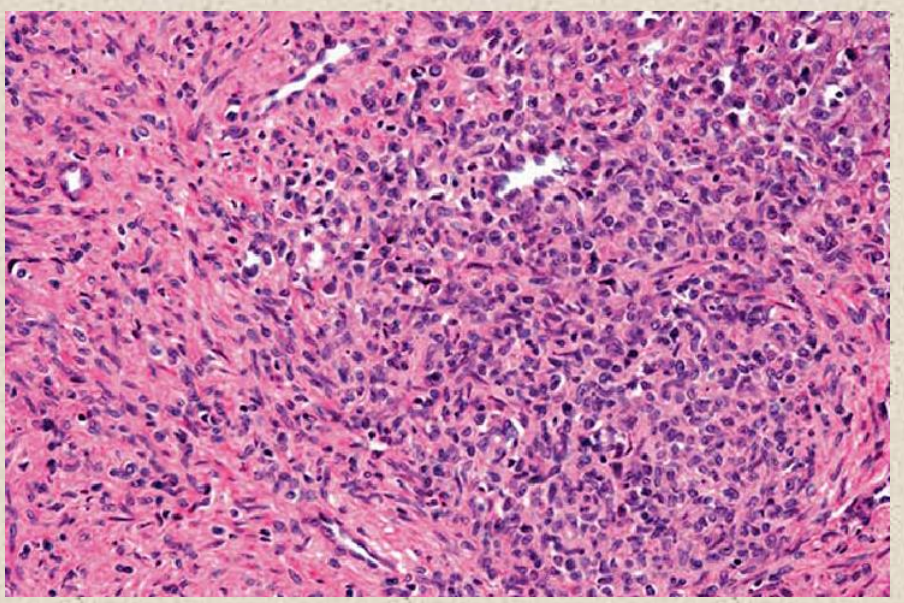
J R Parfitt, M Rodriguez-Justo,[1] R Feakins[2] & M R Novelli[1]
Department of Pathology, London Health Sciences, London, Ontario, Canada, [1]*Department of Histopathology, University College Hospitals London NHS Trust, London, UK and* [2]*Department of Histopathology, The Royal London Hospital, London, UK*

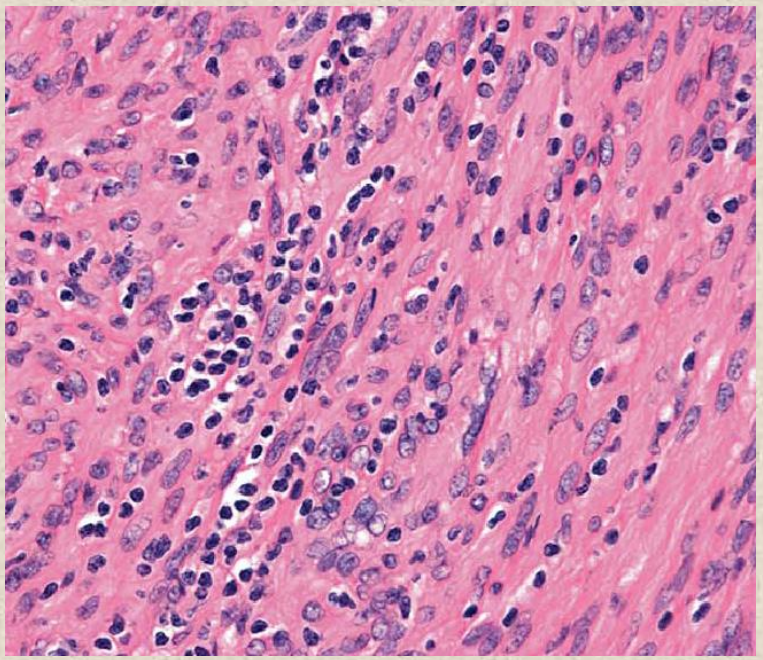
Histopathology 2010, **57**, 250–258. DOI: 10.1111/j.1365-2559.2010.03622.x

Specificity of DOG1 (K9 clone) and protein kinase C theta (clone 27) as immunohistochemical markers of gastrointestinal stromal tumour

Newton A C S Wong & Golda Shelley-Fraser
Department of Histopathology, Bristol Royal Infirmary, Bristol, UK

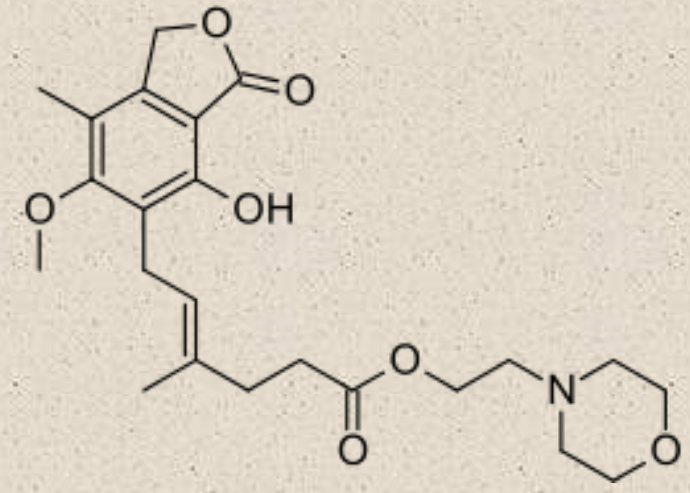
- In HIV/AIDS patients, EBV driven smooth muscle neoplasms:
  - less pleomorphism
  - low mitotic count





Drugs

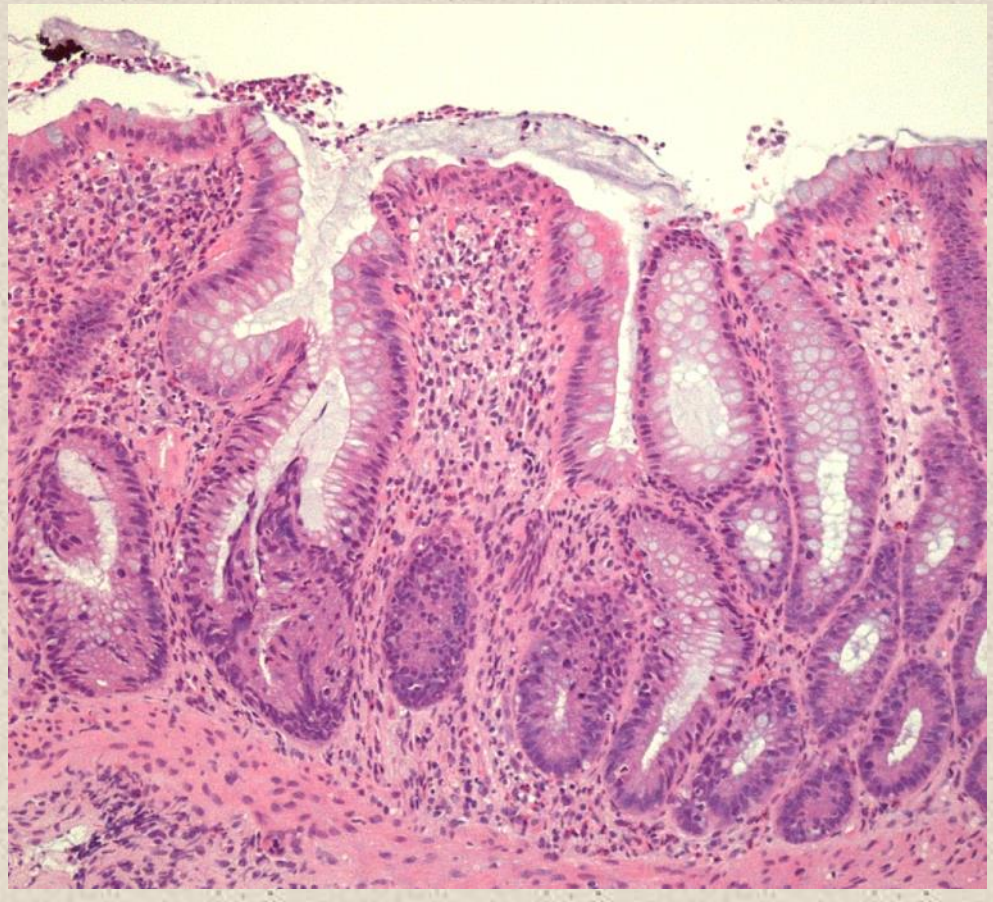
- Diarrhoea and:
  - Antiretrovirals
  - Cyclosporine
  - Tacrolimus
- Mycophenolate mofetil (MMF)

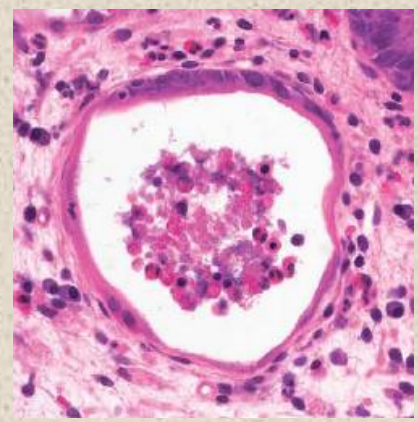


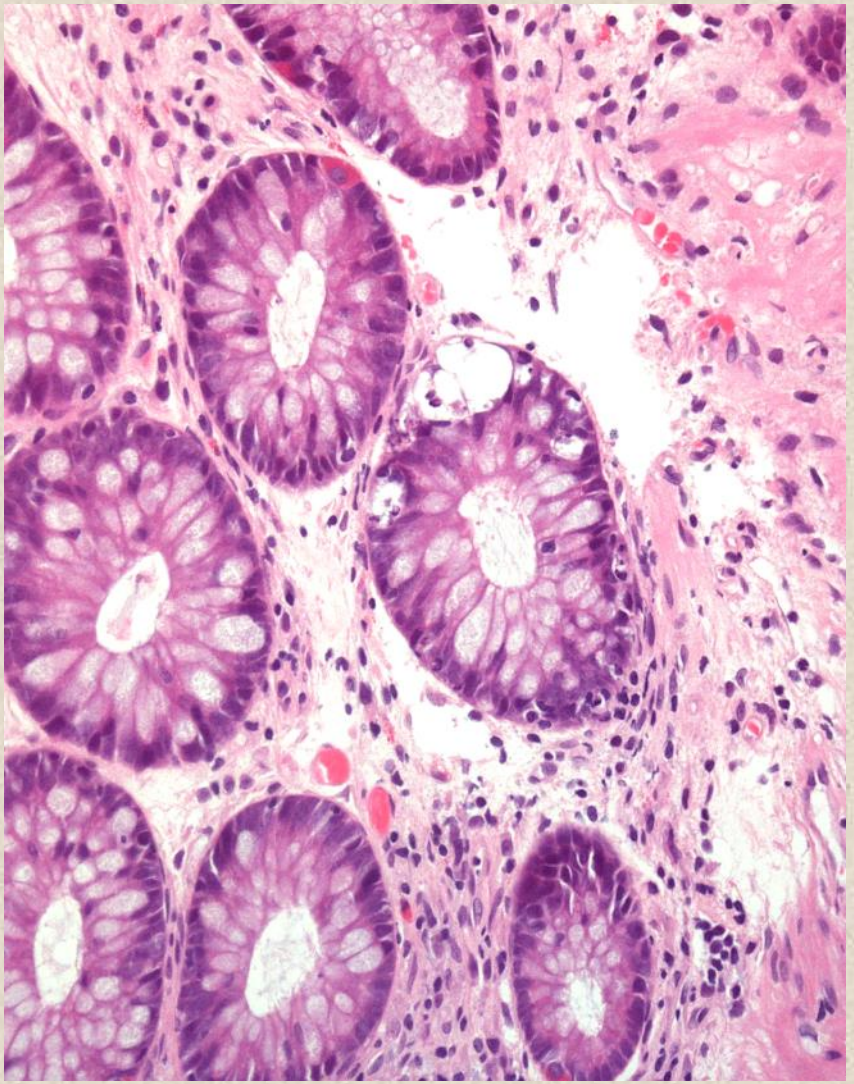
MMF

- Oesophagus to Colorectum
- Histological patterns
  - GvHD like
  - IBD like
  - Combinations
  - (Dilated damaged crypts)

MMF





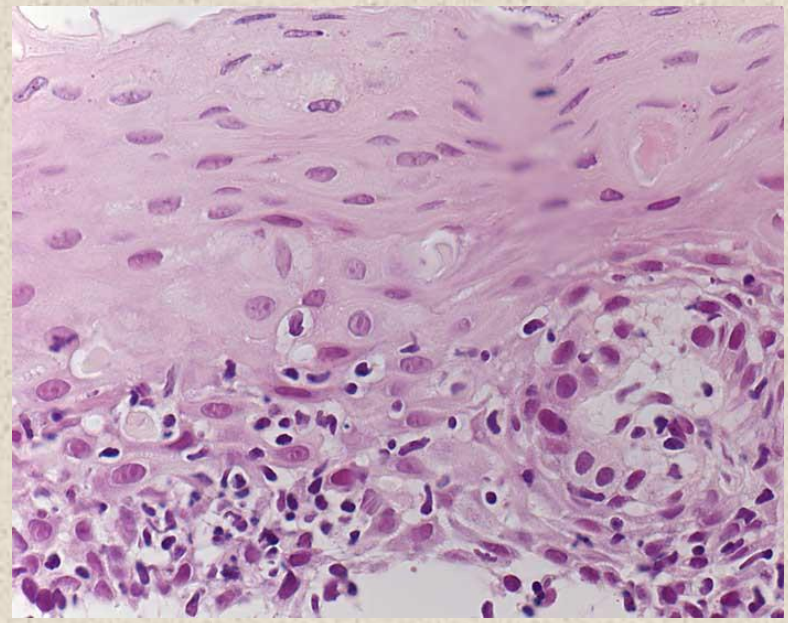


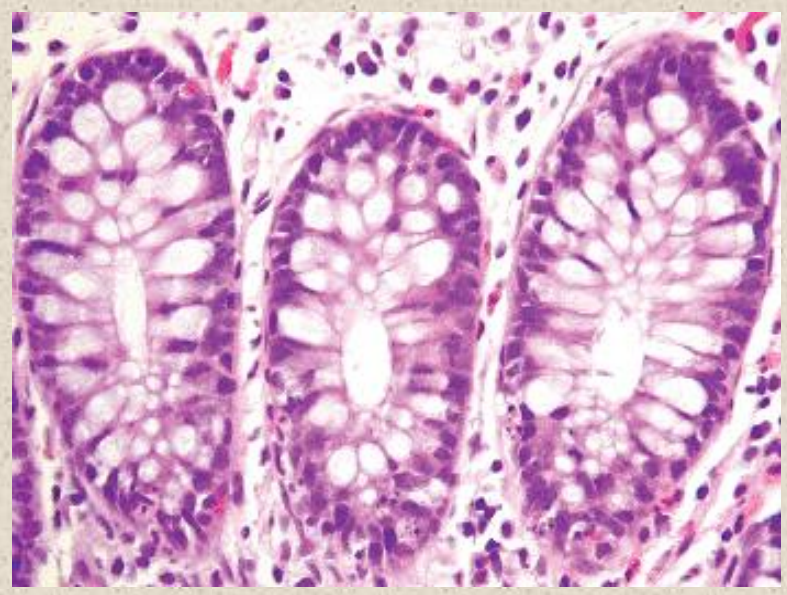
Talk plan

- Diseases common to several immunosuppressed groups
  - Infection
  - Neoplasia
  - Drugs
- Diseases specific to certain immunosuppressed groups

Gastrointestinal GvHD

- BMT rather than solid organ transplant patients
- Hallmark histological feature is apoptosis
  - Proliferative compartments





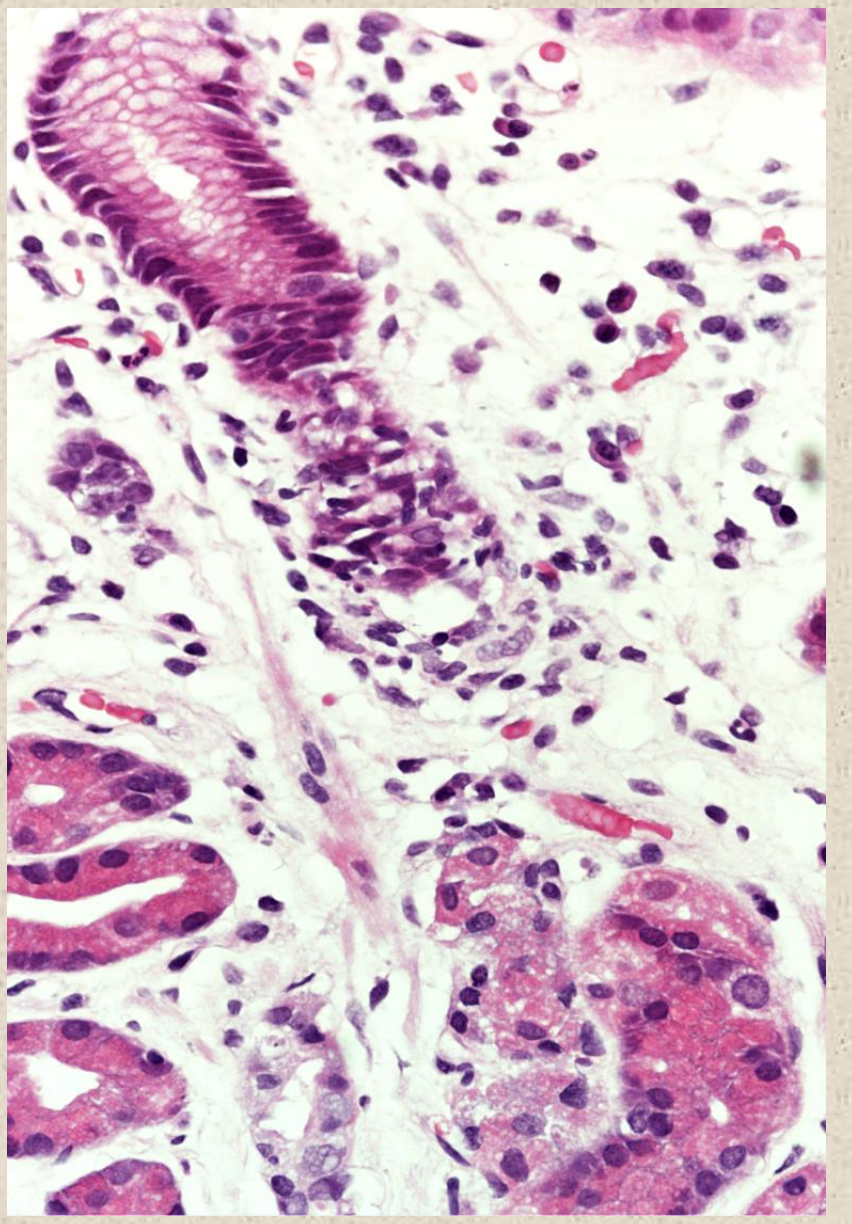


TABLE 1.

Definition and Histologic Grading System for Gut

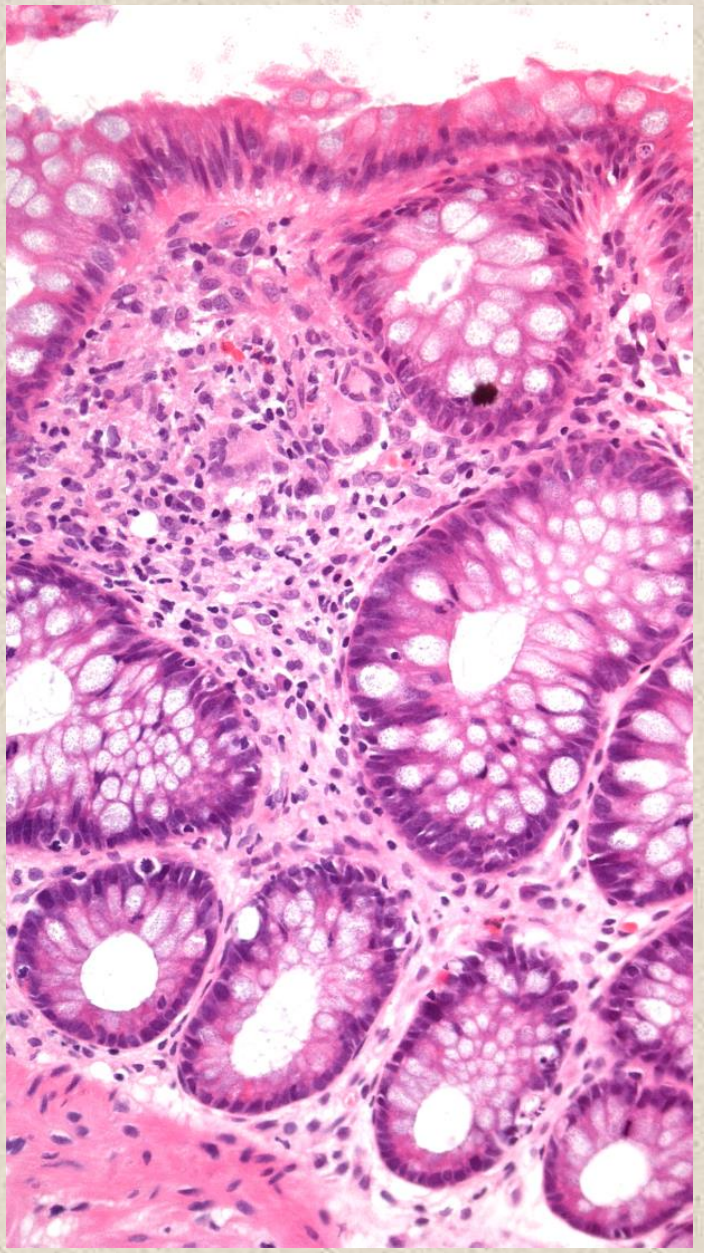
Grade	Histological Features[a]
I	Crypt abscesses with necrotic or atypical epithelial cells, in vicinity of inflammatory infiltrate composed of lymphocytes, plasma cells, immunoblasts, and occasionally eosinophils (see Fig. 3)
II	Individual crypt loss (see Fig. 4)
III	Loss of two or more contiguous crypts (see Fig. 5)
IV	Total denudation of epithelium (usually followed rapidly by bacterial or fungal superinfection)

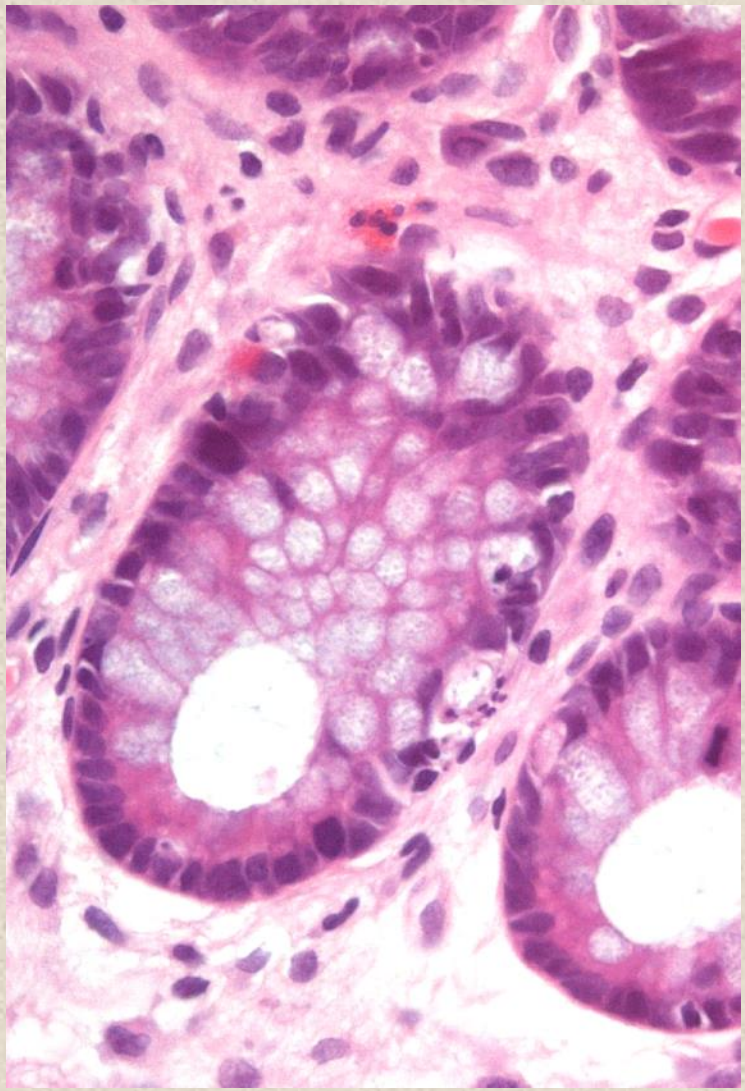
Lerner, K.G., Kao, G.F., Storb, R., Buckner, C.D., Clift, R.A., and Thomas, E.D.: Histopathology of graft-vs.-host reaction (GvHR) in human recipients of marrow from HL-A-matched sibling donors.
Transplant Proc 6: 367–371, 1974.

Gastrointestinal GvHD

- Can include:
  - Acute inflammation
  - Granulomas?

Granulomas in GI GvHD?





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Transplant Proc 6: 367–371, 1974.

Gastrointestinal GvHD

- Other causes of apoptosis
  - Conditioning drugs (< Day 21)
  - Mycophenolate mofetil (MMF)
  - Viruses

Is the Presence of 6 or Fewer Crypt Apoptotic Bodies Sufficient for Diagnosis of Graft Versus Host Disease? A Decade of Experience at a Single Institution

Jingmei Lin, MD, PhD, Rong Fan, MD, PhD, Zijin Zhao, MD, Oscar W. Cummings, MD, and Shaoxiong Chen, MD, PhD

Abstract: Histopathology assessment is crucial for the diagnosis of graft versus host disease (GVHD), as the presence of crypt apoptosis is the cardinal criterion required. However, crypt apoptosis is not limited to GVHD; it also occurs in other conditions such as infection, drug reaction, or inflammatory reactions unrelated to GVHD. To better determine whether the presence of 6 or fewer apoptotic bodies is sufficient for the diagnosis of GVHD, we retrospectively reviewed 78 colon biopsies from 66 patients who received either hematopoietic stem cell (HSCT) or cord blood cell transplantation and whose colon biopsies exhibited apoptotic bodies. Among them, 41 cases contained 6 or fewer apoptotic bodies in the colon biopsy. These biopsies were compared with 141 colon biopsy controls that showed no significant pathologic changes as well as 16 colon biopsies with cytomegalovirus colitis from patients without a history of bone marrow transplantation. Among the 41 cases reviewed, 7 patients had coexisting GVHD in other organs (skin or liver). However, gastrointestinal symptoms of at least 4 HSCT patients whose colon biopsies contained 6 or fewer

Key Words: graft versus host disease, colon, cytomegalovirus colitis, apoptosis, transplantation

(*Am J Surg Pathol* 2013;37:539–547)

Transplantation, either hematopoietic stem cell (HSCT) or cord blood cell, is a potentially curative therapy in the management of immunohematopoietic disorders. However, the efficacy of this treatment is greatly impaired by graft versus host disease (GVHD), a donor-derived immune response against recipient antigens, resulting in significant morbidity and mortality.[1] The gastrointestinal (GI) tract is one of the main target organs involved by GVHD. Unfortunately, GI GVHD may present with a variety of nonspecific symptoms; diagnosis based on clinical presentation alone is not reliable or specific.[2] Gross endoscopic discordance with histologic findings exists[3,4]; therefore histopathology assessment is crucial to make a diagnosis of GVHD.

Control grp: Non-BMT patients investigated for GI symptoms or being followed up for colorectal polyps

Strikingly, the presence of a single or rare crypt apoptosis was seen in 21.3% (30 of 141) of the normal controls with a mean of 0.2 per 10 contiguous crypts and a maximum count of up to 5 per 10 contiguous crypts.

TABLE 5. Suggested Modified Histopathologic Criteria for Grading GVHD in Colon Biopsies

Indeterminate for GVHD
Rare crypt apoptosis ($\leq$6 apoptotic bodies per 10 contiguous crypts)
Grade 1 GVHD
Increased crypt apoptosis without crypt/glands loss ($\geq$ 7 apoptotic bodies per 10 contiguous crypts)
Grade 2 GVHD
Loss of individual crypt/gland with crypt apoptosis
Grade 3 GVHD
Loss of 2 or more contiguous crypts/glands with crypt apoptosis
Grade 4 GVHD
Extensive crypt loss with mucosal denudation or ulceration with crypt apoptosis

When assessing transplant patient GI biopsies

- Time from transplant?
- Transplant type?
- Underlying disease?
- GvHD elsewhere?
- MMF therapy?
- CMV, Adenovirus and EBV titres?

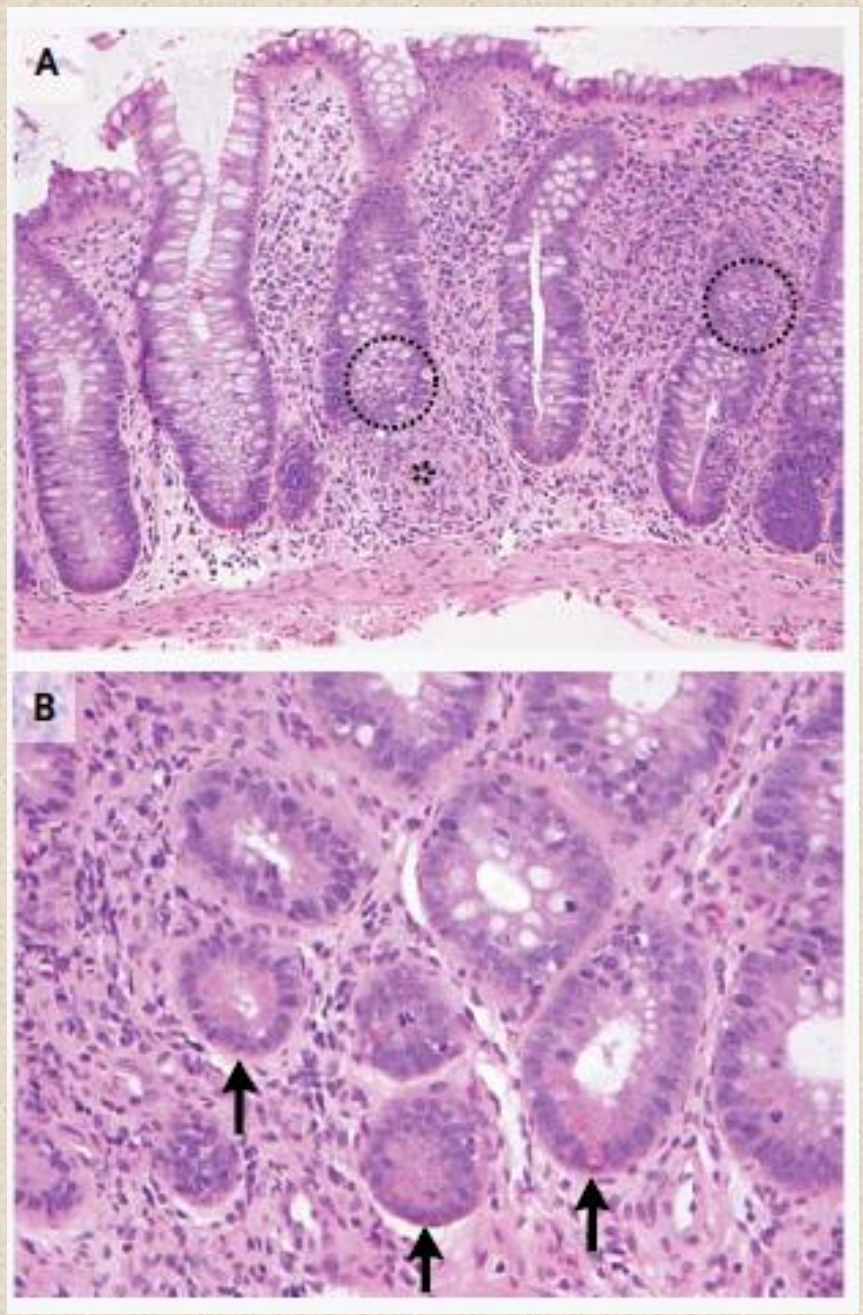
The NEW ENGLAND JOURNAL of MEDICINE

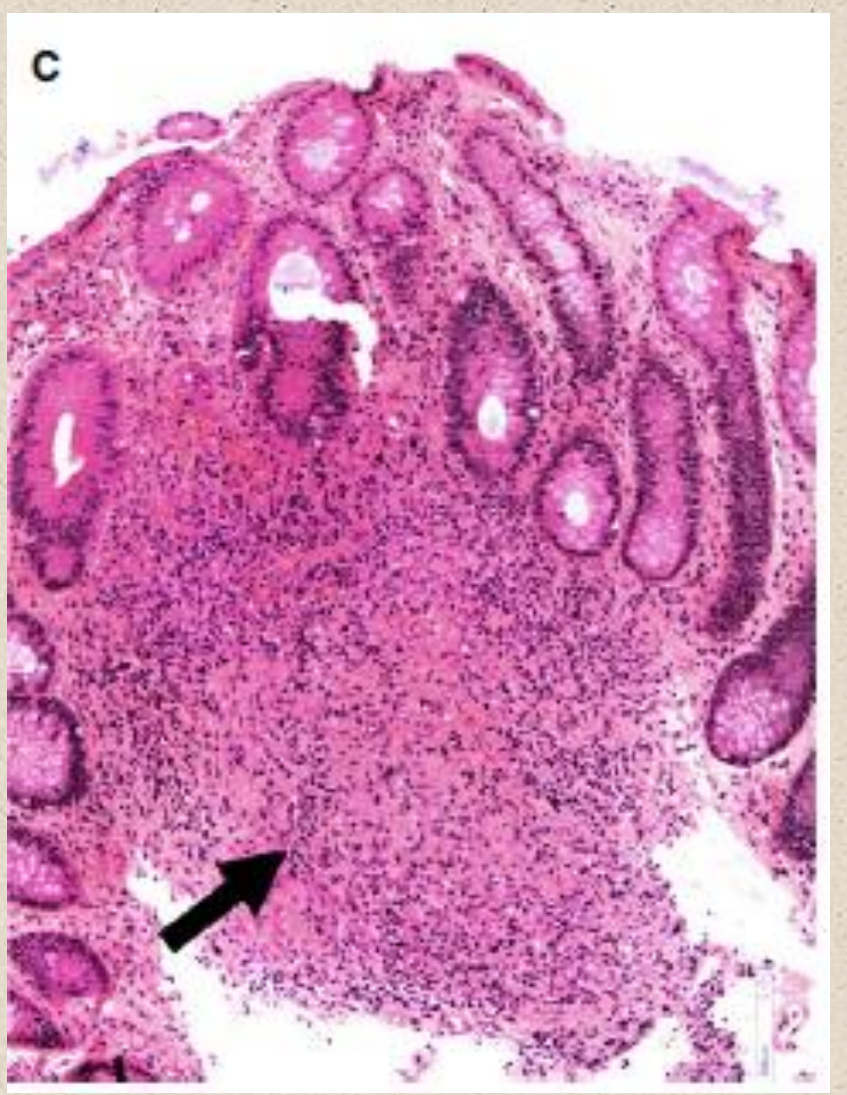
ORIGINAL ARTICLE

Cord Colitis Syndrome in Cord-Blood Stem-Cell Transplantation

Alex F. Herrera, M.D., Gabriela Soriano, M.D., Andrew M. Bellizzi, M.D., Jason L. Hornick, M.D., Ph.D., Vincent T. Ho, M.D., Karen K. Ballen, M.D., Lindsey R. Baden, M.D., Corey S. Cutler, M.D., M.P.H., Joseph H. Antin, M.D., Robert J. Soiffer, M.D., and Francisco M. Marty, M.D.

N Engl J Med 2011;365:815-24.


A
B


C

The NEW ENGLAND JOURNAL of MEDICINE

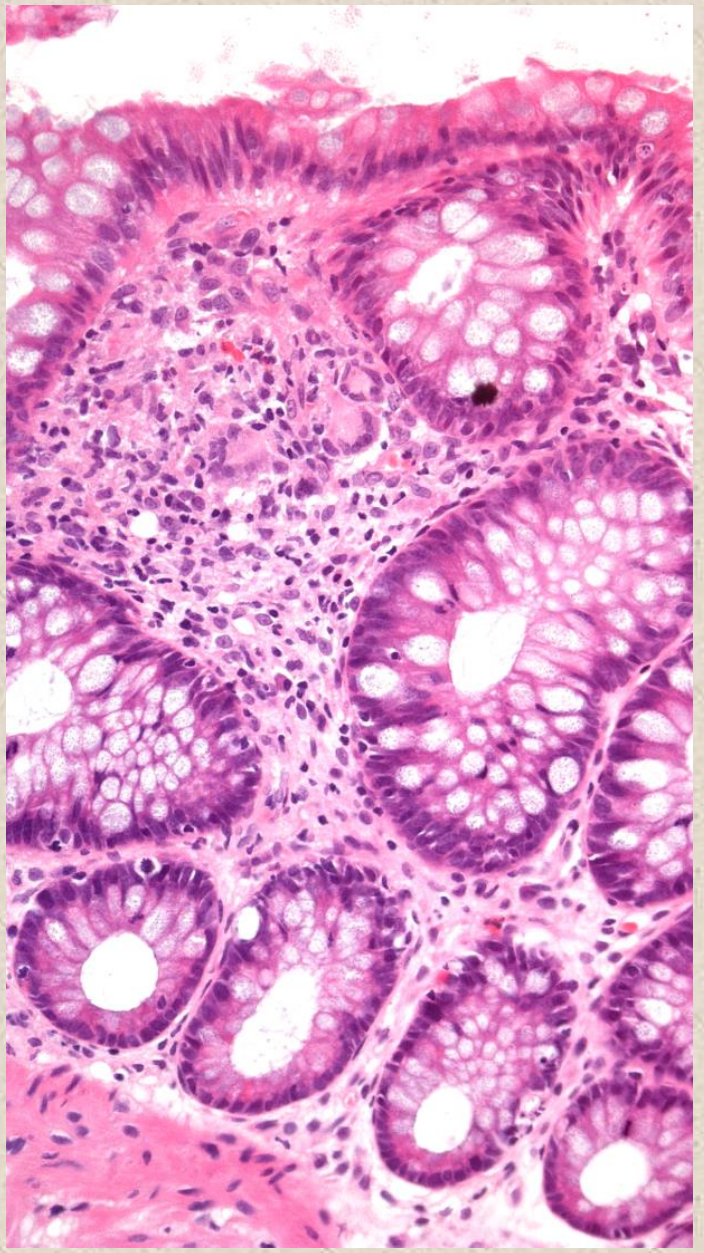
ORIGINAL ARTICLE

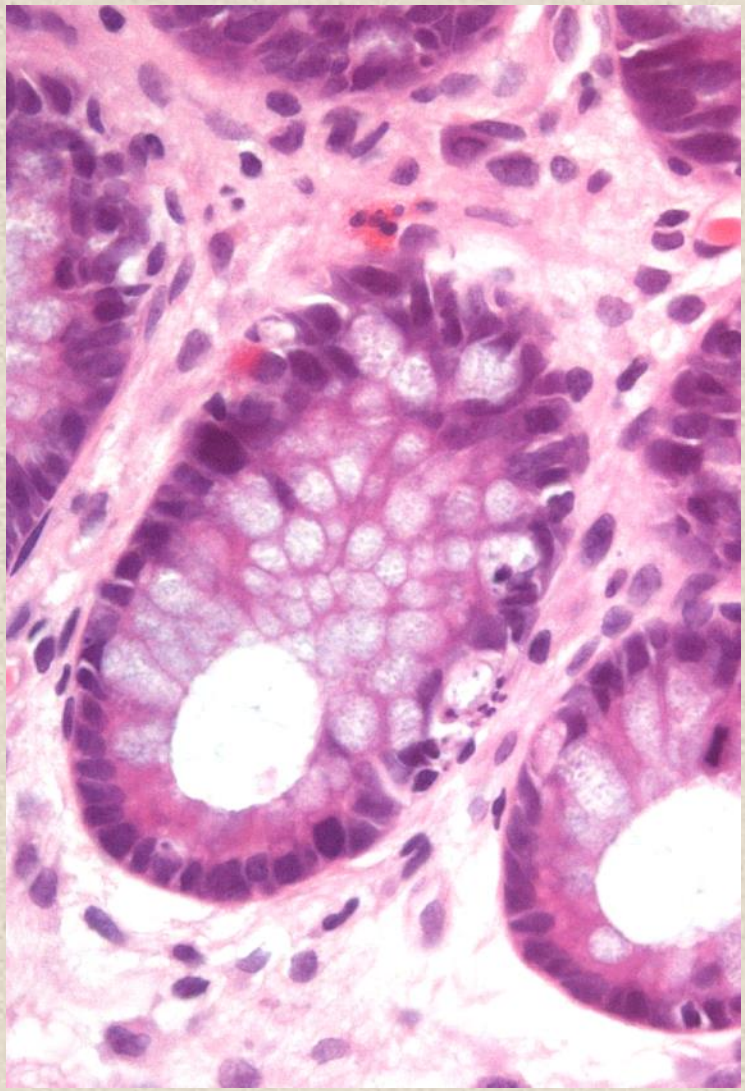
Sequence-Based Discovery of *Bradyrhizobium enterica* in Cord Colitis Syndrome

Ami S. Bhatt, M.D., Ph.D., Samuel S. Freeman, B.S.E., Alex F. Herrera, M.D., Chandra Sekhar Pedamallu, Ph.D., Dirk Gevers, Ph.D., Fujiko Duke, B.S., Joonil Jung, Ph.D., Monia Michaud, M.Sc., Bruce J. Walker, B.S., Sarah Young, Ph.D., Ashlee M. Earl, Ph.D., Aleksander D. Kostic, Ph.D., Akinyemi I. Ojesina, M.D., Ph.D., Robert Hasserjian, M.D., Karen K. Ballen, M.D., Yi-Bin Chen, M.D., Gabriela Hobbs, M.D., Joseph H. Antin, M.D., Robert J. Soiffer, M.D., Lindsey R. Baden, M.D., Wendy S. Garrett, M.D., Ph.D., Jason L. Hornick, M.D., Ph.D., Francisco M. Marty, M.D., and Matthew Meyerson, M.D., Ph.D.

N Engl J Med 2013;369:517-28.

Granulomas in GI GvHD?





Bone Marrow Transplantation (2013) **48,** 1249–1252

www.nature.com/bmt

ORIGINAL ARTICLE

Evaluating the association between histological manifestations of cord colitis syndrome with GVHD

S Shimoji[1], K Kato[1], Y Eriguchi[1], K Takenaka[2], H Iwasaki[2], T Miyamoto[1], Y Oda[3], K Akashi[1,2] and T Teshima[2,4]

Cord colitis syndrome (CCS) is a recently proposed clinical entity characterized by a persistent diarrheal illness after cord blood transplantation (CBT), which is not caused by GVHD or CMV colitis. CCS is histologically characterized by chronic active colitis with granulomatous inflammation and Paneth cell metaplasia suggesting chronicity. However, the specificity of these pathological features to CCS remains to be validated. We conducted a retrospective study of 49 patients who had diarrhea and underwent diagnostic colonoscopy with biopsy following allogeneic hematopoietic SCT. None of the patients met the clinical criteria for CCS. Chronic active colitis with granulomatous inflammation and Paneth cell metaplasia was present in 12/33 (36%) patients with biopsy-proven GVHD, 4/6 (67%) patients with CMV colitis and 2/15 (13%) patients with nonspecific colitis. In patients with GVHD and/or CMV colitis, these pathological features were present in 4/8 (50%) patients after CBT and in 11/26 (42%) patients undergoing BMT or PBSCT. These results demonstrate that chronic active colitis with granuloma and Paneth cell metaplasia is not only a specific feature of CCS but also is present in GVHD and CMV colitis, irrespective of stem cell source.

Biol Blood Marrow Transplant 20 (2014) 1008–1013

Late-Onset Colitis after Cord Blood Transplantation Is Consistent with Graft-Versus-Host Disease: Results of a Blinded Histopathological Review

Filippo Milano [1,2,*], Howard M. Shulman [1,2], Katherine A. Guthrie [1,3], Ivy Riffkin [1], George B. McDonald [1,2], Colleen Delaney [1,2]

[1] *Clinical Research Division, Fred Hutchinson Cancer Research Center, Seattle, Washington*
[2] *Departments of Pediatrics, Pathology, and Medicine, University of Washington School of Medicine, Seattle, Washington*
[3] *Public Health Sciences Division, Fred Hutchinson Cancer Research Center, Seattle, Washington*

Article history:
Received 27 November 2013
Accepted 19 March 2014

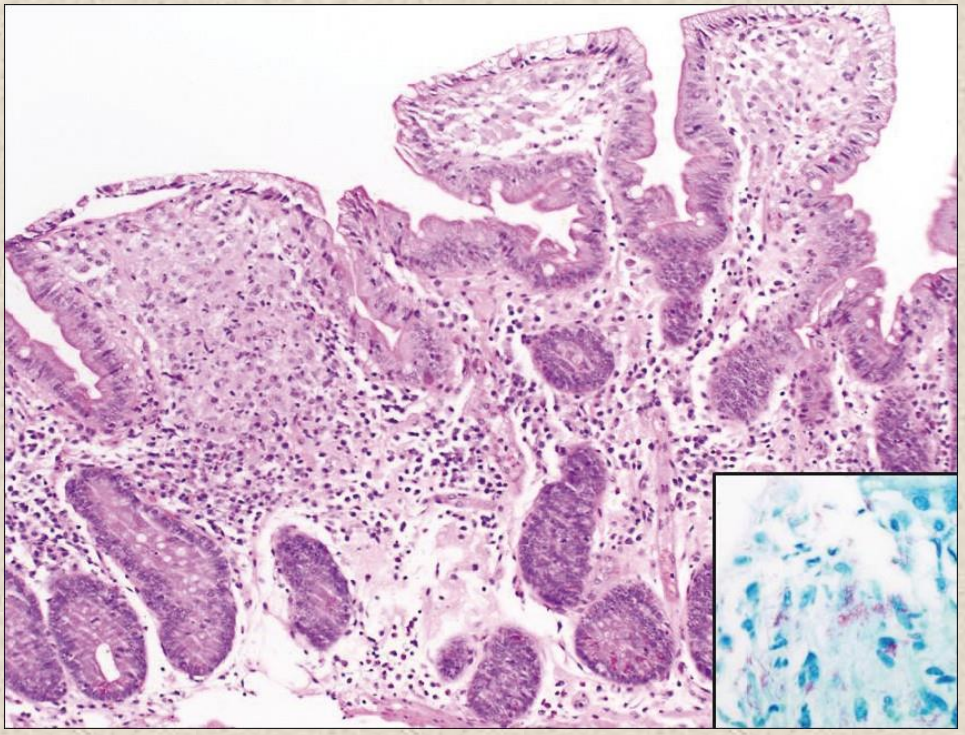
Key Words:
Cord blood transplant
Cord colitis syndrome
Gut graft-versus-host disease

A B S T R A C T

Cord colitis syndrome after umbilical cord blood transplantation (UCBT) involves late-onset diarrhea, absence of infection or GVHD, chronic active colitis, and granulomatous inflammation that responds to antibiotics. We tested the hypothesis that Seattle recipients of UCBT had late-occurring colitis distinct from GVHD and colitis in other allograft recipients. We conducted a blinded histological review of 153 colon biopsy specimens from 45 UCBT recipients and 45 matched allografted controls obtained between day +70 and day +365 post-transplantation. Diarrhea was the primary indication for biopsy in 10 UCBT recipients and 11 controls. No histological differences were seen between UCBT recipients and controls with diarrhea or between the entire cohort of UCBT recipients and their controls. Distorted mucosal architecture and apoptotic crypt cells typical of GVHD were common in both groups; Paneth cell metaplasia and granulomas were rare findings. Chronic active colitis was present in 58% of the UCBT recipients and in 62% of controls. No UCBT recipient with diarrhea was treated with antibiotics, and all recipients responded to systemic corticosteroids. Colitis occurring after day +70 in allografted controls was related to acute GVHD, independent of the source of donor cells. We could not identify a histologically distinct cord colitis syndrome in either the UCBT or the non–cord blood allograft recipients.

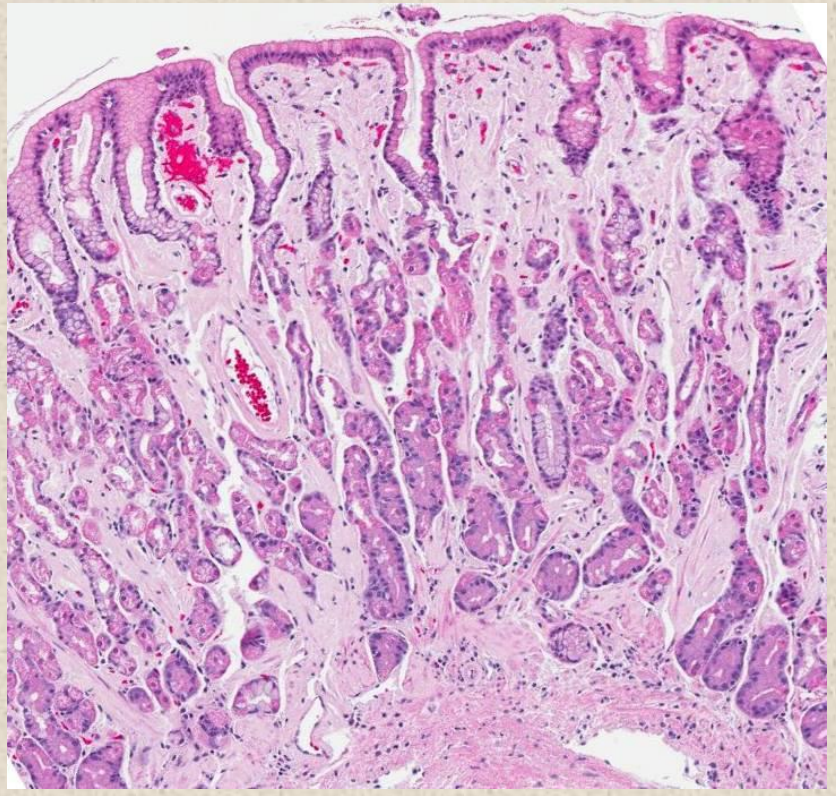
Underlying condition requiring transplant

- BMT transplant
  - Lymphoma/leukaemia



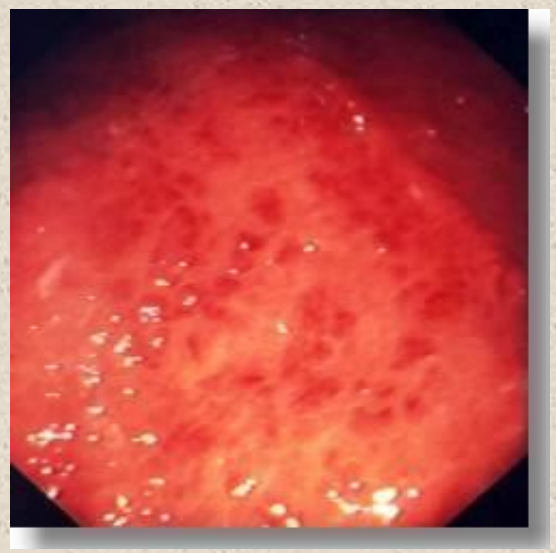
Underlying condition requiring transplant

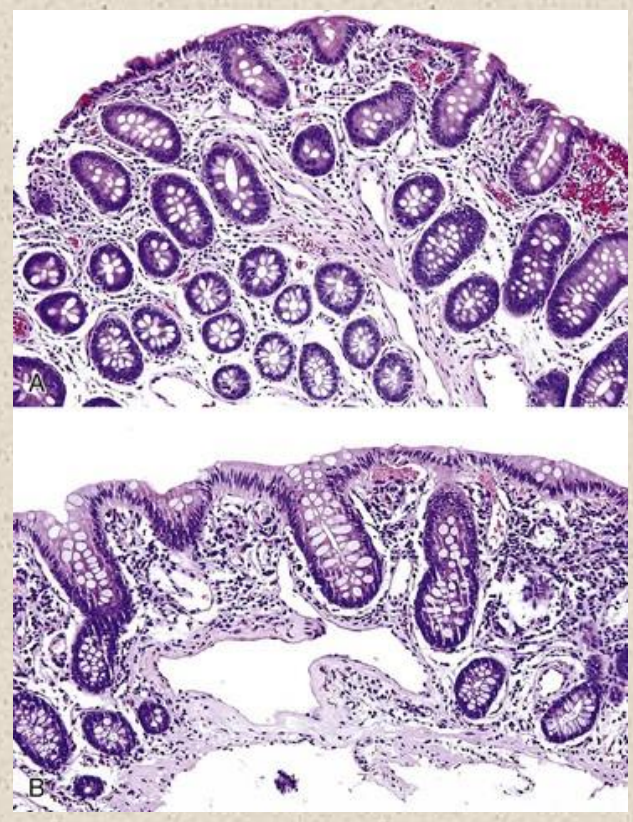
- Renal transplant
  - Amyloid



Underlying condition requiring transplant

- Liver transplant
  - Portal colopathy





  - Primary sclerosing cholangitis and IBD

Transplantation and IBD

- Does transplantation improve or worsen IBD?

Colorectal disease in liver allograft recipients – a clinicopathological study with follow-up

Newton A.C.S Wong[a], Andrew J. Bathgate[b] and Christopher O.C. Bellamy[a]

Objective To determine the spectrum and outcome of colorectal diseases occurring in adult liver allograft recipients.

Design A retrospective cohort analysis of clinical, microbiological and histopathological data regarding colorectal disease.

Patients Forty three out of 302 adult primary liver allograft recipients were transplanted and followed up (at median 42 months) at a tertiary referral centre/teaching hospital.

Results Out of 302 patients, 43 (14%) were investigated (by endoscopy and/or laparotomy) for symptoms of colorectal disease after orthotopic liver transplantation. The symptoms were: diarrhoea ($n = 31$); per-rectal bleeding ($n = 5$); and symptoms relating to pre-transplant activity of pre-transplant ulcerative colitis was unchanged or increased after orthotopic liver transplantation. Two further patients developed new-onset ulcerative colitis after orthotopic liver transplantation.

Conclusions Ulcerative colitis, *C. difficile*, cytomegalovirus infection and medications are the commonest colorectal causes of morbidity after orthotopic liver transplantation. Adult liver allograft recipients are, however, unlikely to show certain large bowel diseases encountered in other immunosuppressed groups. Amongst non-ulcerative colitis patients, those presenting with diarrhoea show a good outcome with appropriate management, whereas those with per-rectal bleeding have a more guarded prognosis. *Eur J Gastroenterol Hepatol* 14:231–236

Transplantation and IBD

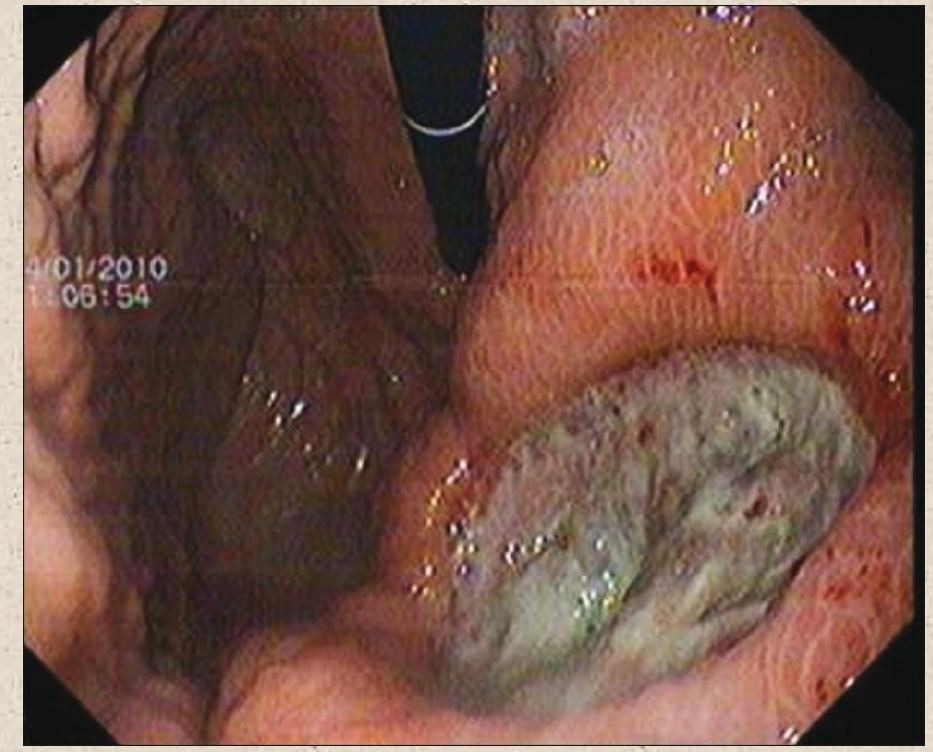
- Does transplantation improve or worsen IBD?

activity of pre-transplant ulcerative colitis was unchanged or increased after orthotopic liver transplantation. Two further patients developed new-onset ulcerative colitis after orthotopic liver transplantation.

- Immunosuppression helps but restoration of normal liver function has opposite effect.

Other specific associations

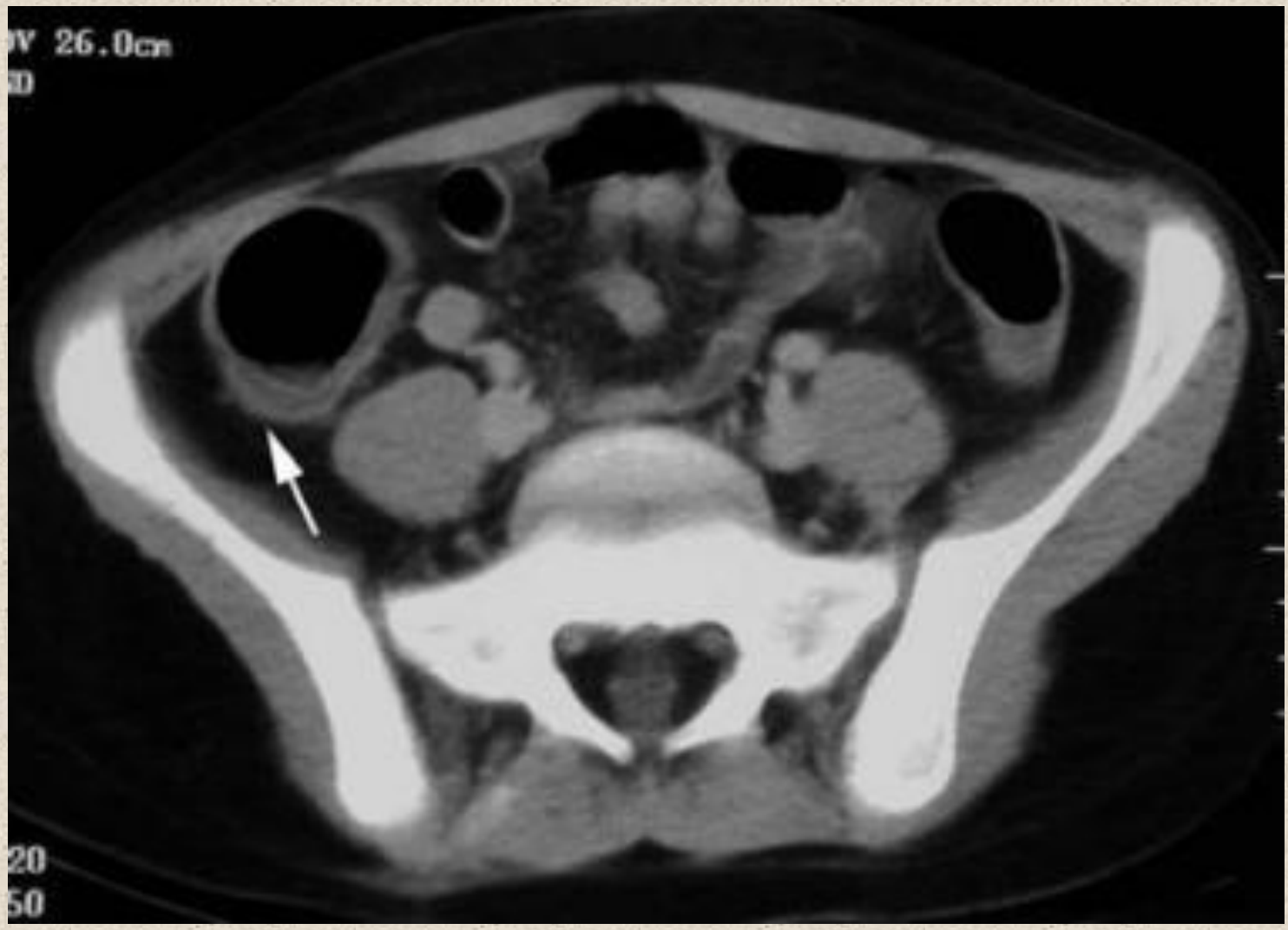
- Solid organ transplant patients
  - Gastric and duodenal ulcers



Other specific associations

- Solid organ transplant patients
  - Gastric and duodenal ulcers
- HIV/AIDS patients
  - Oesophageal and anal ulcers
  - Enterocolopathy (apoptosis and villous atrophy)

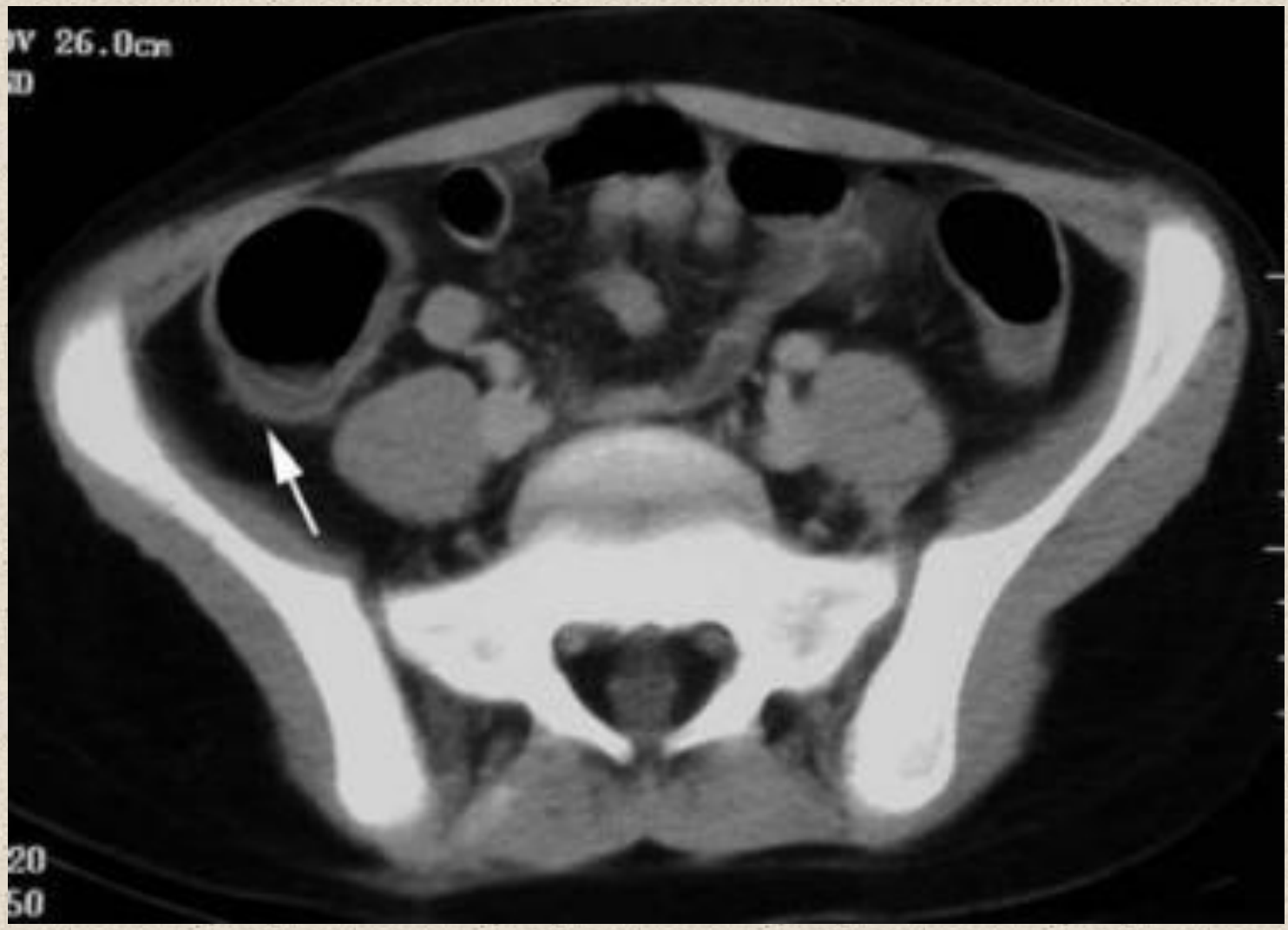
23M AML patient



- Pneumatosis coli:

- Colitis but no …

Leukaemia and neutropaenic colitis



Summary

- Rare and/or multiple pathology
- Clinical data are crucial – especially when considering GvHD

When assessing transplant patient GI biopsies

- Time from transplant?
- Transplant type?
- Underlying disease?
- GvHD elsewhere?
- MMF therapy?
- CMV, Adenovirus and EBV titres?