Medizinische Universität Graz

Gastritis: diagnostic criteria and differential diagnosis

11th Digestive Pathology Course

Hilton Hotel, Bucharest, Romania, November 2-3, 2018

European Network of Gastrointestinal Pathology
ENGIP

European Society of Pathology

Cord Langner MD
Diagnostic & Research Centre for Molecular BioMedicine
Institute of Pathology
Medical University of Graz, Austria

Agenda

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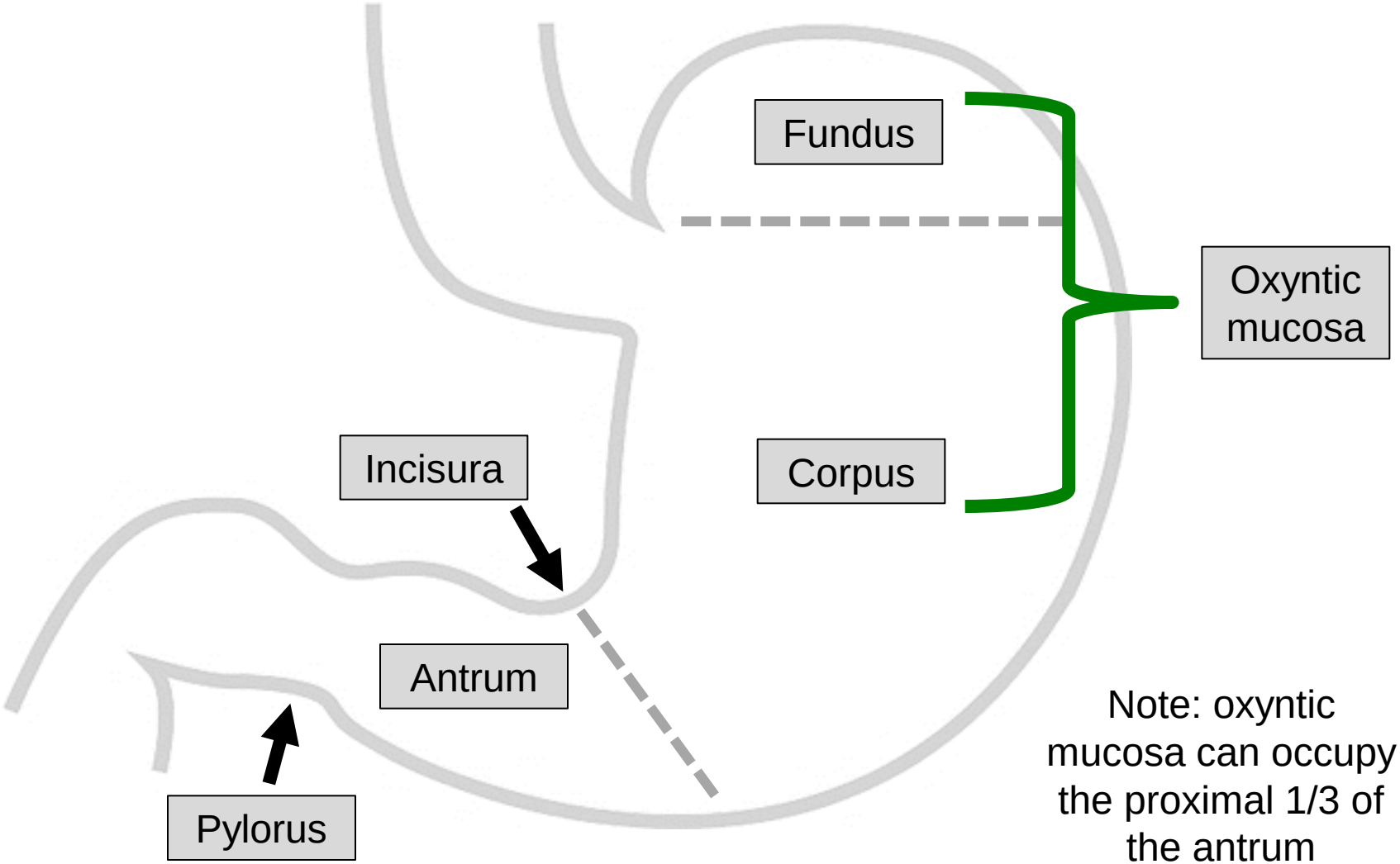
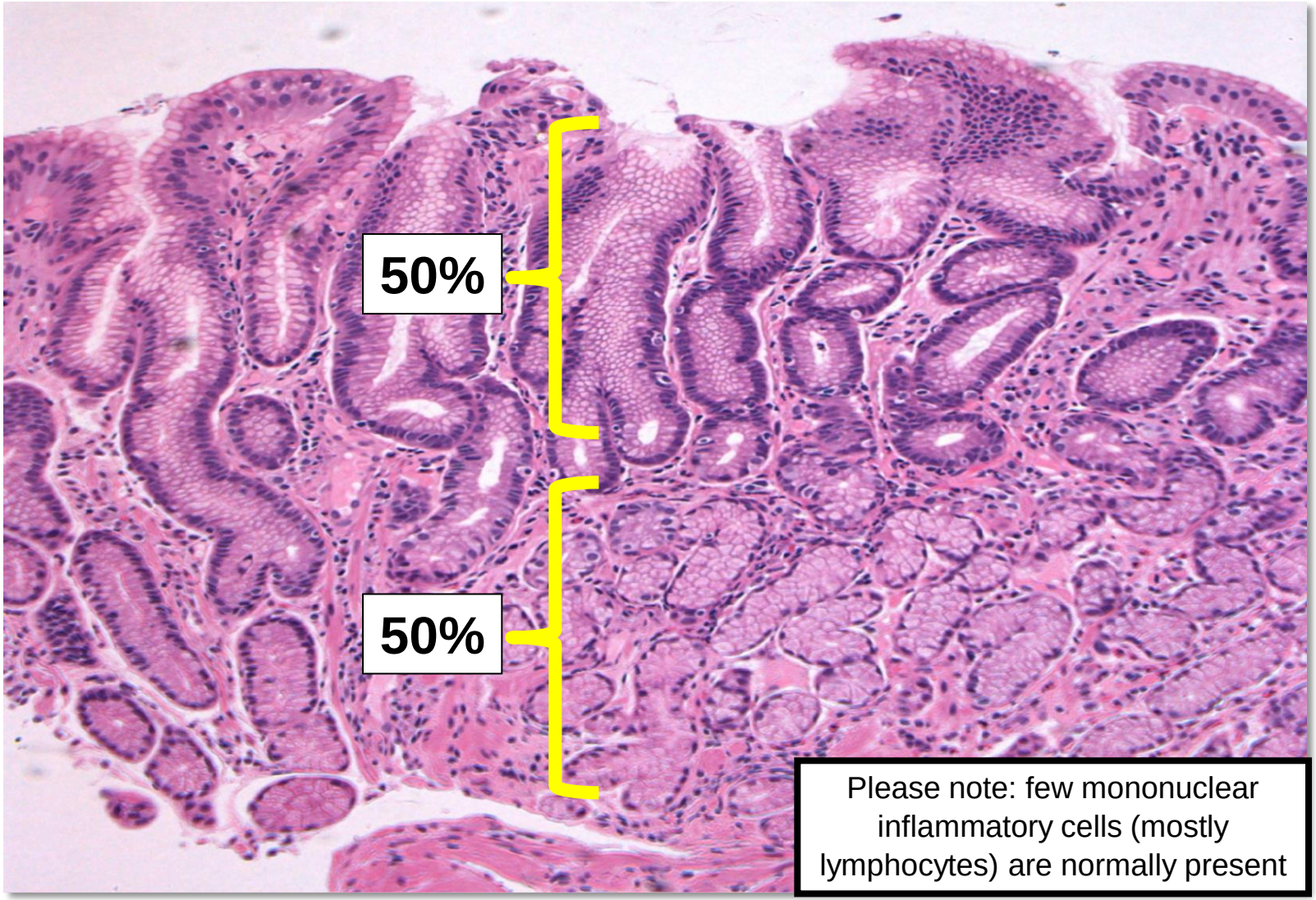
- **The normal stomach**
- **Definition of gastritis**
- **The aetiological alphabet of gastritis**
  - **A** utoimmune gastritis
  - **B** acterial gastritis (HP-Gastritis)
  - **C** hemical gastritis (reactive gastropathy)
  - **D** istinct other types of gastritis
- **Grading und staging of chronic gastritis**
- **Gastric polyps**
- **Take home message**

The normal stomach

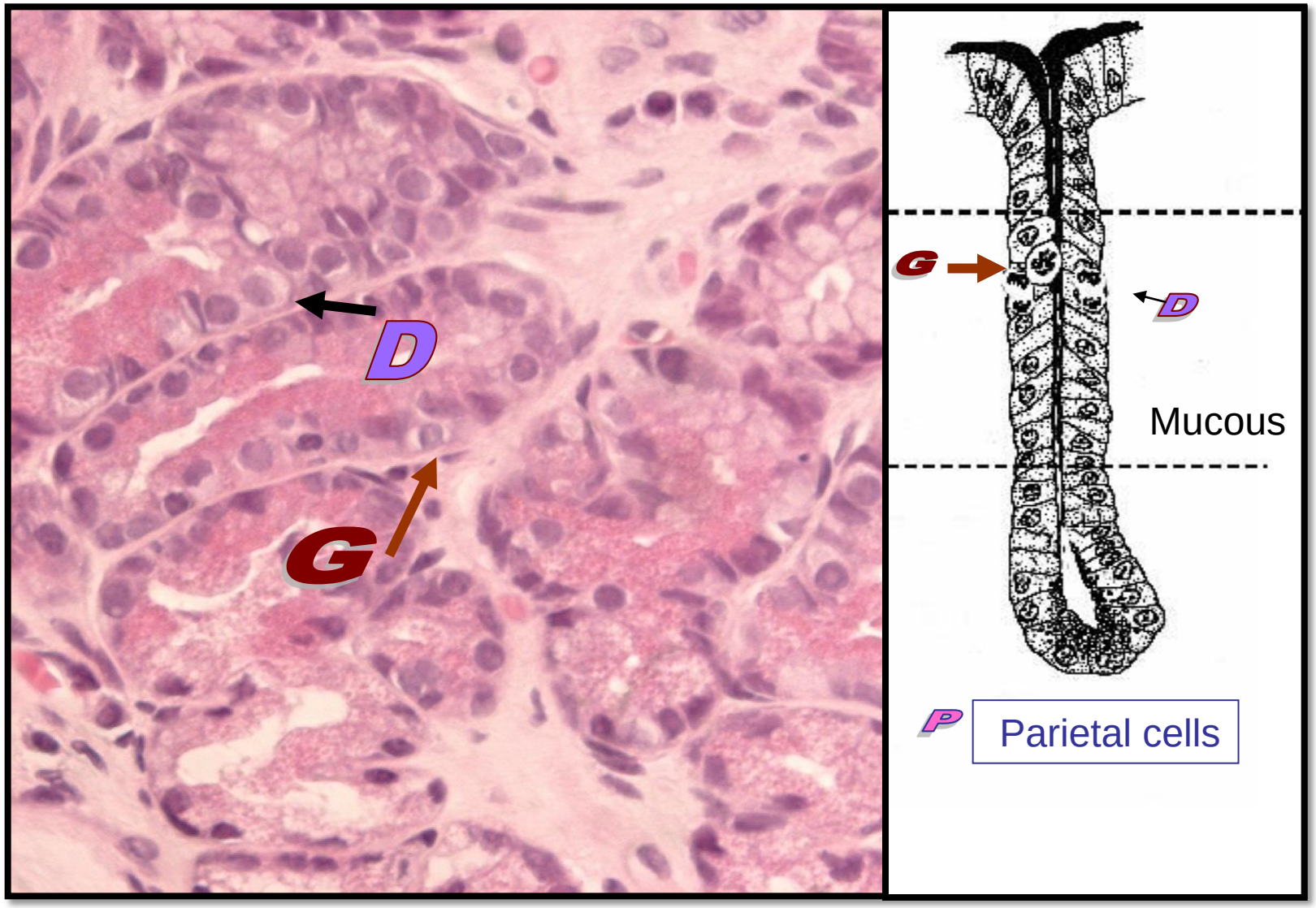


Note: oxyntic mucosa can occupy the proximal 1/3 of the antrum

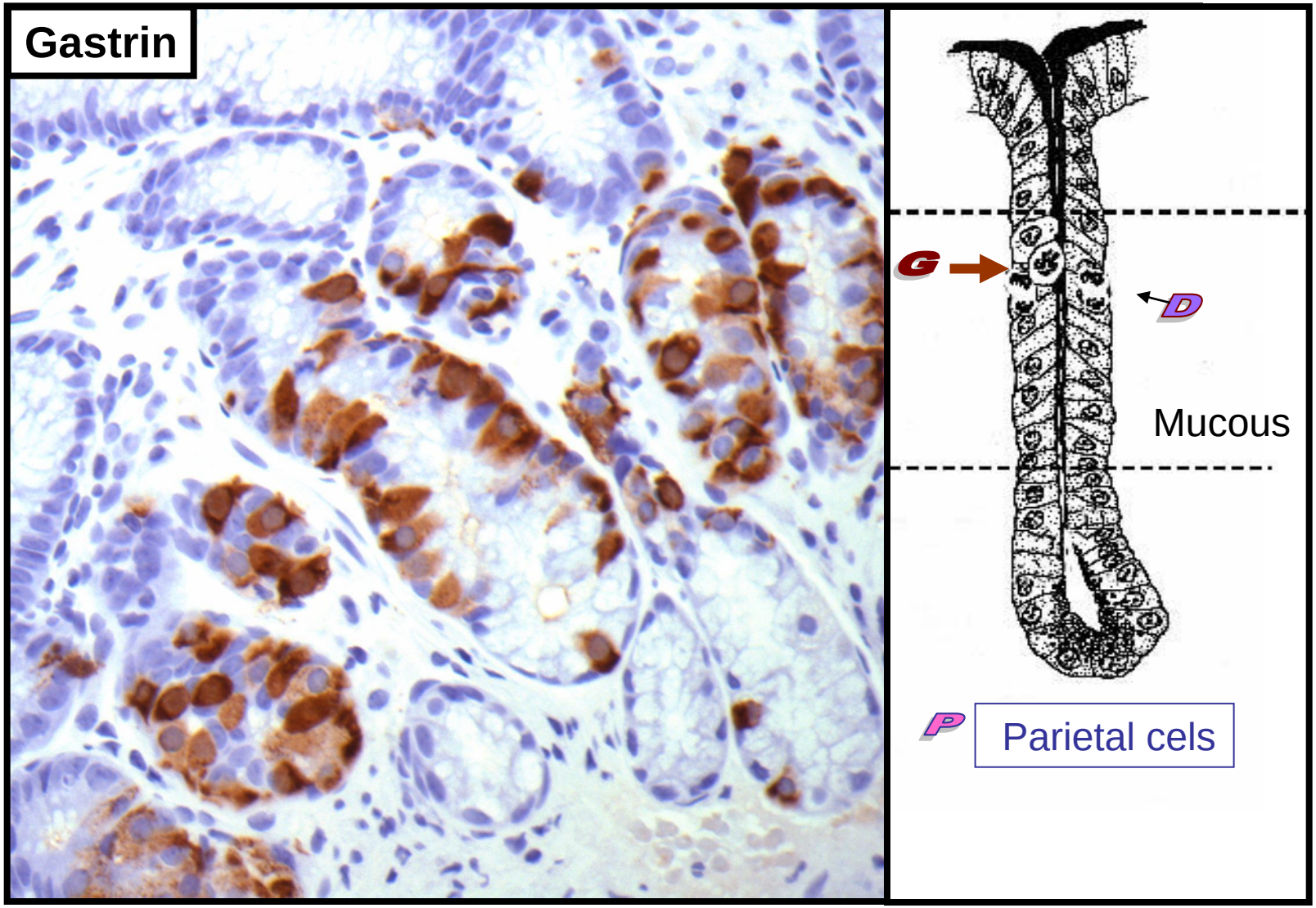
The normal antrum



The normal antrum



The normal antrum



The normal antrum

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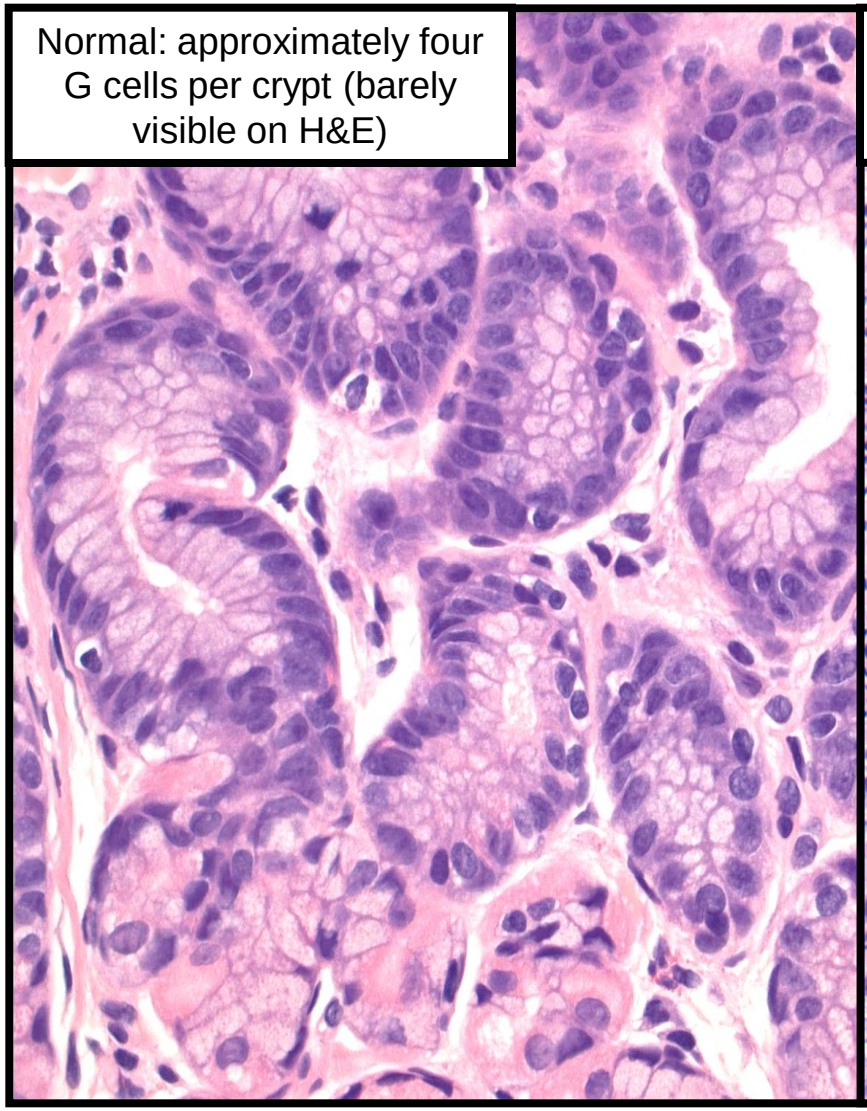
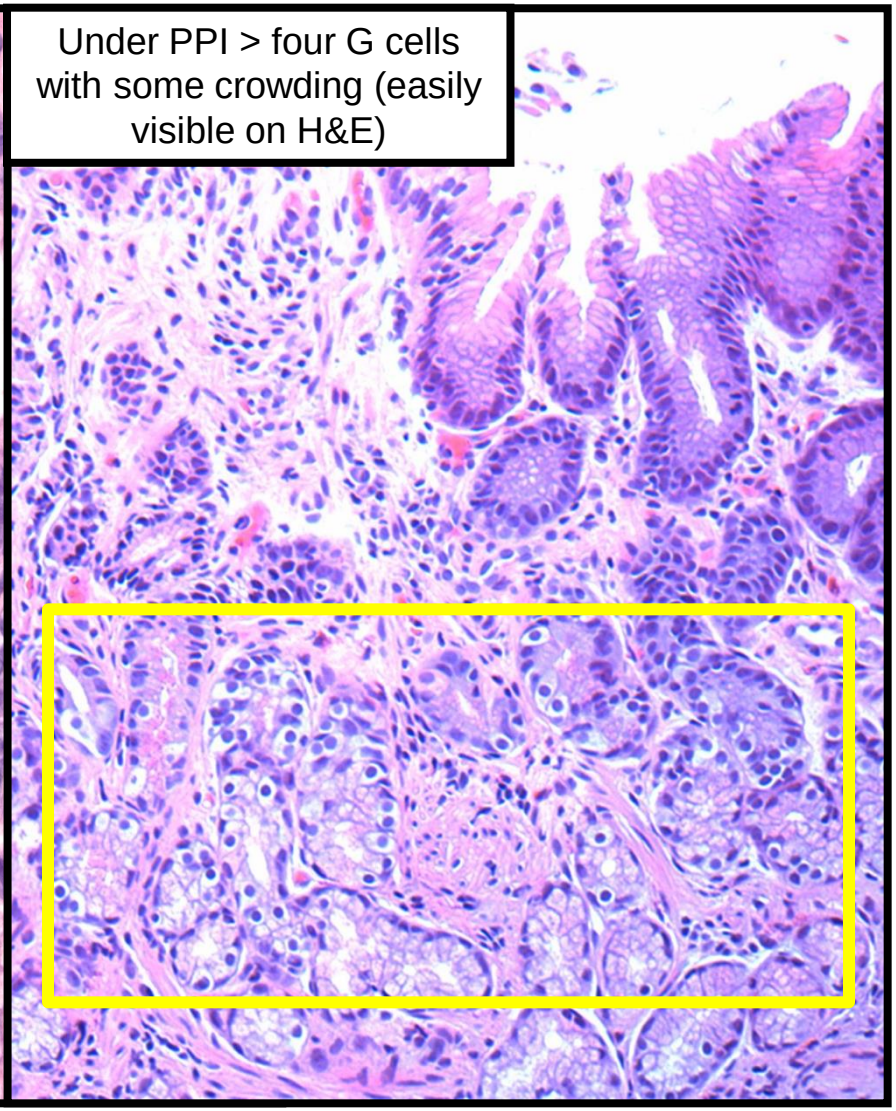
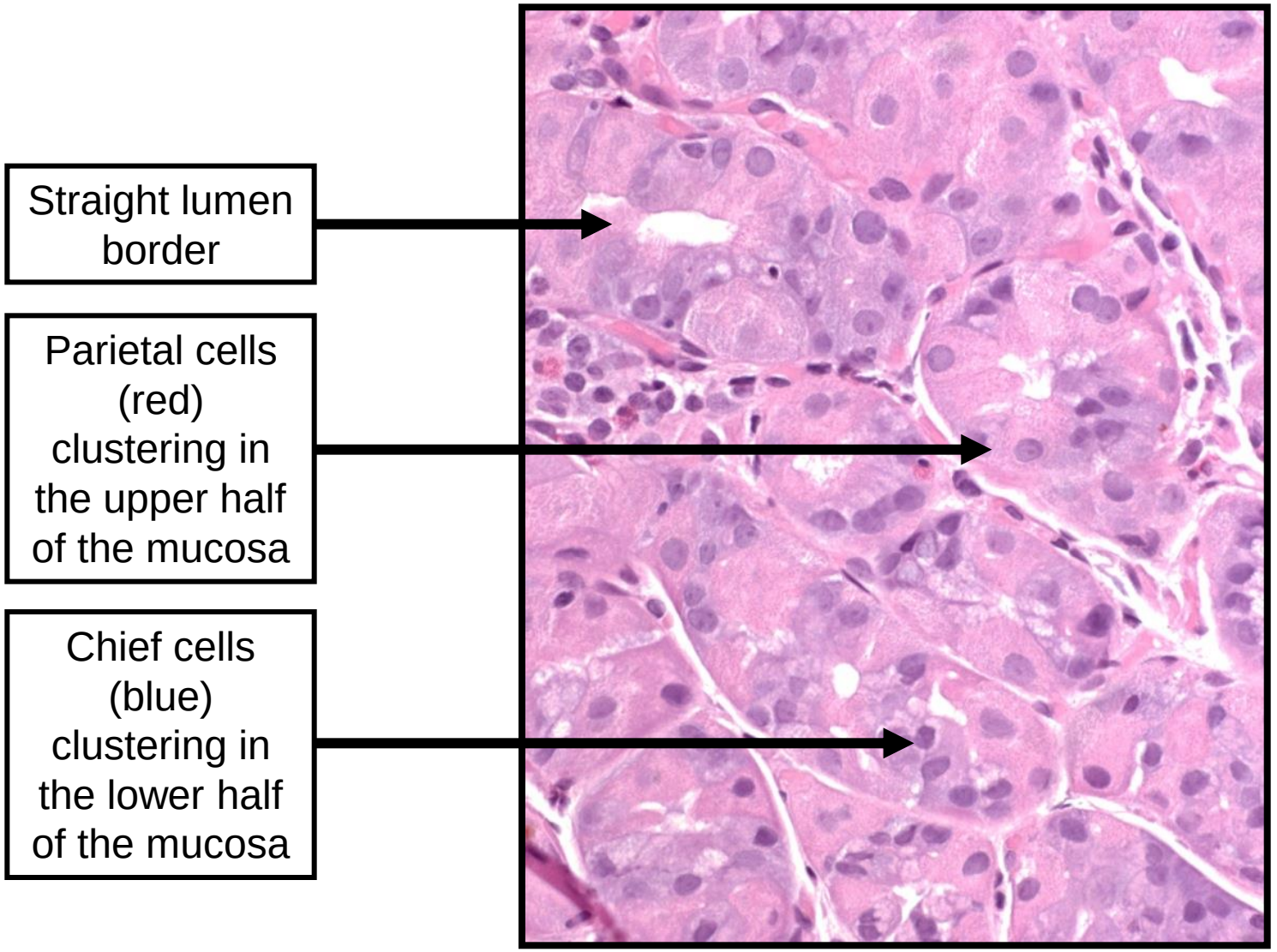
Normal: approximately four G cells per crypt (barely visible on H&E)



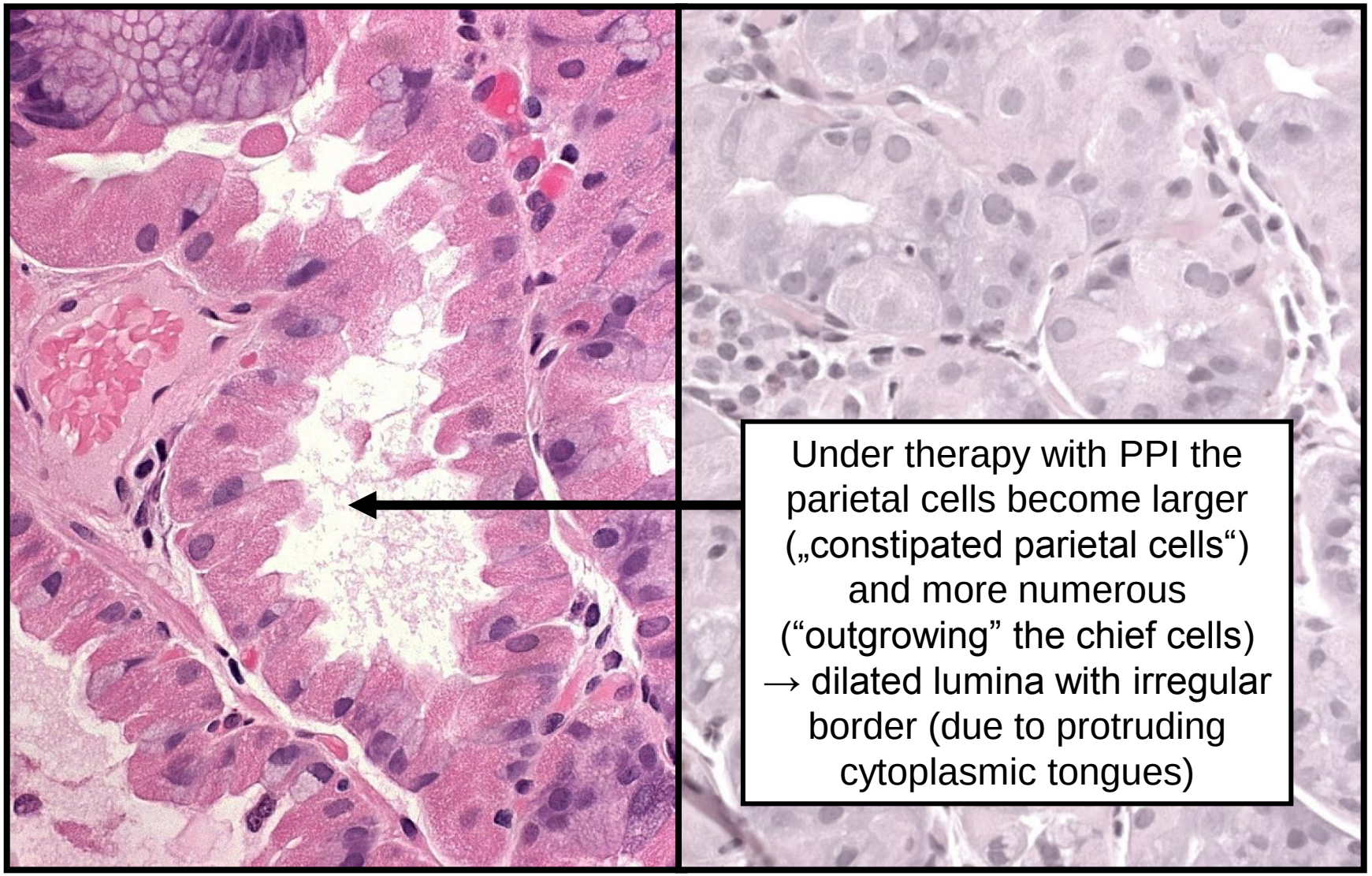
Under PPI > four G cells with some crowding (easily visible on H&E)



The normal corpus



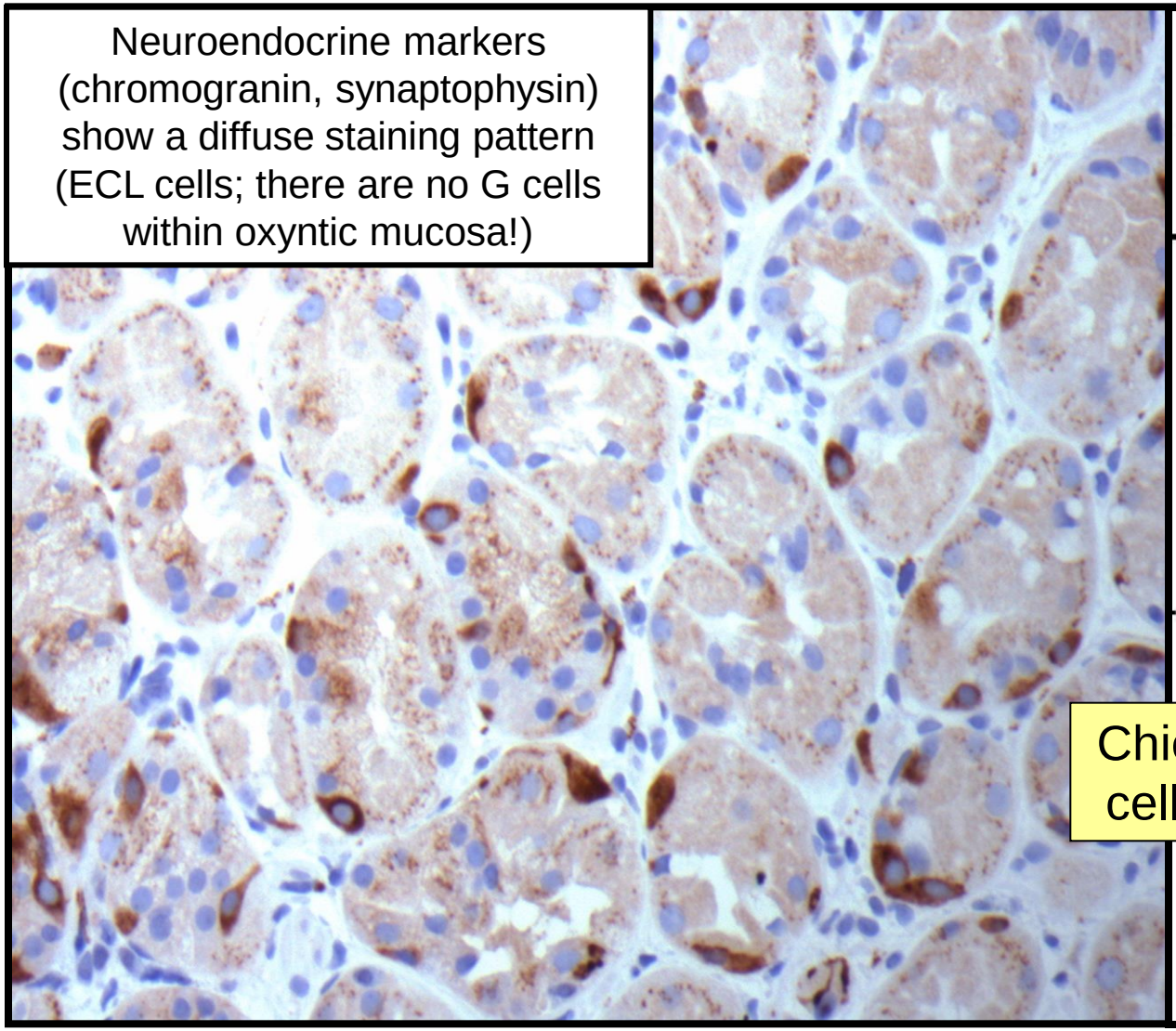
The normal corpus

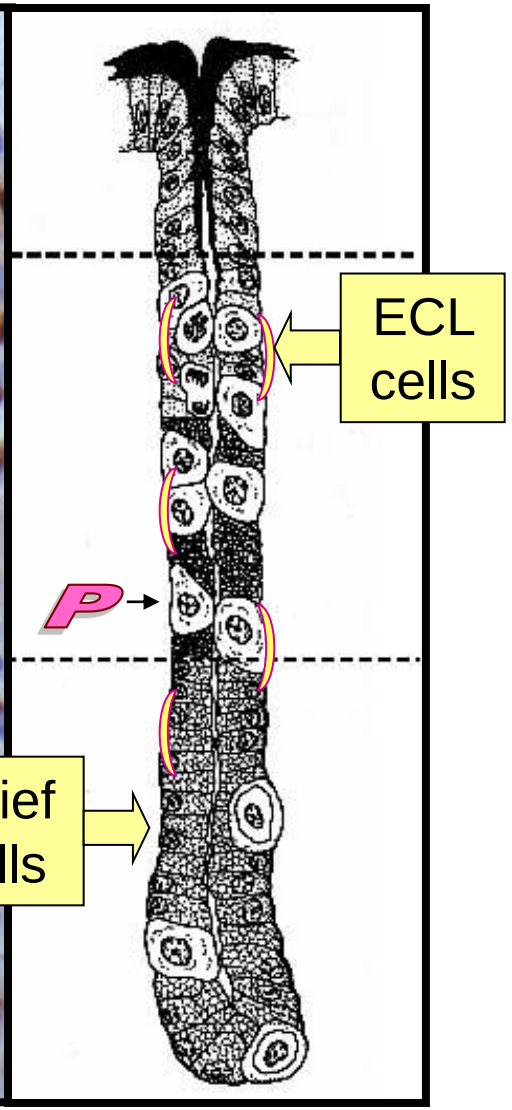


Under therapy with PPI the parietal cells become larger („constipated parietal cells“) and more numerous (“outgrowing” the chief cells) → dilated lumina with irregular border (due to protruding cytoplasmic tongues)

The normal corpus

Neuroendocrine markers (chromogranin, synaptophysin) show a diffuse staining pattern (ECL cells; there are no G cells within oxyntic mucosa!)





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Definition of Gastritis:

“Histological proof of gastric mucosa inflammation”

Professor Peter Malfertheiner

Gastroenterologist

Magdeburg, Germany

Kyoto global consensus report on *Helicobacter pylori* gastritis

Kentaro Sugano,[1] Jan Tack,[2] Ernst J Kuipers,[3] David Y Graham,[4] Emad M El-Omar,[5] Soichiro Miura,[6] Ken Haruma,[7] Masahiro Asaka,[8] Naomi Uemura,[9] Peter Malfertheiner,[10] on behalf of faculty members of Kyoto Global Consensus Conference

Box 3 Aetiology-based classification of gastritis (3A) and duodenitis (3B). A proposal according to the consensus at the Kyoto consensus conference

3A Proposed classification of gastritis in the Kyoto consensus conference

Autoimmune gastritis

Infectious gastritis

- *Helicobacter pylori*-induced gastritis
- Bacterial gastritis other than *H. pylori*
  - *Helicobacter heilmannii* gastritis
  - Enterococcus gastritis
  - Mycobacteria gastritis
  - Secondary syphilitic gastritis
- Gastric phlegmone
- Viral gastritis
  - Enteroviral gastritis
  - Cytomegalovirus gastritis
- Fungal gastritis
  - Gastritis due to mucormycosis
  - Gastric candidiasis
  - Gastric histoplasmosis
- Parasitic gastritis
  - Cryptosporidium gastritis
  - Gastric *strongyloides stercorale*
  - Gastric anisakiasis

Gastritis due to external causes

- Drug-induced gastritis
- Alcoholic gastritis
- Radiation gastritis
- Chemical gastritis
- Gastritis due to duodenal reflux
- Gastritis due to other specified external cause

Gastritis due to specified causes

- Lymphocytic gastritis
- Ménétrier disease
- Allergic gastritis
- Eosinophilic gastritis

Gastritis due to other diseases classified elsewhere

- Gastritis due to sarcoidosis
- Gastritis due to vasculitis
- Gastritis due to Crohn's disease

3B Proposed classification of duodenitis in the Kyoto consensus conference

Infectious duodenitis

- *H. pylori*-induced duodenitis
- Bacterial duodenitis other than *H. pylori*
  - Mycobacterial duodenitis
  - Duodenitis due to *Tropheryma whipplei* (Whipple's disease)
- Duodenal phlegmone
- Fungal duodenitis
  - Duodenal candidiasis
- Parasitic duodenitis
  - Ancylostomasis (hookworm) duodenitis
  - Duodenal anisakiasis
  - Duodenitis due to *Giardia lamblia*
  - Strongyloides duodenitis
- Viral duodenitis
  - Cytomegaloviral duodenitis
  - Herpetic duodenitis

Duodenitis due to external causes

- Alcoholic duodenitis
- Chemical duodenitis
- Radiation duodenitis
- Duodenitis due to other external causes
- Drug-induced duodenitis

Duodenitis due to specified causes

- Allergic duodenitis
- Eosinophilic duodenitis
- Lymphocytic duodenitis

Duodenitis due to other diseases classified elsewhere

- Duodenitis due to Crohn's disease
- Duodenitis due to sarcoidosis
- Duodenitis due to vasculitis
- Duodenitis due to Henoch–Schönlein purpura
- Duodenitis due to coeliac disease

Sugano et al. Gut 2015

Contents lists available at ScienceDirect

Digestive and Liver Disease

journal homepage: www.elsevier.com/locate/dld

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Alimentary Tract

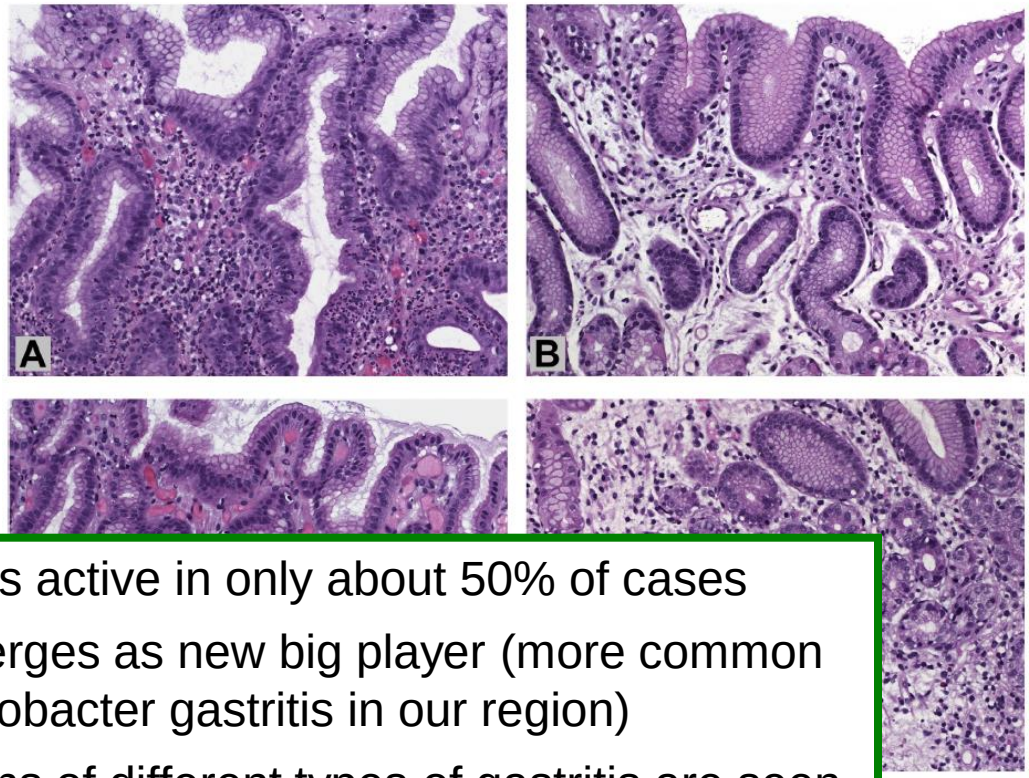
Changing prevalence patterns in endoscopic and histological diagnosis of gastritis? Data from a cross-sectional Central European multicentre study

Eva-Maria Wolf[a], Wolfgang Plieschnegger[b], Michael Geppert[c], Bernd Wigginghaus[d], Gabriele M. Höss[e], Andreas Eherer[f], Nora I. Schneider[a], Almuthe Hauer[g], Peter Rehak[h], Michael Vieth[i], Cord Langner[a,*]

Table 2
Histological diagnosis of gastritis.

Histological type of gastritis	*N* (%)
Helicobacter gastritis (HG)	210 (18.7%)
HG only	208 (18.5%)
HG + reactive gastropathy	1 (0.1%)
HG + Crohn's disease	1 (0.1%)
Post *Helicobacter* gastritis (PHG)	215 (19.1%)
PHG only	176 (15.7%)
PHG + reactive gastropathy	21 (1.9%)
PHG + autoimmune gastritis	11 (1%)
PHG + reactive gastropathy + autoimmune gastritis	6 (0.5%)
PHG + Crohn's disease	1 (0.1%)
Reactive gastropathy (RG)	234 (20.8%)
RG only	201 (17.1%)
RG + post *Helicobacter* gastritis	21 (1.9%)
RG + post *Helicobacter* gastritis + autoimmune Gastritis	6 (0.5%)
RG + autoimmune gastritis	5 (0.4%)
RG + *Helicobacter* gastritis	1 (0.1%)
Autoimmune gastritis (AG)	26 (2.3%)
AG only	
AG + post *Helicob*	
AG + post *Helicob*	
AG + reactive gas	
Crohn's disease (CD	
CD only	
CD + *Helicobacter*	
CD + post *Helicob*	

Abbreviations: HG – RG – reactive gastrop



mmune gastritis (D).

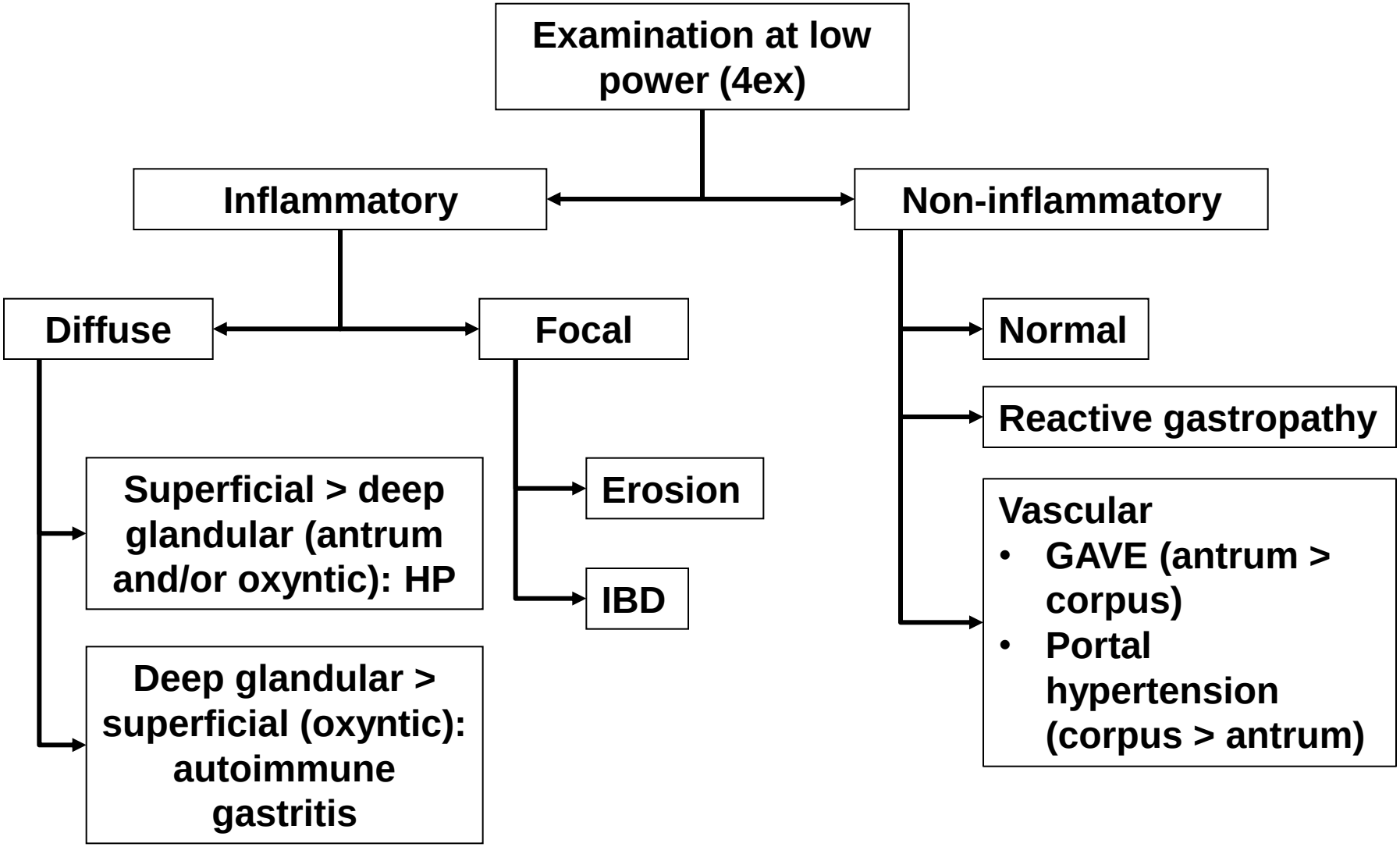
Helicobacter-gastritis is active in only about 50% of cases

Reactive gastropathy emerges as new big player (more common than active Helicobacter gastritis in our region)

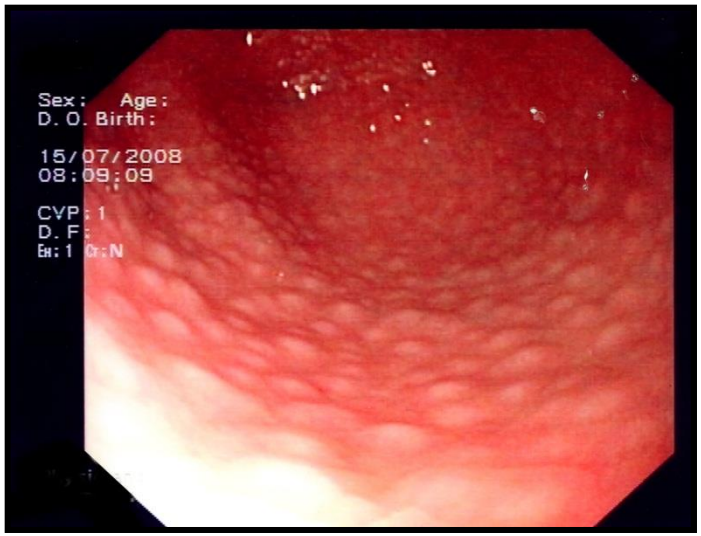
In 7% of cases combinations of different types of gastritis are seen

Wolf et al. Dig Liver Dis 2014

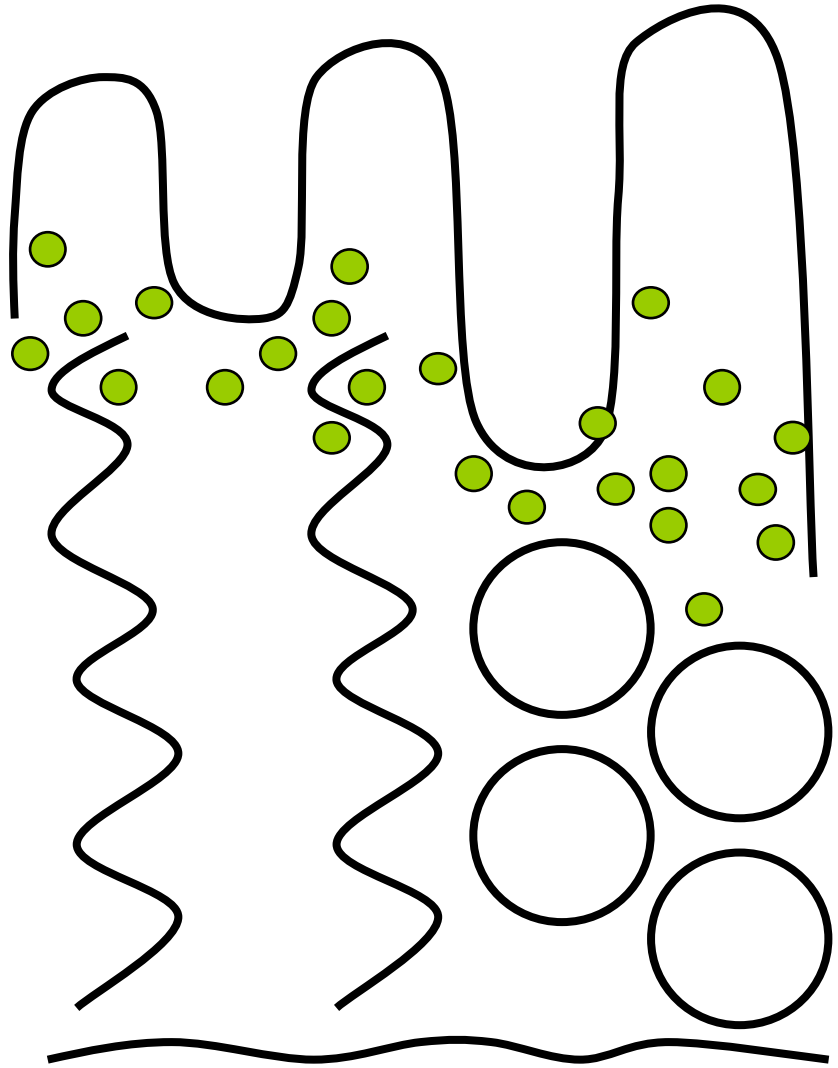
Algorithmic approach to the diagnosis of gastritis



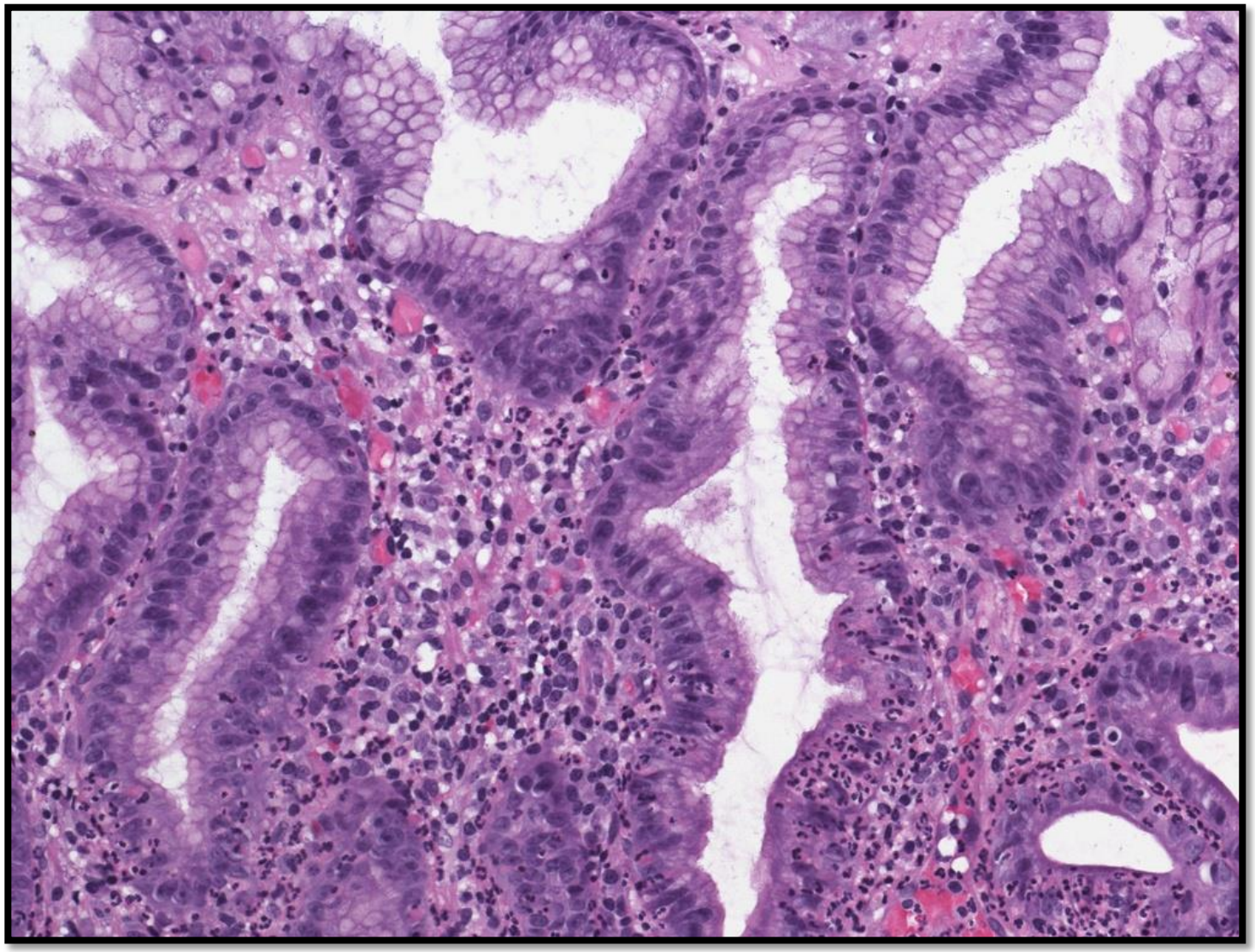
Helicobacter gastritis



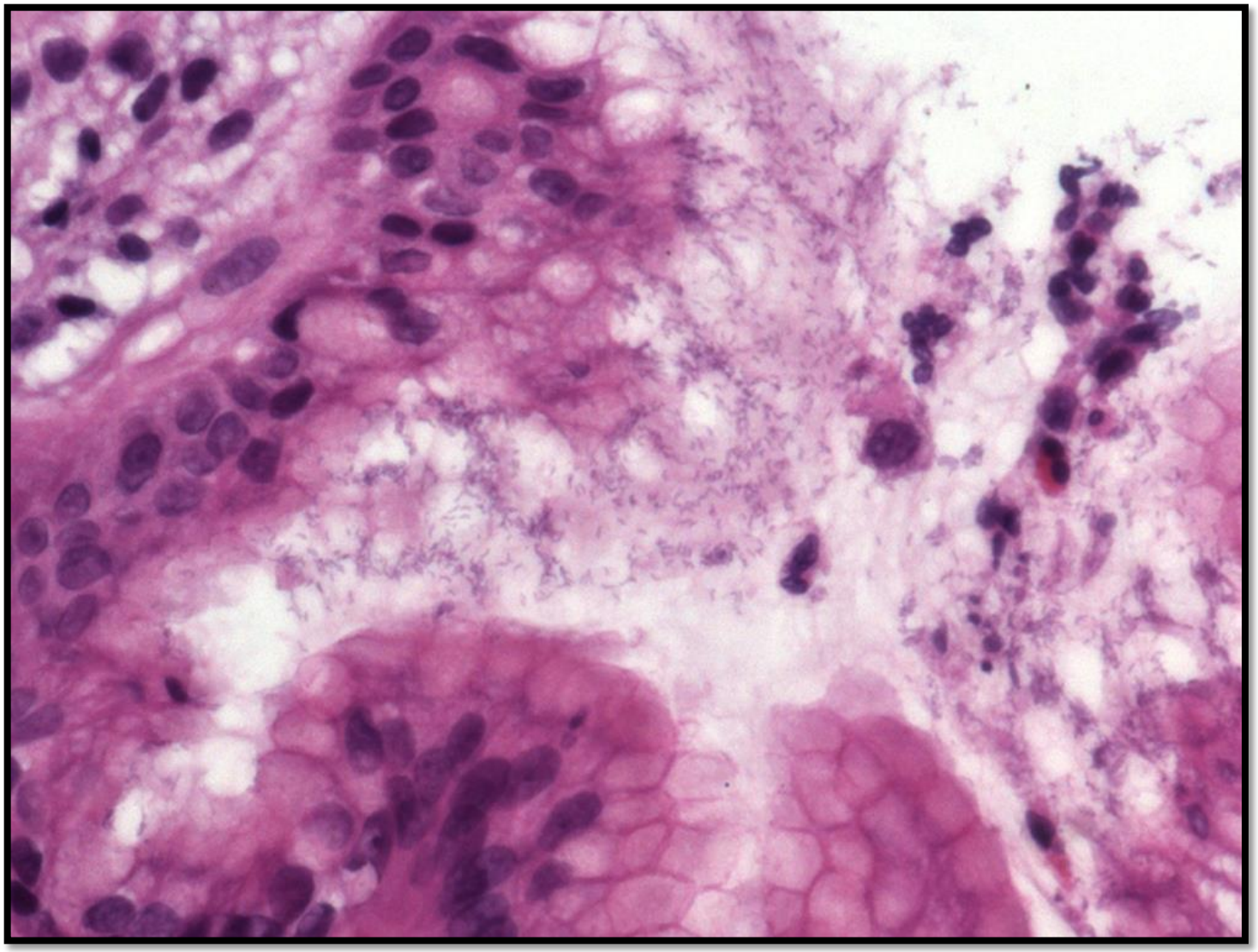
- Chronic-active inflammation
- Starts in the antrum, but may shift to the corpus (in patients receiving PPIs and/or with intestinal metaplasia)



Helicobacter gastritis



Helicobacter gastritis



HP gastritis und non-HP helicobacter gastritis

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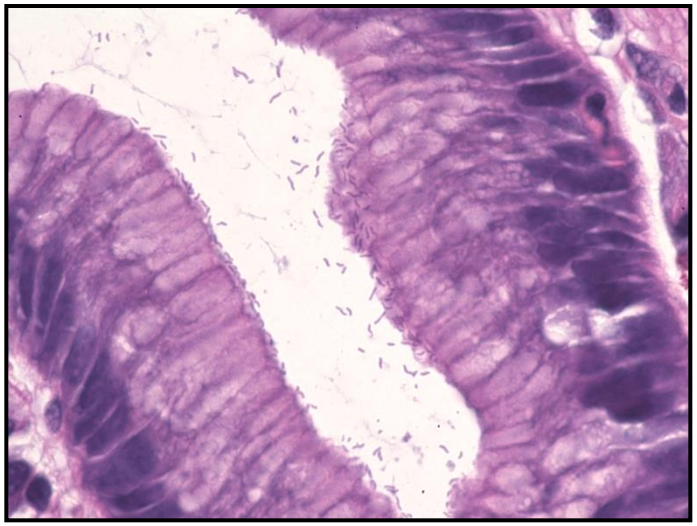
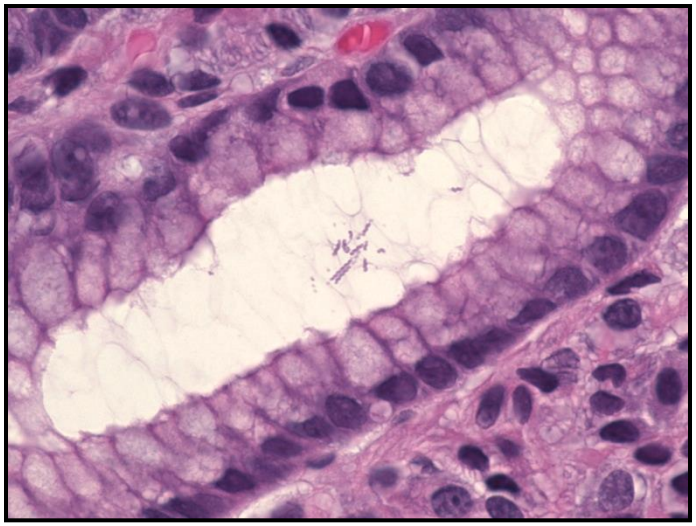
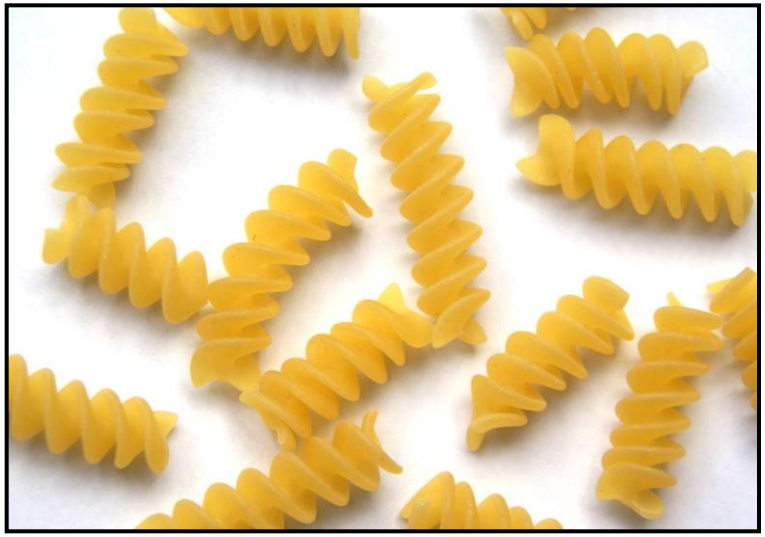
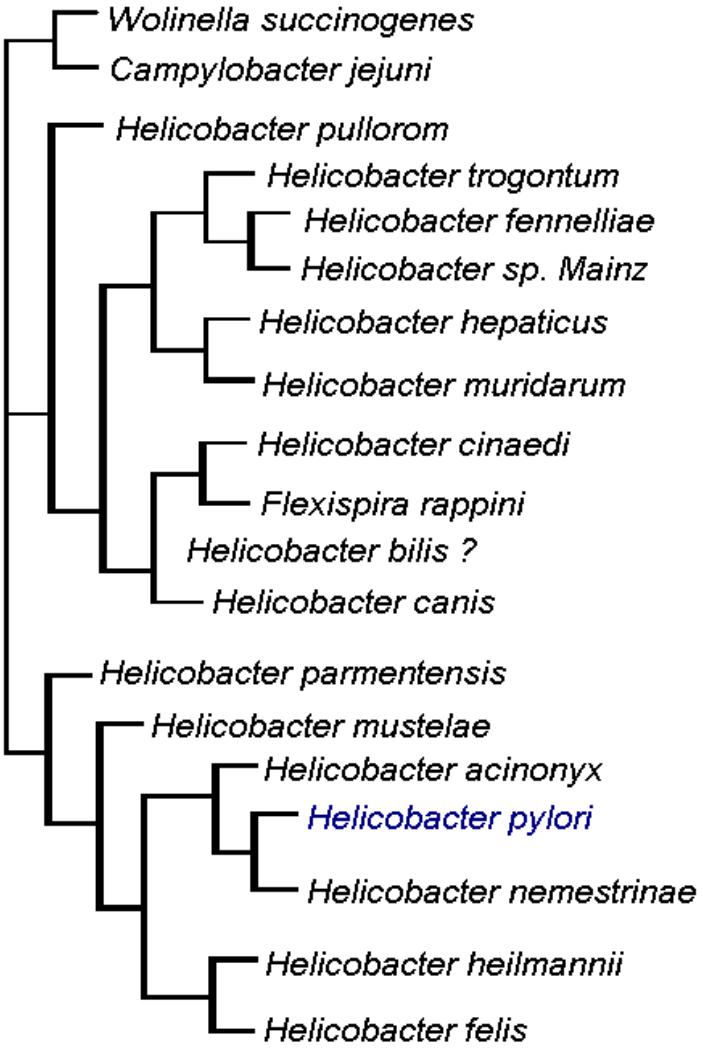
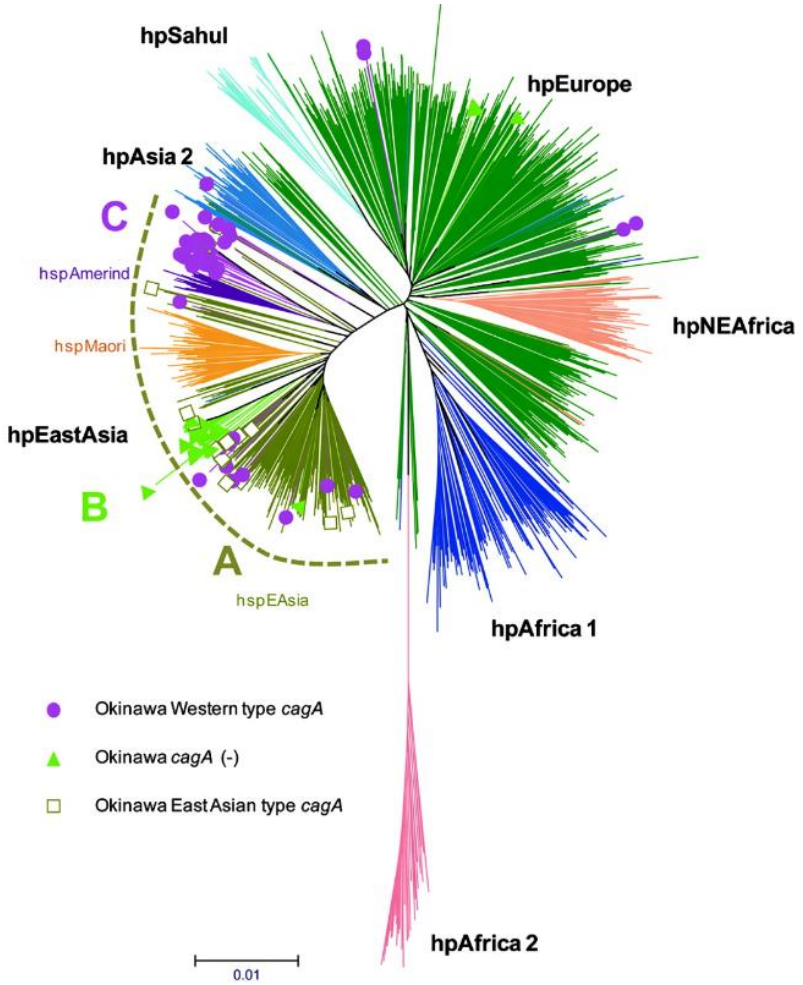






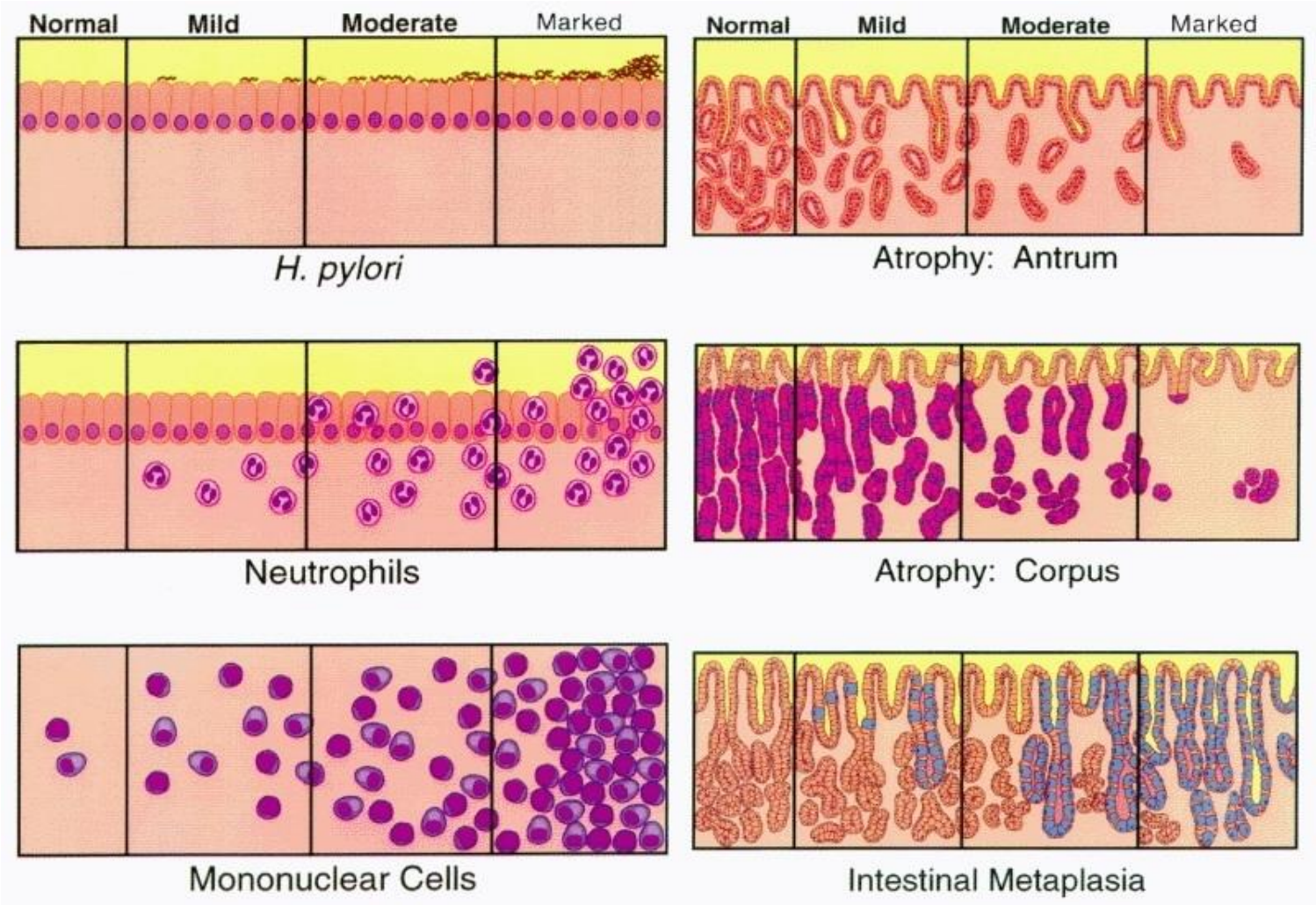
HP gastritis und non-HP helicobacter gastritis





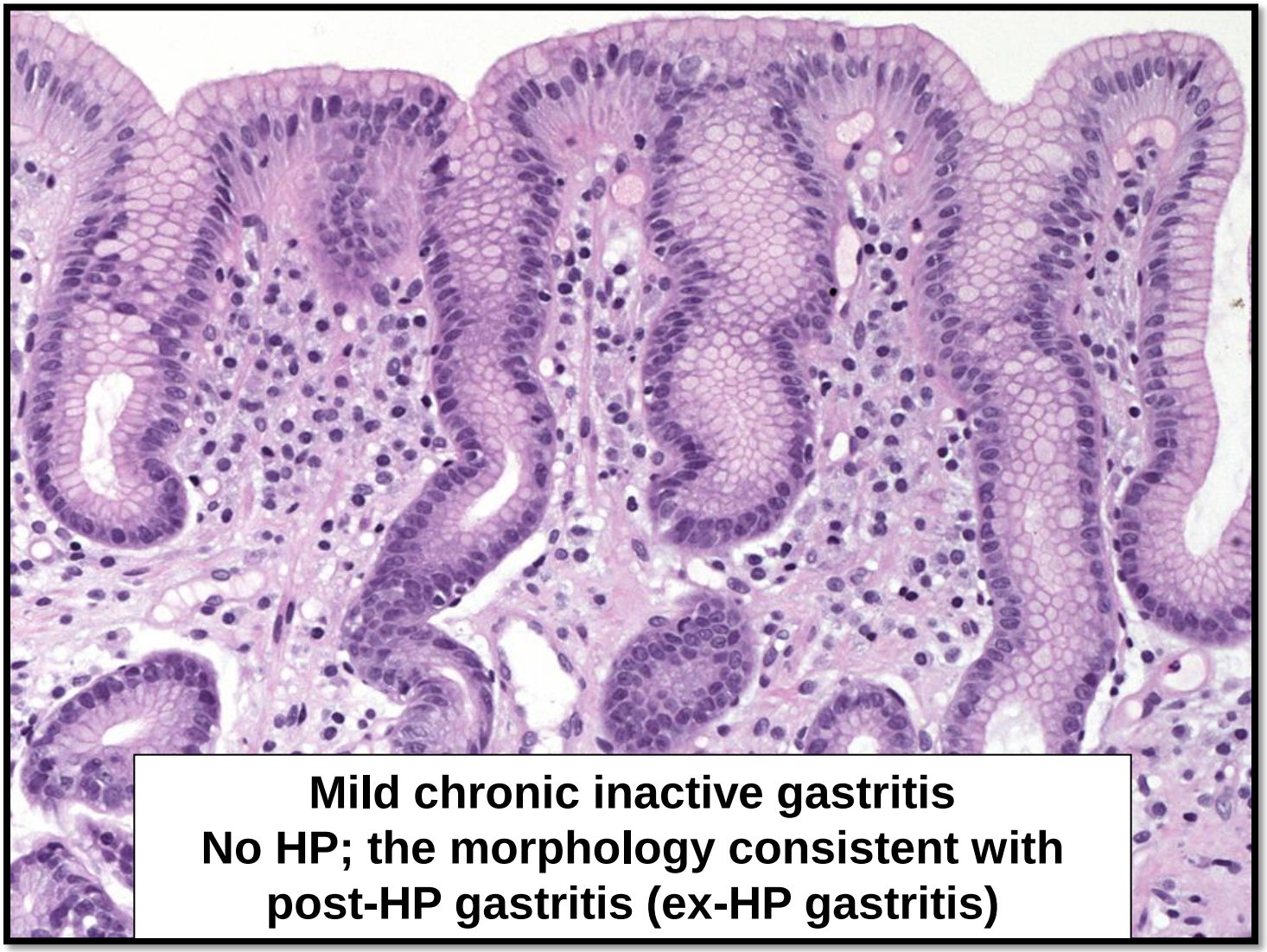
Matsunari et al. J Clin Microbiol 2012

Sydney classification



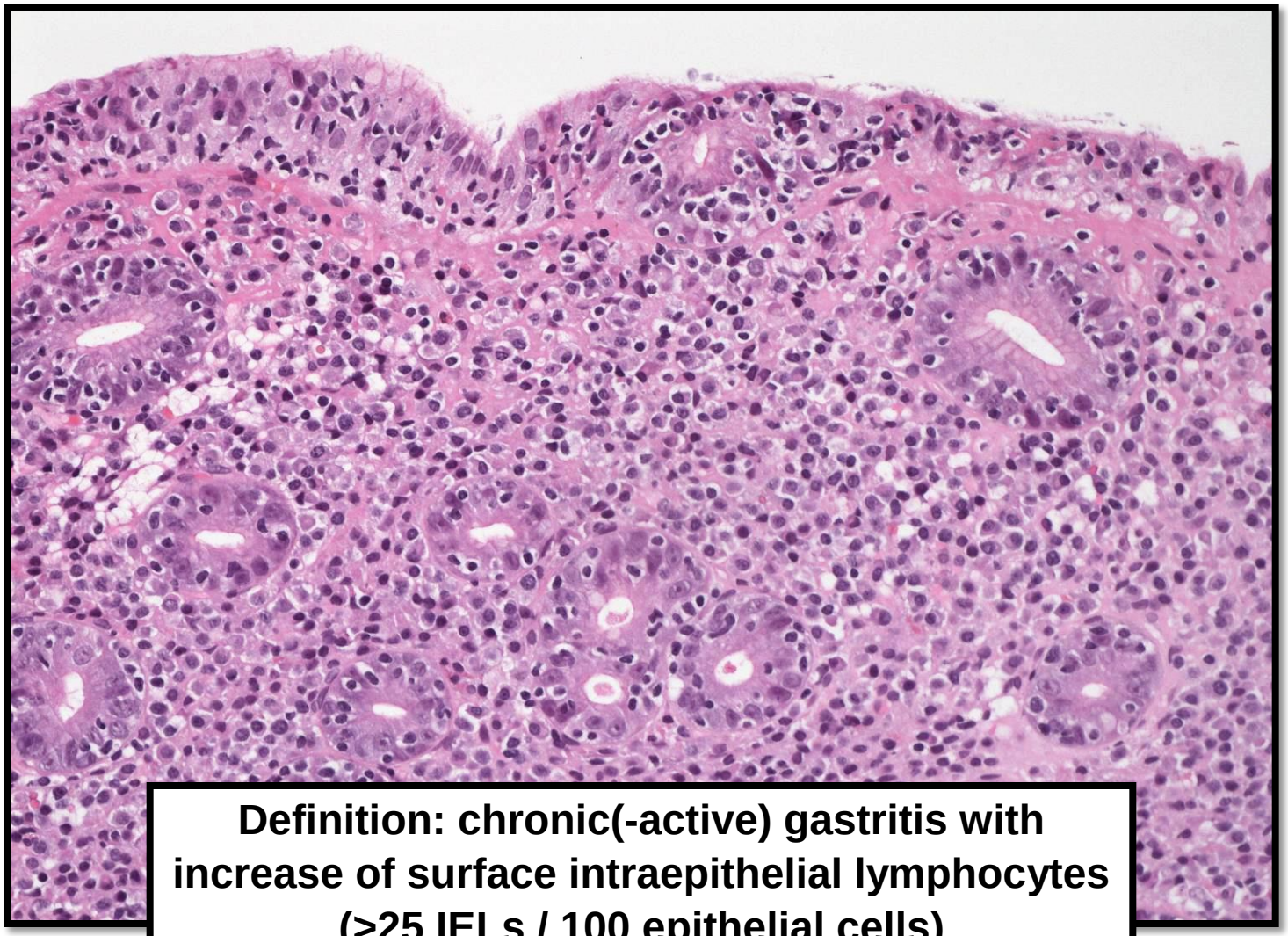
Dixon et al. Am J Surg Pathol 1996

Post-(or Ex)-HP Gastritis



Mild chronic inactive gastritis
No HP; the morphology consistent with post-HP gastritis (ex-HP gastritis)

Lymphocytic gastritis



Definition: chronic(-active) gastritis with increase of surface intraepithelial lymphocytes (>25 IELs / 100 epithelial cells)

Lymphocytic gastritis

- **Antrum-dominant lymphocytic gastritis**
  - Association with lymphocytic duodenitis or enteritis and villous atrophy (coeliac disease)

AP&T Alimentary Pharmacology and Therapeutics

Medizinische Universität Graz

The coeliac stomach: gastritis in patients with coeliac disease

B. Lebwohl*,†, P. H. R. Green* & R. M. Genta‡,§

Table 1 | Characteristics of patients who underwent concurrent gastric and duodenal biopsy during a 6-year period (n = 287 503)

Characteristic	Number (%)
Age, years	
Mean/median (SD)	51.7/53 (18)
0–19	12 415 (4)
20–39	60 360 (21)
40–59	110 210 (38)
≥60	104 518 (36)
Gender*	
Male	96 722 (34)
Female	190 678 (67)
Gastric histology	
Normal	183 325 (64)
Active *H. pylori* gastritis	27 366 (10)
Chronic active gastritis, *H. pylori*-negative	4619 (2)
Chronic inactive gastritis	16 155 (6)
Lymphocytic gastritis	818 (0.3)
Reactive gastropathy	46 790 (16)
Intestinal metaplasia	20 223 (7)
Atrophic gastritis	1647 (0.6)
Duodenal histology	
Normal/duodenitis	264 739 (92)
Duodenal intraepithelial lymphocytosis	18 816 (7)
Partial villous atrophy	2062 (0.7)
Subtotal/total villous atrophy	1886 (0.7)

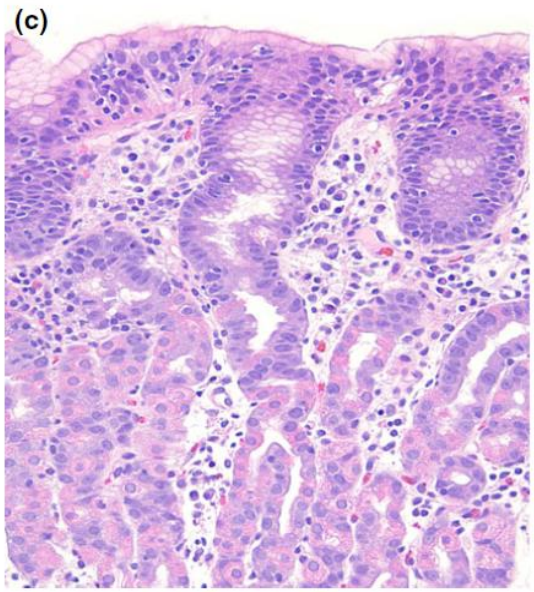
* Gender data missing for 103 patients (0.04%).

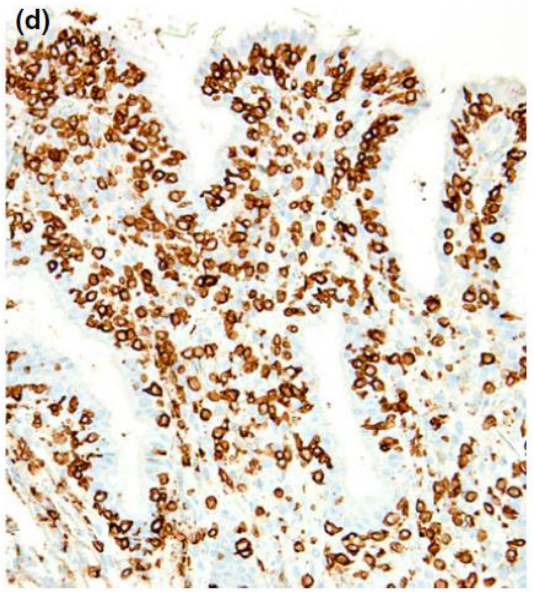
Aim

To compare the prevalence of LG, CAG and CIG among those with normal duodenal histology (or nonspecific duodenitis) and those with CD, as defined by villous atrophy (Marsh 3).

Methods

We analysed all concurrent gastric and duodenal biopsy specimens submitted to a national pathology laboratory during a 6-year period. We performed multiple logistic regression to identify independent predictors of each gastritis subtype.





Lebwohl et al. Aliment Pharmacol Ther 2015

AP&T Alimentary Pharmacology and Therapeutics

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The coeliac stomach: gastritis in patients with coeliac disease

B. Lebwohl*,†, P. H. R. Green* & R. M. Genta‡,§

Table 2 | Univariate and multivariate analysis of predictors of lymphocytic gastritis

Characteristic	Univariate analysis: Prevalence of lymphocytic gastritis	Univariate analysis: *P*-value	Multivariate analysis: OR (95% CI)	Multivariate analysis: *P*-value
Age, years				
0–19	26 (0.2)	<0.0001	0.75 (0.50–1.45)	0.1860
20–39	160 (0.3)		1.0 (ref)	ref
40–59	246 (0.2)		0.94 (0.77–1.53)	0.5632
≥60	386 (0.4)		1.83 (1.51–2.21)	<0.0001
Gender				
Male	288 (0.3)	0.3463	1.0 (ref)	ref
Female	530 (0.3)		0.88 (0.76–1.02)	0.0925
H. pylori status				
H. pylori	65 (0.2)	0.1249	0.87 (0.67–1.12)	0.2765
No *H. pylori*	753 (0.3)		1.0 (ref)	ref
Duodenal histology				
Normal/duodenitis	385 (0.15)	<0.0001	1.0 (ref)	ref
Duodenal intraepithelial lymphocytosis	146 (0.8)		6.15 (5.06–7.47)	<0.0001
Partial villous atrophy	104 (5.0)		37.66 (30.16–47.03)	<0.0001
Subtotal/total villous atrophy	183 (9.7)		78.57 (65.37–94.44)	<0.0001

Lebwohl et al. Aliment Pharmacol Ther 2015

Lymphocytic gastritis

- **Antrum-dominant lymphocytic gastritis**
  - Association with lymphocytic duodenitis or enteritis and villous atrophy (coeliac disease)
- **Corpus-dominant lymphocytic gastritis**
  - Usually caused by HP (antibiotics may heal this type of gastritis also when HP-negative)

Alimentary Pharmacology & Therapeutics

Medizinische Universität Graz

Healing of lymphocytic gastritis after *Helicobacter pylori* eradication therapy – a randomized, double-blind, placebo-controlled multicentre trial

A. MADISCH*, S. MIEHLKE*, F. NEUBER*, A. MORGNER*, E. KUHLISCH†, S. RAPPEL‡, N. LEHN§, E. BAYERDÖRFFER¶, G. SEITZ** & M. STOLTE‡

	Triple therapy group ($n = 25$)	Omeprazole/placebo group ($n = 26$)	95% CI for RR	*P*-value*
Intention-to-treat				
After 3 months				
Total	20 (80)	15 (57.7)	0.8–2.9	0.06
Baseline *H. pylori* status				
Positive	6/8 (75)	5/13 (38.5)		
Negative†	14/17 (82)	10/13 (76.9)		
After 12 months				
Total	24 (96)	14 (53.8)	1.1–3.5	0.01
Baseline *H. pylori* status				
Positive	8/8 (100)	5/13 (38.4)		
Negative†	16/17 (94.1)	9/13 (69.2)		
Per-protocol				
After 3 months				
Total	19 (82.6)	12 (54.5)	0.8–3.4	0.2
After 12 months				
Total	23 (100)	14 (63.6)	1.0–2.9	0.02

At baseline, 21 patients of the entire study population (41.1%) were histologically H. pylori-positive.

Based on Warthin-Starry staining, H. pylori density was low in 18 patients (85.7%), moderate in two patients (9.5%) and high in only one patient (4.8%) respectively.

Four of 13 patients of the omeprazole/placebo group who were histologically H. pylori-negative at baseline were H. pylori-positive after 12 months.

Madisch et al. Aliment Pharmacol Ther 2006

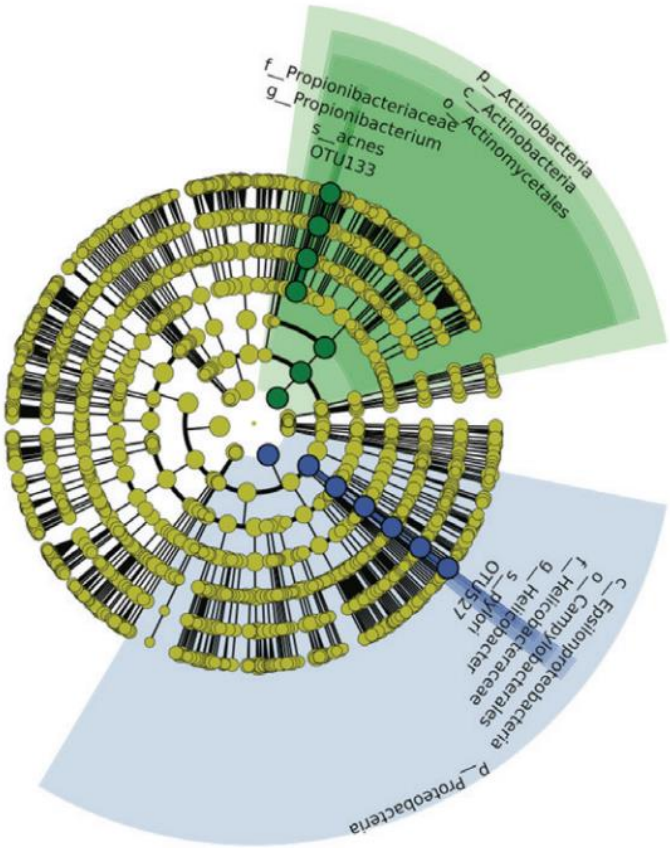
Journal of Pathology
J Pathol 2016; **240:** 425–436
Published online 21 October 2016 in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/path.4782

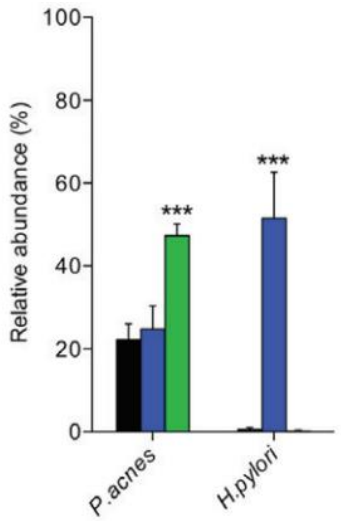
ORIGINAL PAPER

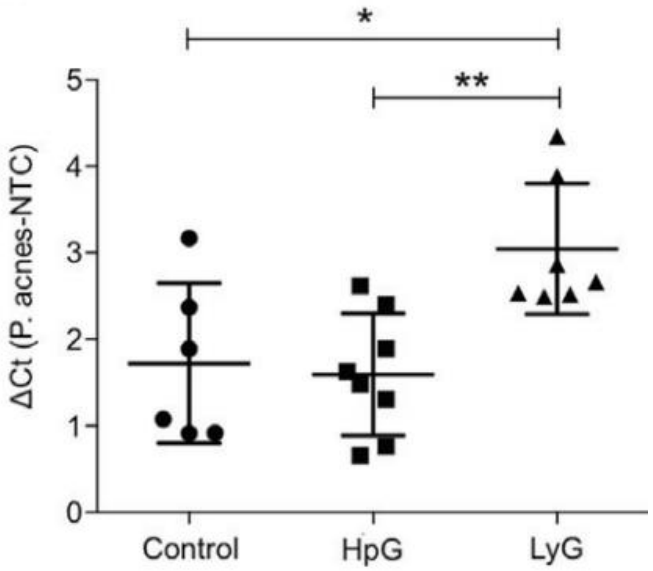
Medizinische Universität Graz

Propionibacterium acnes overabundance and natural killer group 2 member D system activation in corpus-dominant lymphocytic gastritis

Ana Montalban-Arques,[1,2] Philipp Wurm,[1,2] Slave Trajanoski,[3] Silvia Schauer,[1] Sabine Kienesberger,[4,5] Bettina Halwachs,[1,2,5] Christoph Högenauer,[2,6] Cord Langner[1] and Gregor Gorkiewicz[1,2,5,*]







Comparative microbiota analysis of specimens from LyG, H. pylori gastritis and healthy controls precluded involvement of H. pylori in LyG but identified Propionibacterium acnes as possible disease trigger.

Montalban-Arques et al. J Pathol 2016

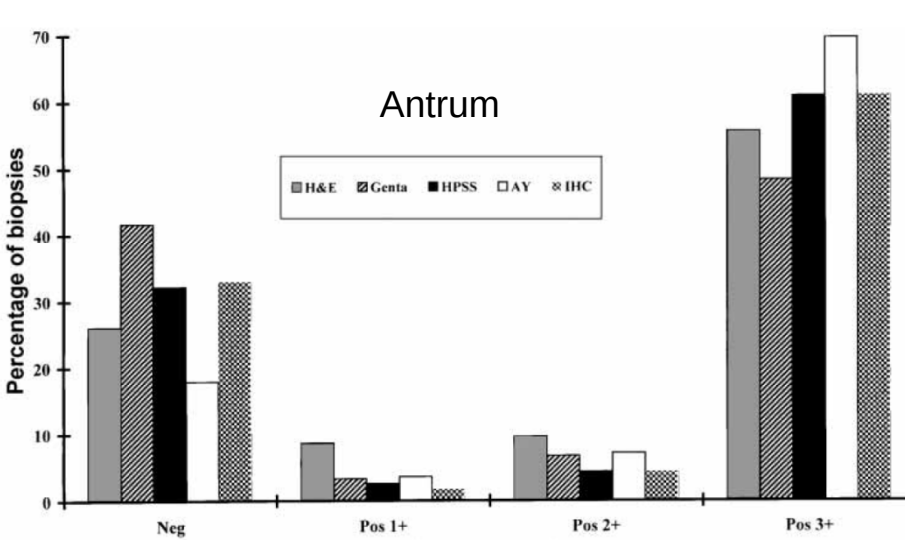
Medizinische Universität Graz

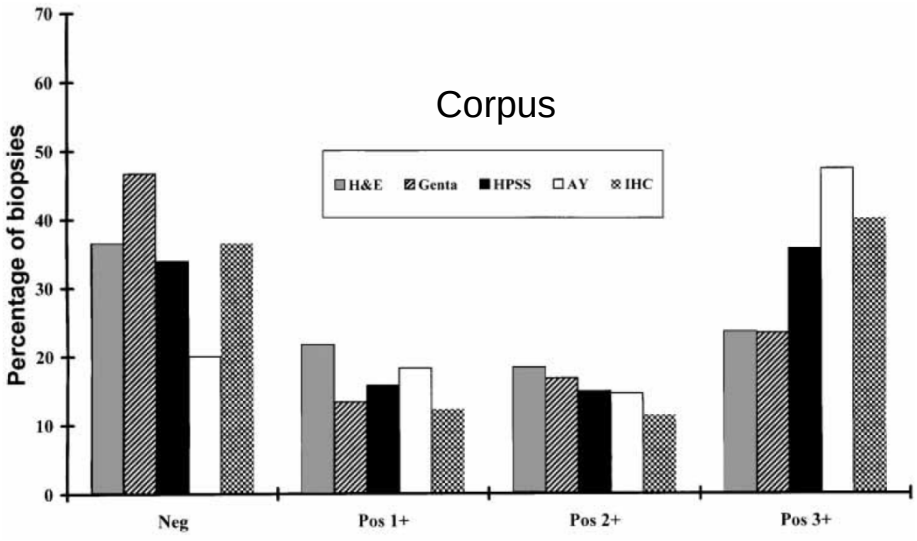
Do we need a special stain to detect *Helicobacter pylori*?

Assessment of different methods for staining *Helicobacter pylori* in endoscopic gastric biopsies

Medizinische Universität Graz

Jehoram T. Anim[1], Nabil Al-Sobkie[2], Asha Prasad[1], Bency John[1], Prem N. Sharma[3], Ibtissam Al-Hamar[1]





We conclude that H&E is adequate for the initial assessment of gastric biopsies in symptomatic upper gastrointestinal patients (it is a well-tested, cheap and easy staining method).

When the density of the organism is expected to be low, we recommend addition of silver staining because of its high sensitivity and low costs.

Anim et al. Acta Histochem 2000

ORIGINAL ARTICLE

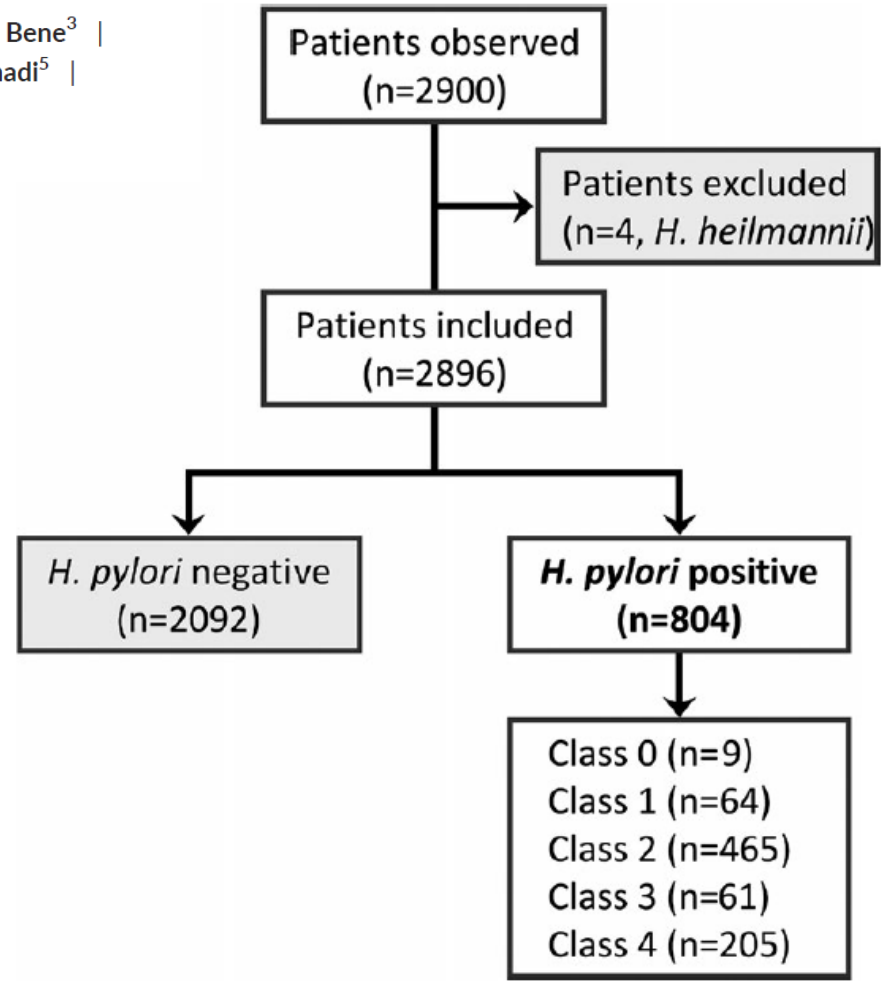
WILEY Helicobacter

Medizinische Universität Graz

Sensitivity of *Helicobacter pylori* detection by Giemsa staining is poor in comparison with immunohistochemistry and fluorescent in situ hybridization and strongly depends on inflammatory activity

Éva Kocsmár[1] | Ildikó Szirtes[1] | Zsófia Kramer[1] | Attila Szijártó[2] | László Bene[3] | György Miklós Buzás[4] | István Kenessey[1] | Peter Bronsert[5,6] | Agnes Csanadi[5] | Lisa Lutz[5] | Martin Werner[5] | Ulrich Friedrich Wellner[6,7] | András Kiss[1] | Zsuzsa Schaff[1] | Gábor Lotz[1]

	Giemsa		IHC	
2896 cases	+	687 (23.7%)	+	662 (22.8%)
			–	25 (0.9%)
	–	2209 (76.3%)	+	133 (4.6%)
			–	2076 (71.7%)



Kocsmar et al. Helicobacter 2017

ORIGINAL ARTICLE

WILEY Helicobacter

Medizinische Universität Graz

Sensitivity of *Helicobacter pylori* detection by Giemsa staining is poor in comparison with immunohistochemistry and fluorescent in situ hybridization and strongly depends on inflammatory activity

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TABLE 2 Results of the studied stainings by statistical classes in the *Helicobacter pylori*-positive cases. Greatly decreased proportions of positive cases are outlined in bold

H. pylori-positive cases (n=804)		Giemsa		IHC		FISH	
Statistical class		−	+	−	+	−	+
No chronic gastritis	0	6 (67%)	3 (33%)	1 (12%)	8 (88%)	1 (12%)	8 (88%)
Chronic nonactive gastritis without structural alteration	1	36 (56%)	28 (44%)	1 (1.5%)	63 (98.5%)	4 (6%)	60 (94%)
Chronic active gastritis without structural alteration	2	32 (7%)	433 (93%)	3 (0.6%)	462 (99.4%)	0 (0%)	465 (100%)
Chronic nonactive gastritis with structural alteration	3	47 (77%)	14 (23%)	3 (5%)	58 (95%)	8 (13%)	53 (87%)
Chronic active gastritis with structural alteration	4	17 (8%)	188 (92%)	1 (0.5%)	204 (99.5%)	3 (1.5%)	202 (98.5%)

Kocsmar et al. Helicobacter 2017

Appropriate Use of Special Stains for Identifying *Helicobacter pylori*

Recommendations From the Rodger C. Haggitt Gastrointestinal Pathology Society

Kenneth P. Batts, MD, Scott Ketover, MD,† Sanjay Kakar, MD,‡ Alyssa M. Krasinskas, MD,§ Kisha A. Mitchell, MD,‖ Rebecca Wilcox, MD,¶ Maria Westerhoff, MD,# Joseph Rank, MD,** Joanna Gibson, MD,‖ Anthony R. Mattia, MD,†† Oscar W. Cummings, MD,‡‡ Jon M. Davison, MD,§§ Bita V. Naini, MD,‖‖ Sarah M. Dry, MD,‖‖ and Rhonda K. Yantiss, MD¶¶*

TABLE 1. GIPS Recommendations for Use of Ancillary Stains in Detection of *H. pylori*

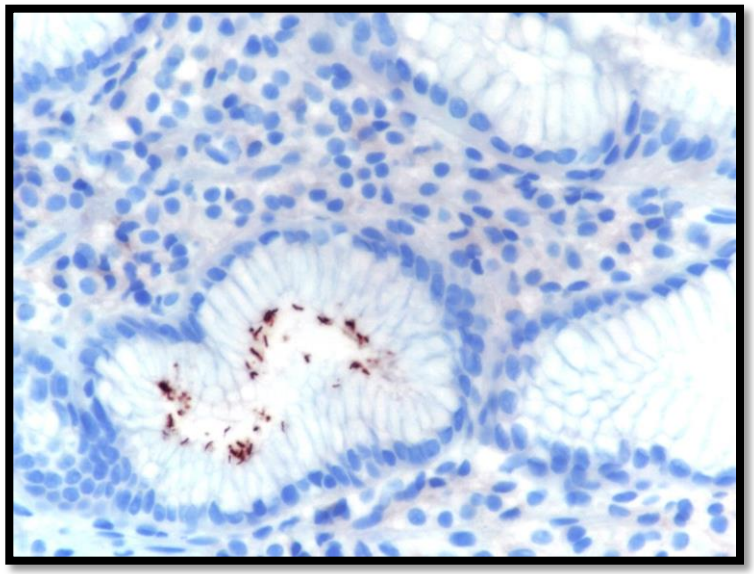
Morphologic Findings	GIPS Recommendations For Special Stains*
Normal gastric mucosa	Not indicated
Chemical (reactive) gastropathy	Not indicated if chemical injury is only abnormality
	Appropriate if superimposed chronic gastritis is present
Chronic active gastritis	Not indicated if H&E demonstrates organisms
	Appropriate if H&E is negative for *H. pylori*
	Low yield if serologic studies are known to be negative
Chronic inactive gastritis	Not indicated if serologic studies are known to be negative, but probably justified in most other cases
	Appropriate if gastroduodenal ulcers are present
	Appropriate if gastric MALT-type lymphoma or adenocarcinoma is present
	Appropriate if duodenal lymphocytosis is present
	Appropriate in patients with prior *H. pylori* treatment
	Appropriate in high-risk demographic areas
Lymphocytic gastritis	Appropriate
Granulomatous gastritis	Unclear utility; no recommendation at this time
Eosinophilic gastritis	Unclear utility; no recommendation at this time
Fundic gland polyps	Not indicated
Hyperplastic polyps	Generally not indicated; ancillary stains may be considered if chronic inflammation is present and other biopsies are lacking
Isolated chronic active carditis	Appropriate
Isolated chronic inactive carditis	Not indicated, unless gastric biopsies are unavailable and/or serologic studies are positive
Barrett esophagus	Not indicated
Duodenal biopsies	Not indicated in overwhelming majority of cases

*We recommend use of immunohistochemistry as the preferred ancillary staining method.

Batts et al. Am J Surg Pathol 2013

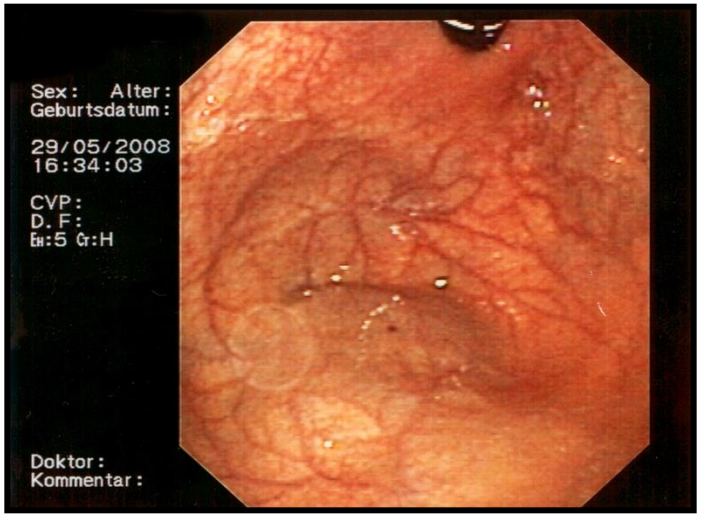
How can we do it?

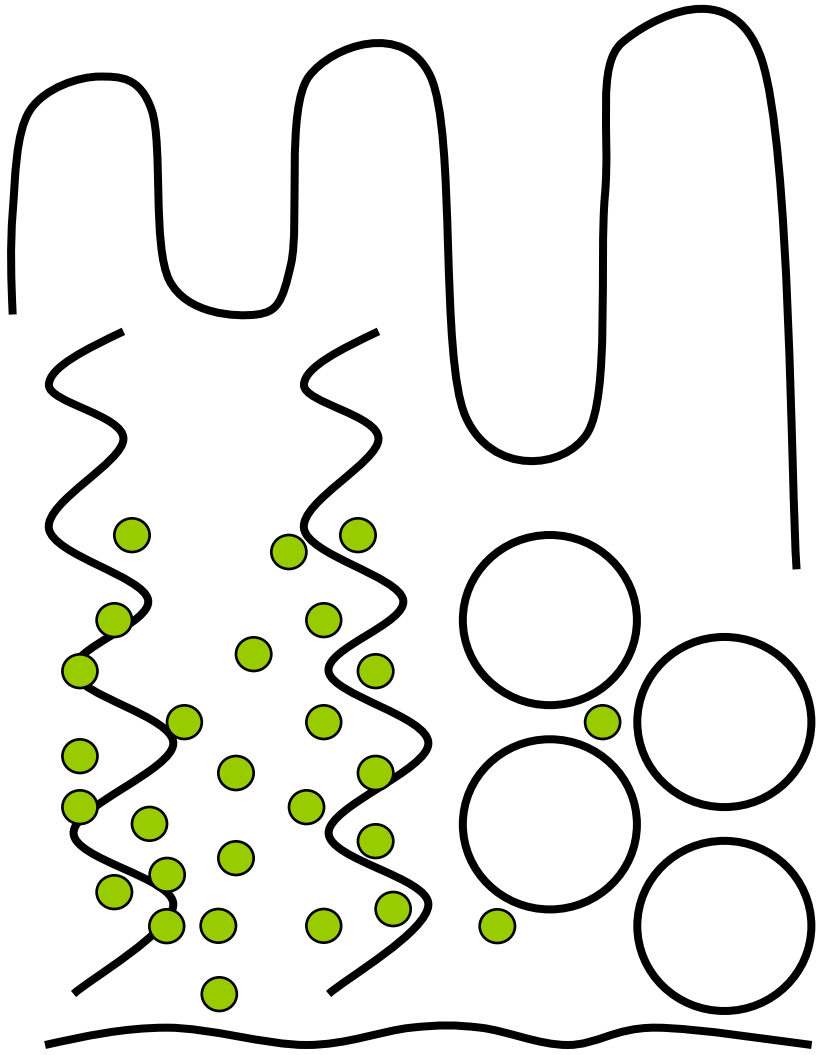
- The approach needs to follow the respective national guidelines (in Germany: Giemsa + PAS for all gastric biopsies)
- It should be guided by the expected regional prevalence of HP



- HP diagnosis is feasible on H&E stained sections (provided there is enough haematoxylin included) and can be used as initial stain in low prevalence countries
- In cases with active gastritis (or at least moderate chronic inactive gastritis) and after HP eradication therapy a special stain should be performed (today preferably immunohistochemistry)

Autoimmune gastritis





- Autoantibodies directed against the proton pump of parietal cells
- T-cell mediated gland destruction within the oxyntic mucosa

Online Submissions: http://www.wjgnet.com/1007-9327office
wjg@wjgnet.com
doi:10.3748/wjg.v16.i1.83

World J Gastroenterol 2010 January 7; 16(1): 83-88
ISSN 1007-9327 (print)

BRIEF ARTICLE

Medizinische Universität Graz

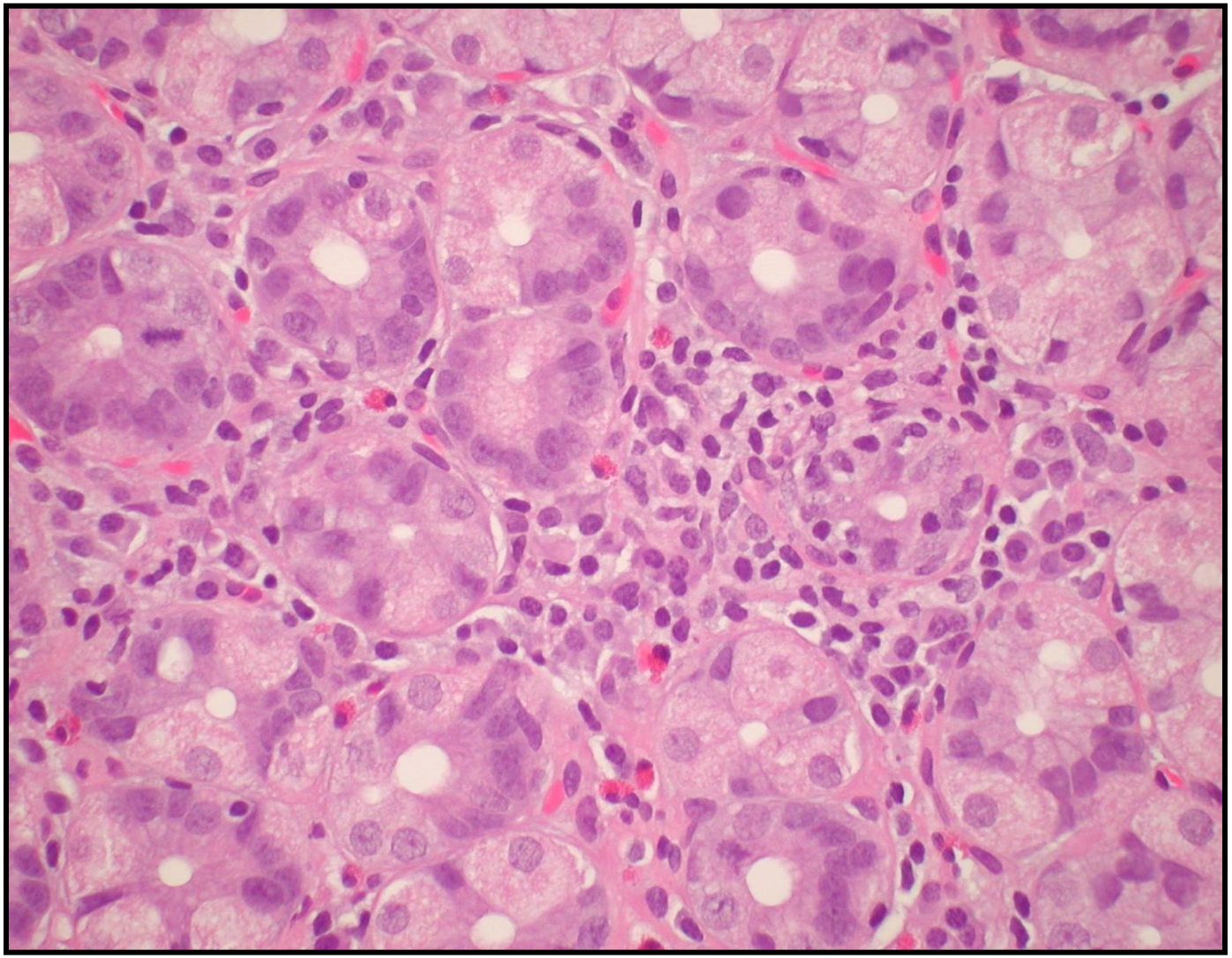
Association of autoimmune type atrophic corpus gastritis with *Helicobacter pylori* infection

Lea Irene Veijola, Aino Mirjam Oksanen, Pentti Ilmari Sipponen, Hilpi Iris Kaarina Rautelin

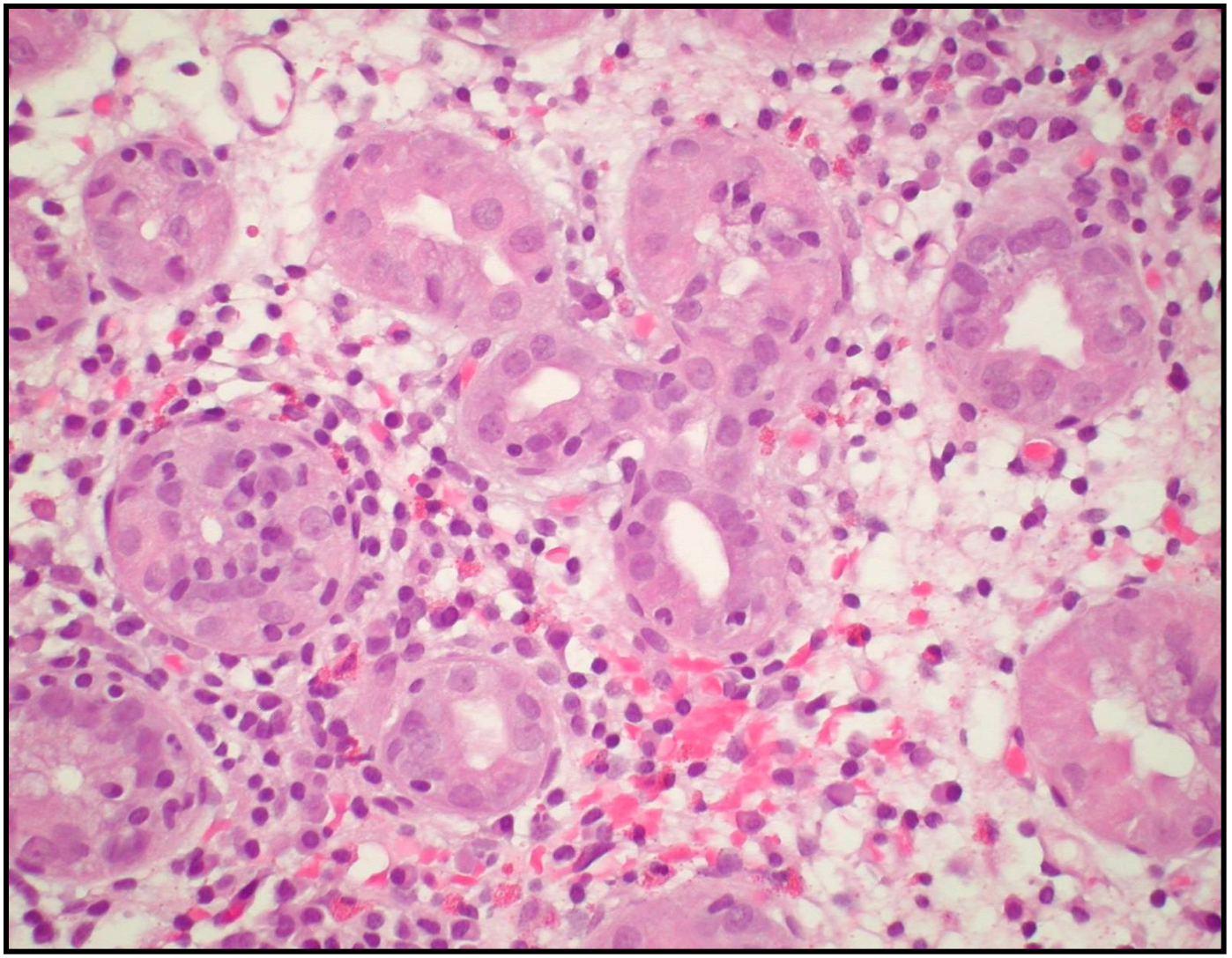
- **Autoimmune gastritis in association with HP infection**
  - Higher patient age (females = males)
  - Active HP gastritis / post-HP gastritis
  - Positive HP serology
- **Autoimmune gastritis not in association with HP infection**
  - Younger patient age (females >> males)
  - No HP / Post-HP gastritis and negative HP serology
  - Other autoimmune diseases: autoimmune thyroiditis, diabetes mellitus type 1, Sjögren‘s syndrome

Veijola et al. World J Gastroenterol 2010

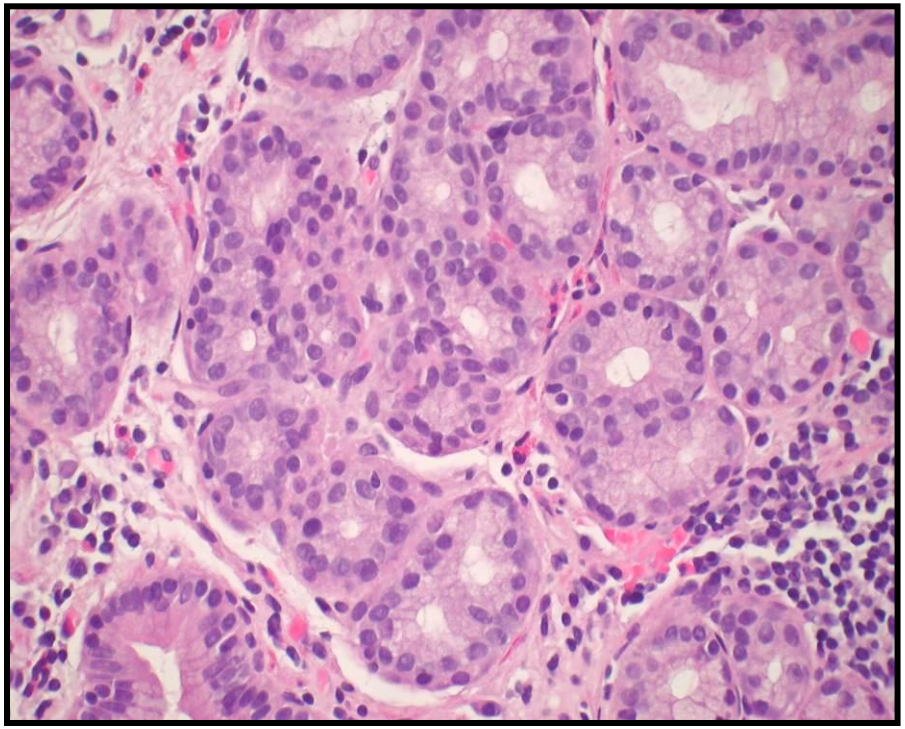
Autoimmune gastritis



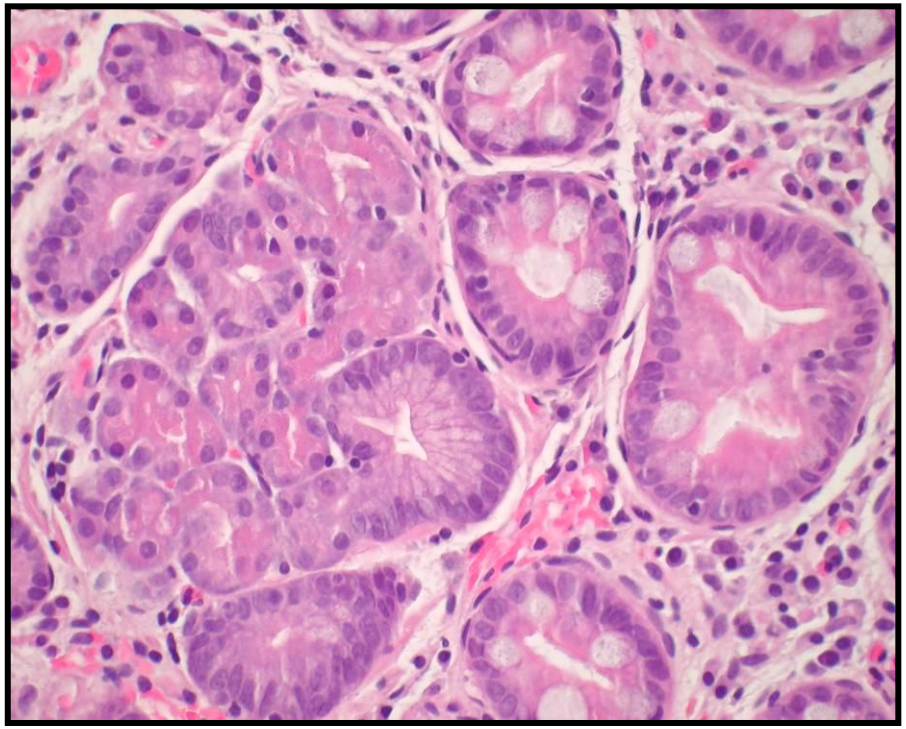
Autoimmune gastritis



Autoimmune gastritis



Pseudopyloric metaplasia



Pancreatic and intestinal metaplasia

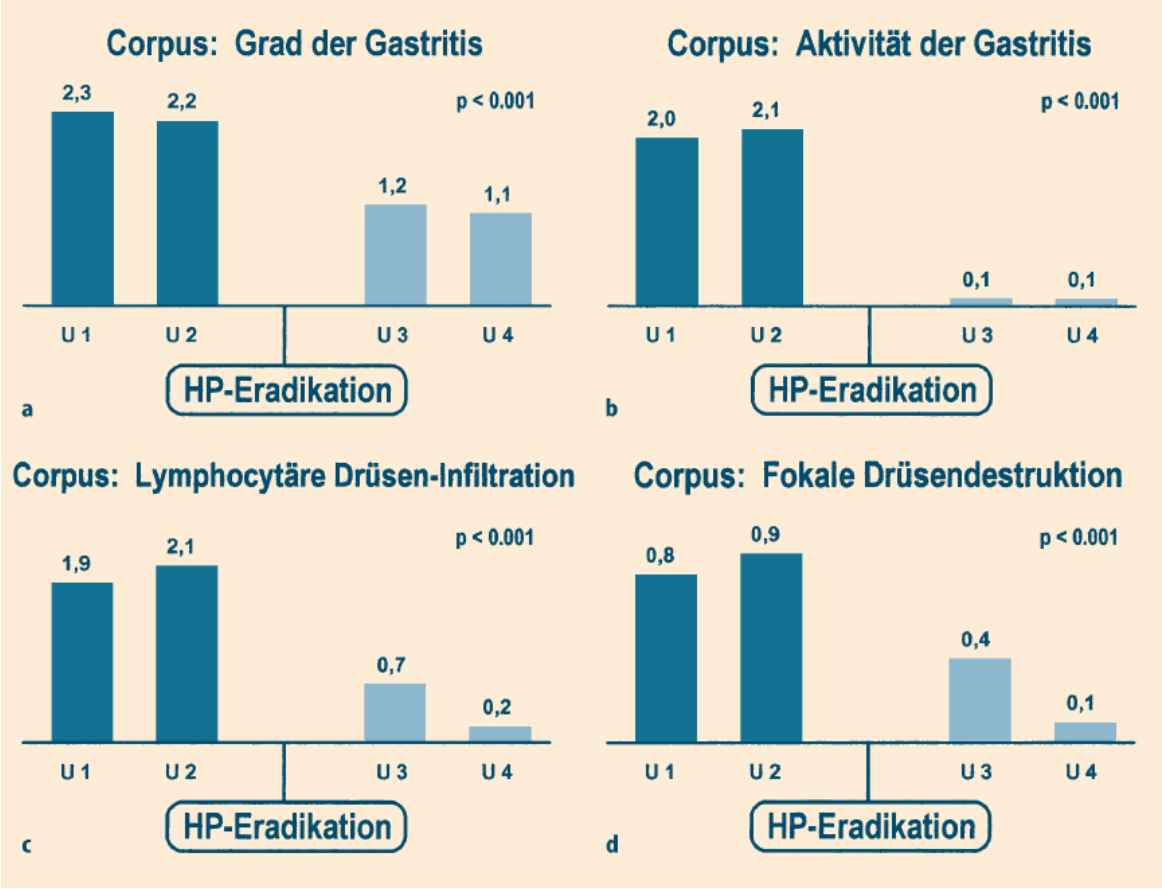
S. Rappel · H. Müller · M. Stolte
Institut für Pathologie, Klinikum Bayreuth

Medizinische Universität Graz

Die aktive präatrophische Autoimmungastritis

Key morphological features of active pre-atrophic autoimmune gastritis:

1. Lymphocytic infiltration of the glands of the oxyntic (corpus and fundus) mucosa
2. Focal destruction in individual oxyntic glands
3. Reactive hypertrophy of the parietal cells



Stolte et al. Z Gastroenterol 1992
Rappel et al. Pathologe 2001

Pathology (February 2013) 45(2), pp. 145–149

Autoimmune gastritis: novel clues to histological diagnosis

MARK BETTINGTON*† AND IAN BROWN*

*Envoi Specialist Pathologists, and †The Queensland Institute of Medical Research, Brisbane, Queensland, Australia

Table 3 Histological features in AIG, HPG and MAG

	Lymphocyte infiltration of crypt epithelium	Neutrophil cryptitis	Basal lymphoid aggregates	Gland architectural disturbance	Thickened muscularis mucosae
AIG	98.0%	44.2%	82.7%	86.5%	92.9%
HPG	23.1%	86.5%	42.3%	1.9%	7.5%
MAG	14.0%	12.5%	62.5%	100.0%	92.3%

AIG, autoimmune gastritis; HPG, *H. pylori* gastritis; MAG, multifocal atrophic gastritis.

Table 2 Results of eosinophil counts in each study group

	Mean eosinophils (range)	Mean eosinophils/ 3HPF (range)	Eosinophils ≥30/HPF
AIG	34.5 (2–89)	79.4 (4–222)	24 (46.1%)
NGB	3.3 (0–11)	6.2 (0–23)	0 (0%)
HPG	8.8 (2–41)	21.1 (3–116)	1 (1.9%)
MAG	10.7 (1–34)	26.6 (3–85)	1 (6.3%)
CG	4.4 (1–12)	9.1 (1–22)	0 (0%)
p value	$p < 0.001$	$p < 0.001$	

AIG, autoimmune gastritis; CG, chronic gastritis; HPF, high power field; HPG, *H. pylori* gastritis; MAG, multifocal atrophic gastritis; NGB, normal gastric body mucosa.

Intestinal metaplasia was seen, by definition, in every case of MAG and comprised 10–50% of the biopsy area in four cases (25%) and >50% in 12 cases (75%). By contrast, while all cases of AIG displayed gastric pseudo-pyloric gland metaplasia, intestinal metaplasia was not identified in five cases (9.6%) and was seen in <10% of the biopsy area in a further seven cases (13.5%). Thirty-one (59.6%) cases had 10–50% intestinal metaplasia and nine cases (17.3%) had >50% intestinal metaplasia. Intestinal metaplasia was present (10–50%) in the gastric body biopsies in HPG in three cases (6%). The gastric antrum also displayed intestinal metaplasia in these cases. Pancreatic metaplasia (Fig. 3A) ranging from 5% to 20% of the total biopsy area was present in 11 (21.2%) AIG cases, but was not seen in NGB, HPG or MAG cases in this study.

As it was part of the inclusion criteria for this study, gastric antral biopsies were examined in all AIG cases. A well-developed reactive gastropathy pattern (Fig. 3B) was found in 15 cases (29%) while the remainder displayed no significant abnormality.

Bettington & Brown. Pathology 2013

Pancreatic Acinar Cell Metaplasia in Autoimmune Gastritis

Nirag C. Jhala, MD; Mario Montemor, MD; Darshana Jhala, MD; Lin Lu, MD; Lynya Talley, PhD; Marian M. Haber, MD; Juan Lechago, MD, PhD

Medizinische Universität Graz

Table 1. Histologic Findings in Various Groups*

Group	Acute Inflammation	Chronic Inflammation	*Helicobacter pylori*	ECL Hyperplasia	Intestinal Metaplasia	Pyloric Metaplasia	Pancreatic Metaplasia
AIG (n = 18)	3	14	3	18†	13	16	9
MAG (n = 15)	6	15	5	0	15	13	1
CAG (n = 30)	27	30	25	0	3	0	0
Unremarkable (n = 37)	0	5	1	0	1	0	1

* AIG indicates autoimmune gastritis; MAG, multifocal atrophic gastritis; CAG, chronic active gastritis; and ECL, enterochromaffin-like cells.
† Includes 8 patients with micronodular hyperplasia and 2 patients with carcinoid tumor.

Table 3. Association of Autoimmune Gastritis to Pancreatic Metaplasia

	Pancreatic Acinar Cell Metaplasia Present	Pancreatic Acinar Cell Metaplasia Absent	Total
Autoimmune gastritis	9	9	18
Nonautoimmune gastritis	2	80	82

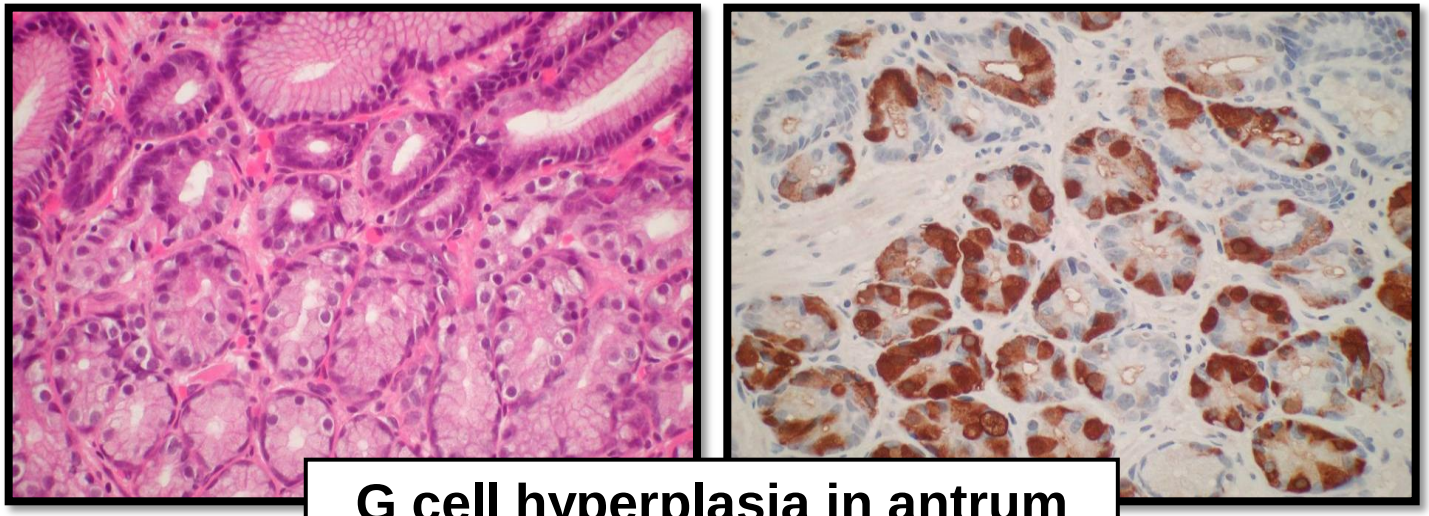
The **„active cell“** in autoimmune gastritis is the T-cell

The presence of **acute inflammation** does **not** render information regarding the **activity of disease**

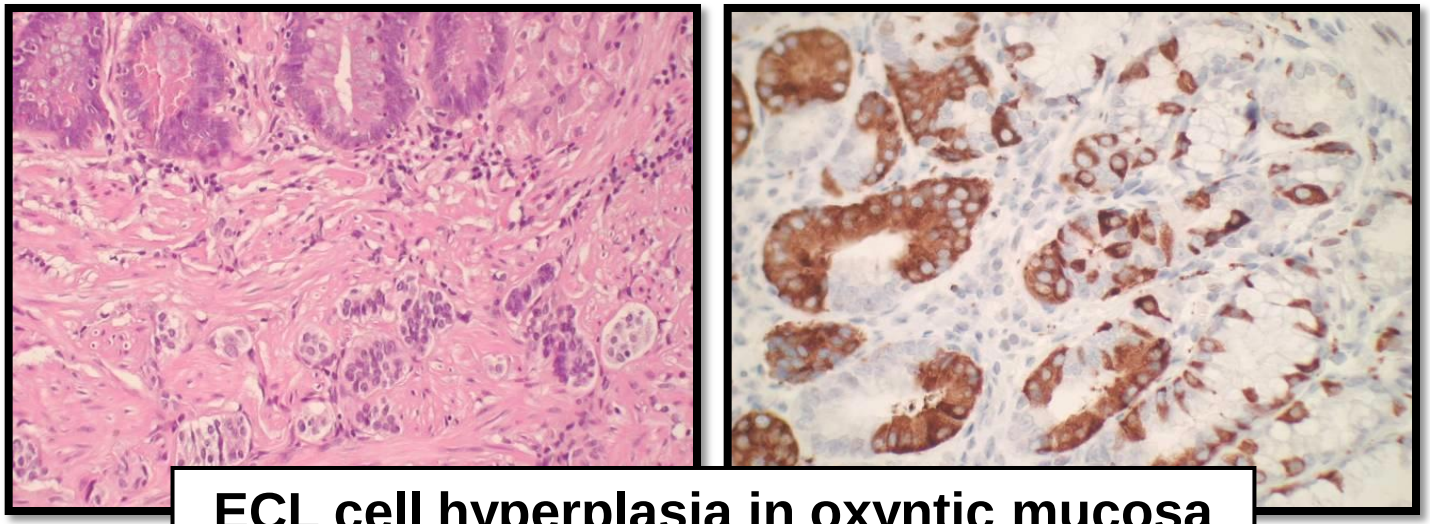
Therefore, the **Sydney System** should **not** be used for reporting

Jhala et al. Arch Pathol Lab Med 2003

Autoimmune gastritis



G cell hyperplasia in antrum



ECL cell hyperplasia in oxyntic mucosa

Hyperplasia-dysplasia-neoplasia-sequence of ECL cell proliferation

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Simple	Increase (>2 fold) in ECL cell number
Linear	Chains of at least 5 ECL cells growing within the gastric glands
Micronodular	Clusters of at least 5 cells within the deep lamina propria (recognizable on H&E)
Adenomatoid	Collections of five or more ECL cell micronodules (intact basal membrane)
Dysplasia	Fusing or enlarging micronodules (150µm – 500µm)
Neoplasia (**NET, carcinoid**)	Lesions larger than 500µm or invasion into the submucosa

Neuroendocrine tumours (carcinoids) in the stomach

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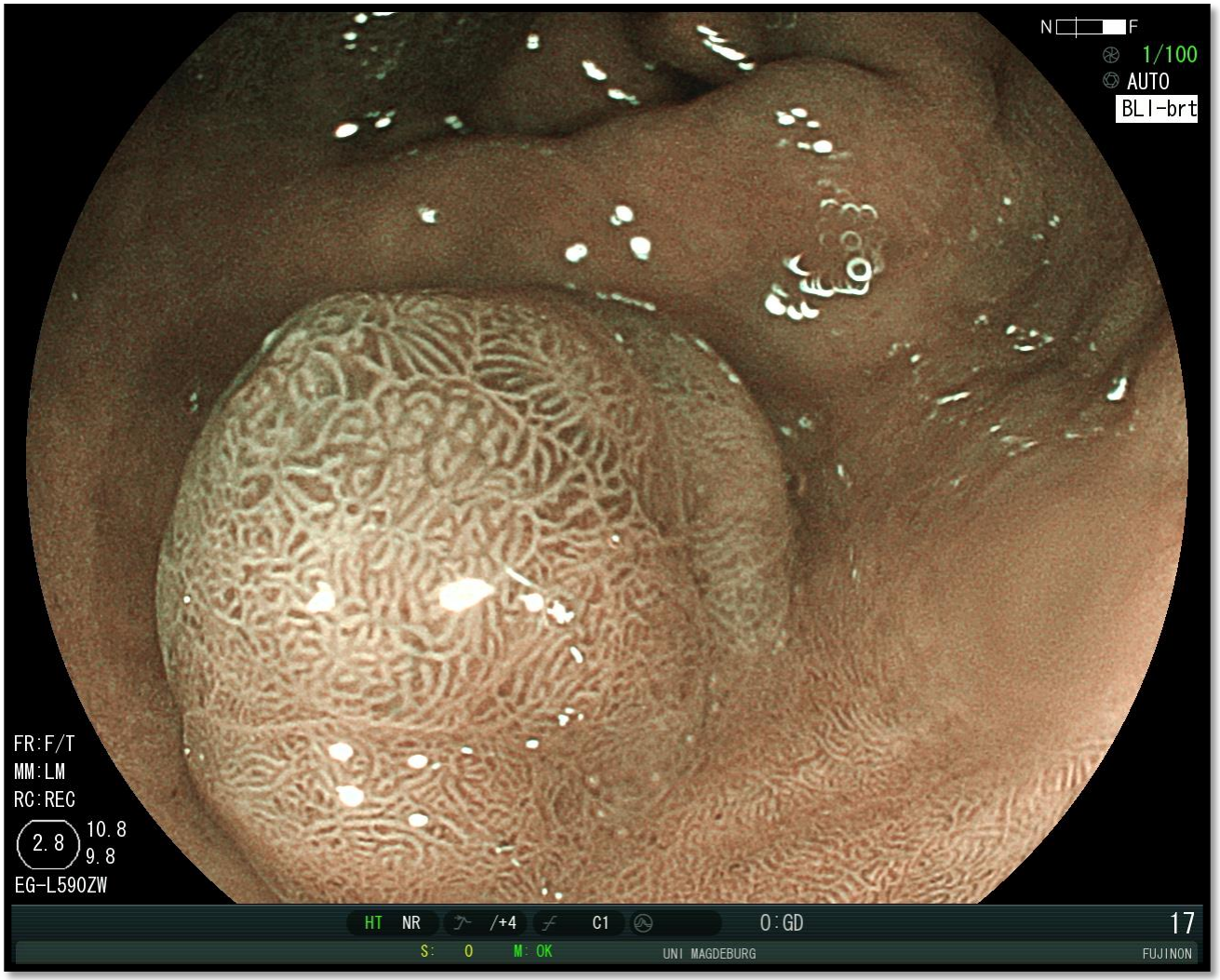

Courtesy of Prof. Peter Malfertheiner, Magdeburg

Neuroendocrine tumours (carcinoids) in the stomach

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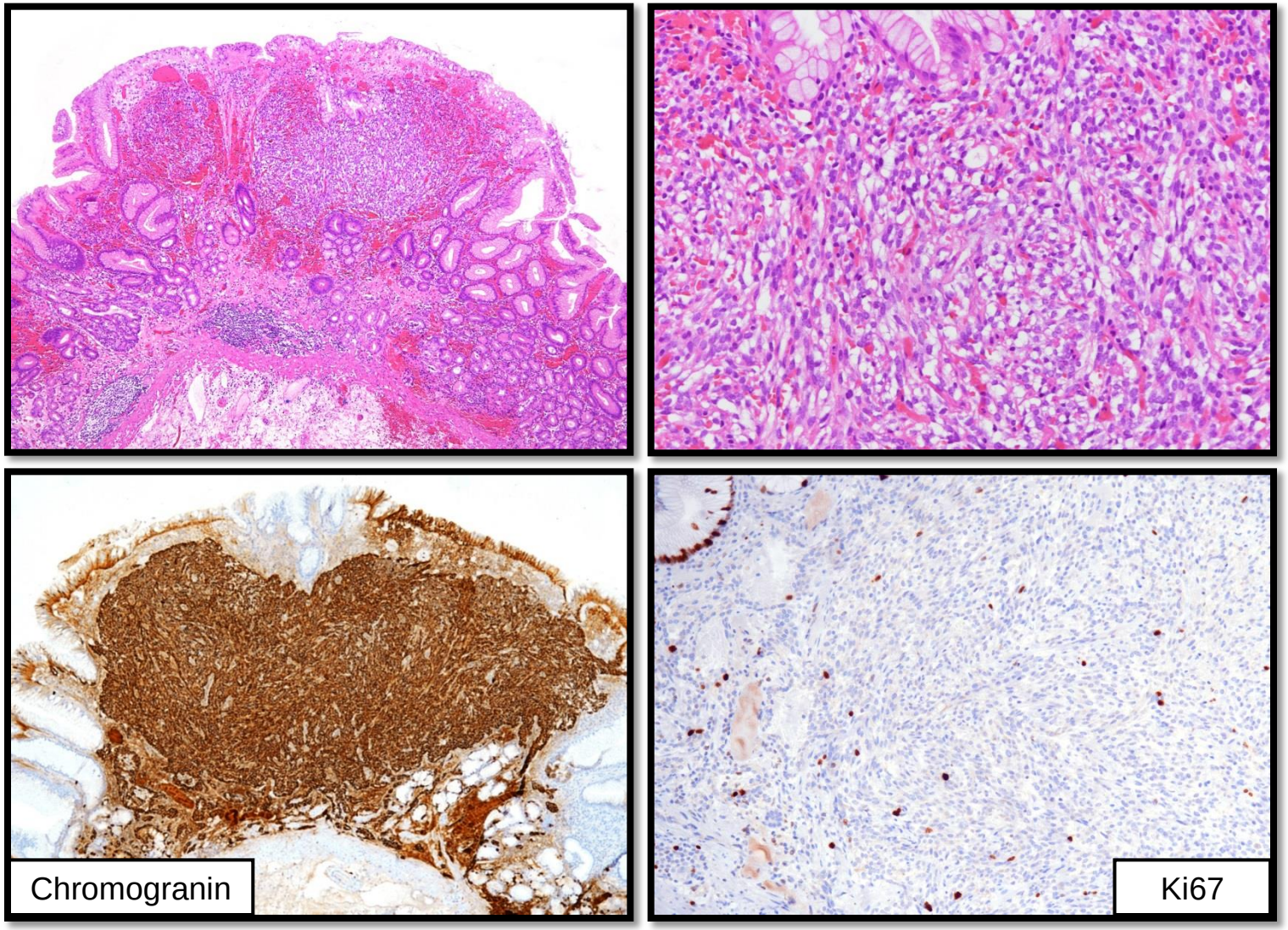

Neuroendocrine tumours (carcinoids) in the stomach

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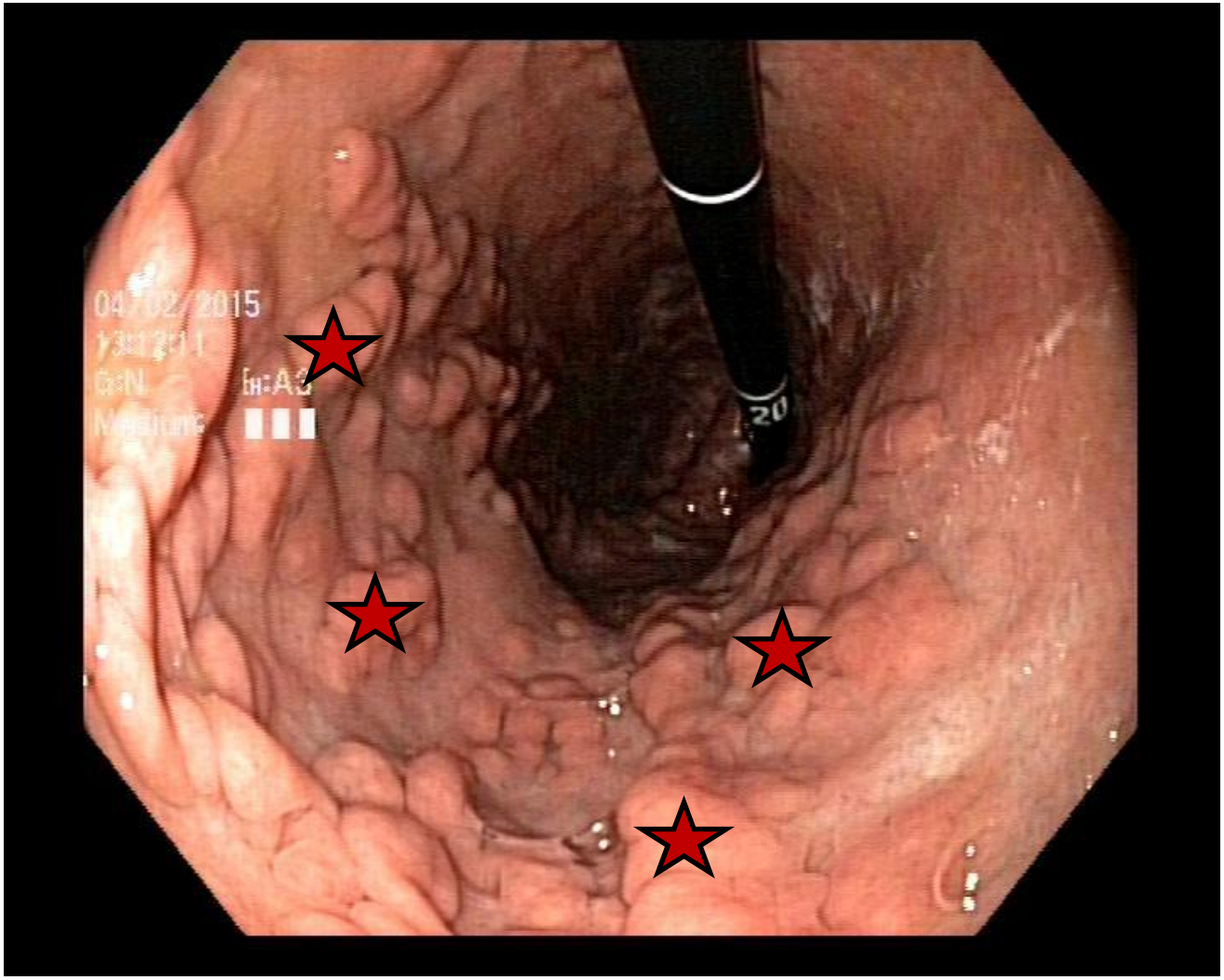
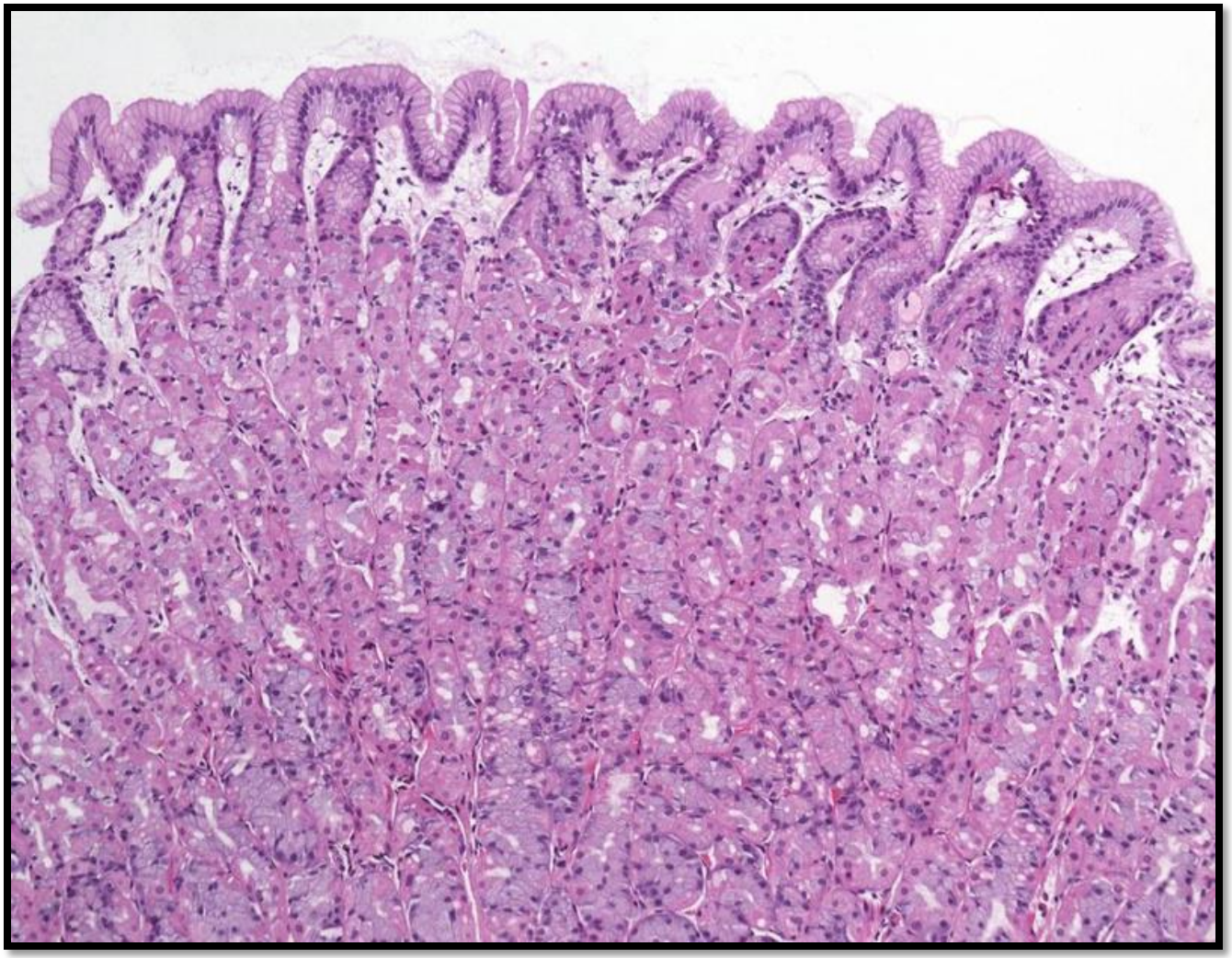
	NET Type I	NET Type II	NET Type III
Frequency	70-80%	5-10%	15-20%
Gender	female > male	female = male	female < male
Age at time of diagnosis	55-70	40-50	50-55
Location	fundus > corpus	fundus > corpus	No predilection (also antrum)
Macroscopy	multifocal, often < 1-2cm	multifocal, often < 1-2cm	Solitary, often < 2cm
Associated diseases	autoimmune gastritis, ECL-cell hyperplasia	Zollinger-Ellison syndrome (MEN I), ECL-cell hyperplasia	sporadic
Acid values	low (absent)	raised	normal
Hypergastrinaemia	present	present	absent
Risk of lymph node metastasis	<5%	7-12%	>50%

(Pseudo-)polyps in autoimmune gastritis



(Pseudo-)polyps in autoimmune gastritis



(Pseudo-)polyps in autoimmune gastritis

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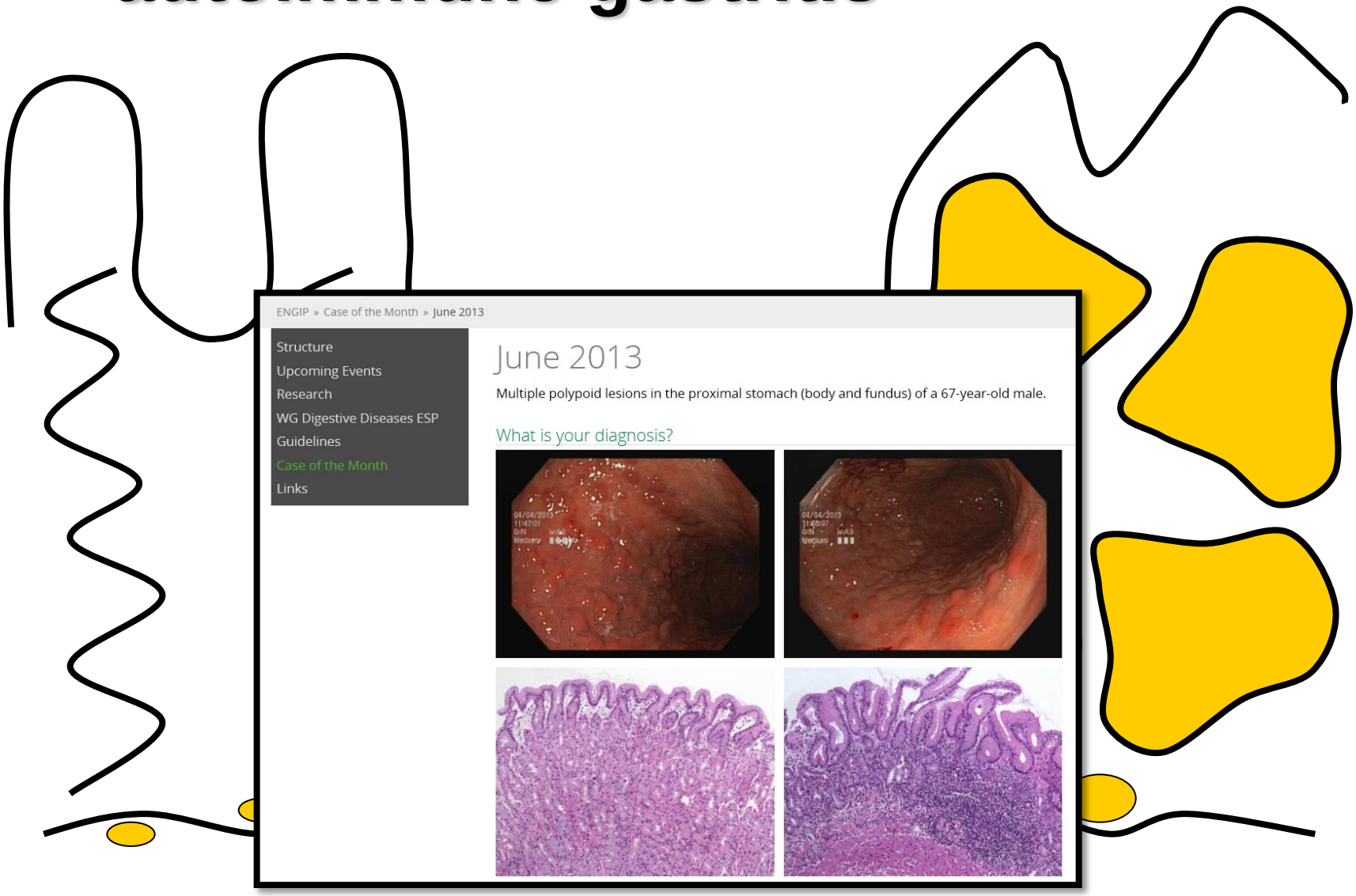

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Gastric Lesions in Patients With Autoimmune Metaplastic Atrophic Gastritis (AMAG) in a Tertiary Care Setting

Jason Y. Park, MD, PhD, Toby C. Cornish, MD, PhD,† Dora Lam-Himlin, MD,‡ Chanjuan Shi, MD, PhD,§ and Elizabeth Montgomery, MD†*

TABLE 3. Endoscopically Identified Lesions Arising in a Background of Autoimmune Metaplastic Atrophic Gastritis (n = 240)

Features (n)	Additional Descriptors
Polyps (179)	
Hyperplastic (138)	
Oxyntic-gland pseudopolyp (20)	
Intestinal-type gastric adenoma (18)	
Pyloric gland adenoma (3)	One was initially classified as a hyperplastic polyp with changes indefinite for dysplasia
Adenocarcinomas (11)	
Poorly differentiated with signet ring cell features (4)	Youngest patient was 40-year-old at the time of diagnosis
Poorly differentiated without signet ring cell features (3)	
Moderate or moderate to poorly differentiated (4)	
Lymphoma (3)	
Extranodal marginal zone lymphoma (MALT type) (2)	*Helicobacter pylori* negative
Large B-cell lymphoma (1)	*Helicobacter pylori* negative; perivascular amyloid present
Well-differentiated neuroendocrine neoplasms (carcinoids) (46)	
Gastrointestinal stromal tumor (1)	

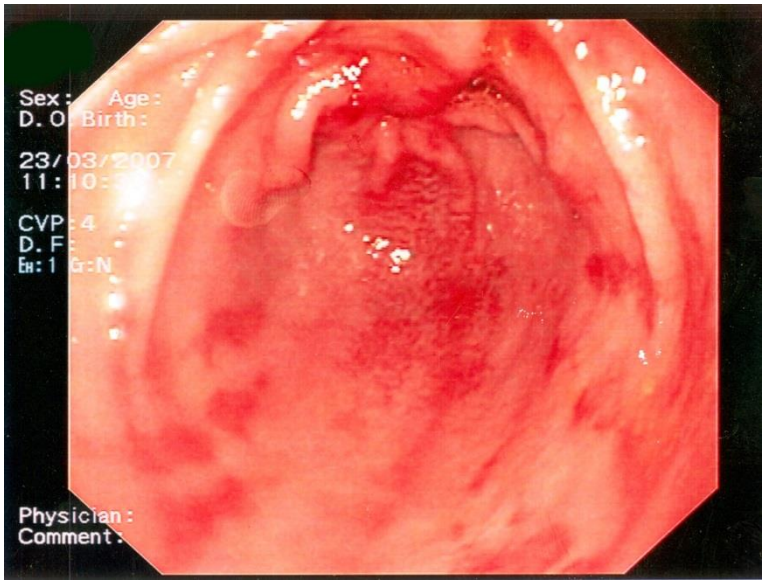
Polyps are seen in 75% of patients with autoimmune gastritis: hyperplastic polyps account for 77%, **oxyntic gland pseudopolyps for 11%**

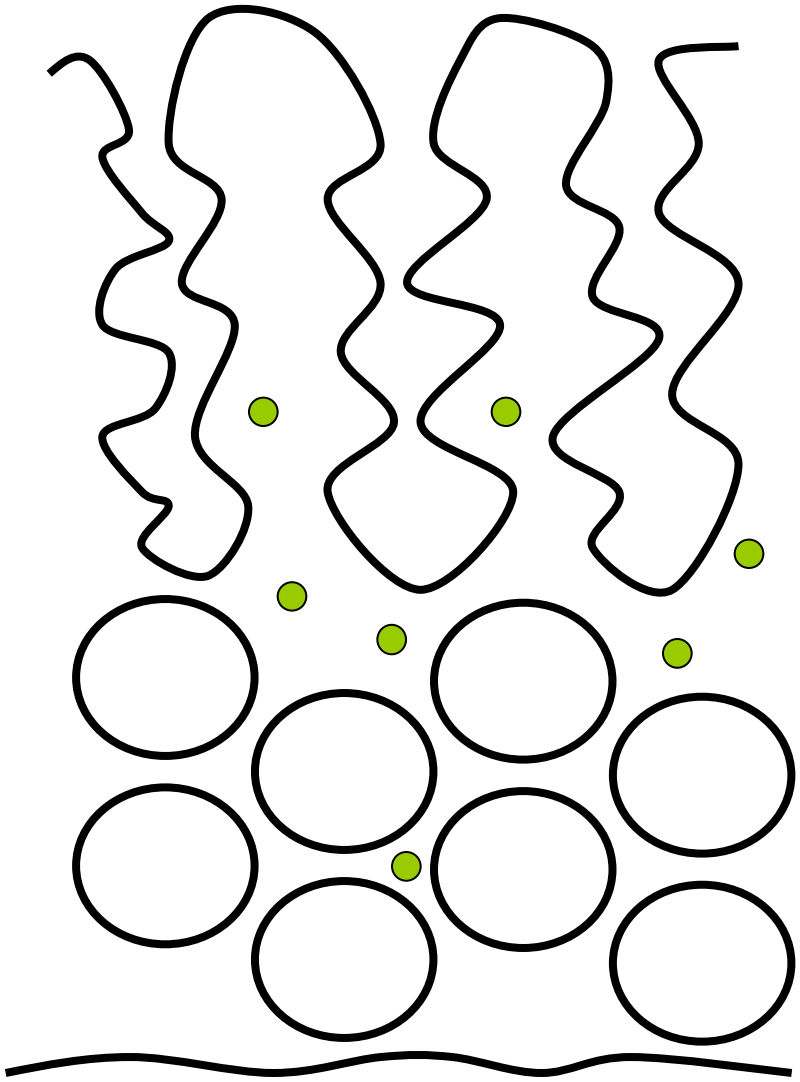
Neuroendocrine tumours (NETs, carcinoids) are found in 19% of patients with autoimmune gastritis

The remaining lesions are adenomas (9%), adenocarcinomas (5%) and malignant lymphomas (1%)

Park et al. Am J Surg Pathol 2010

Reactive gastropathy





- Antrum > oxyntic mucosa
- Two main causes (chemical injury to the mucosa)
  - Duodenogastric reflux (“reflux gastritis/gastropathy”)
  - Drugs (NSAIDs)

J Clin Pathol 1986;39:524–530

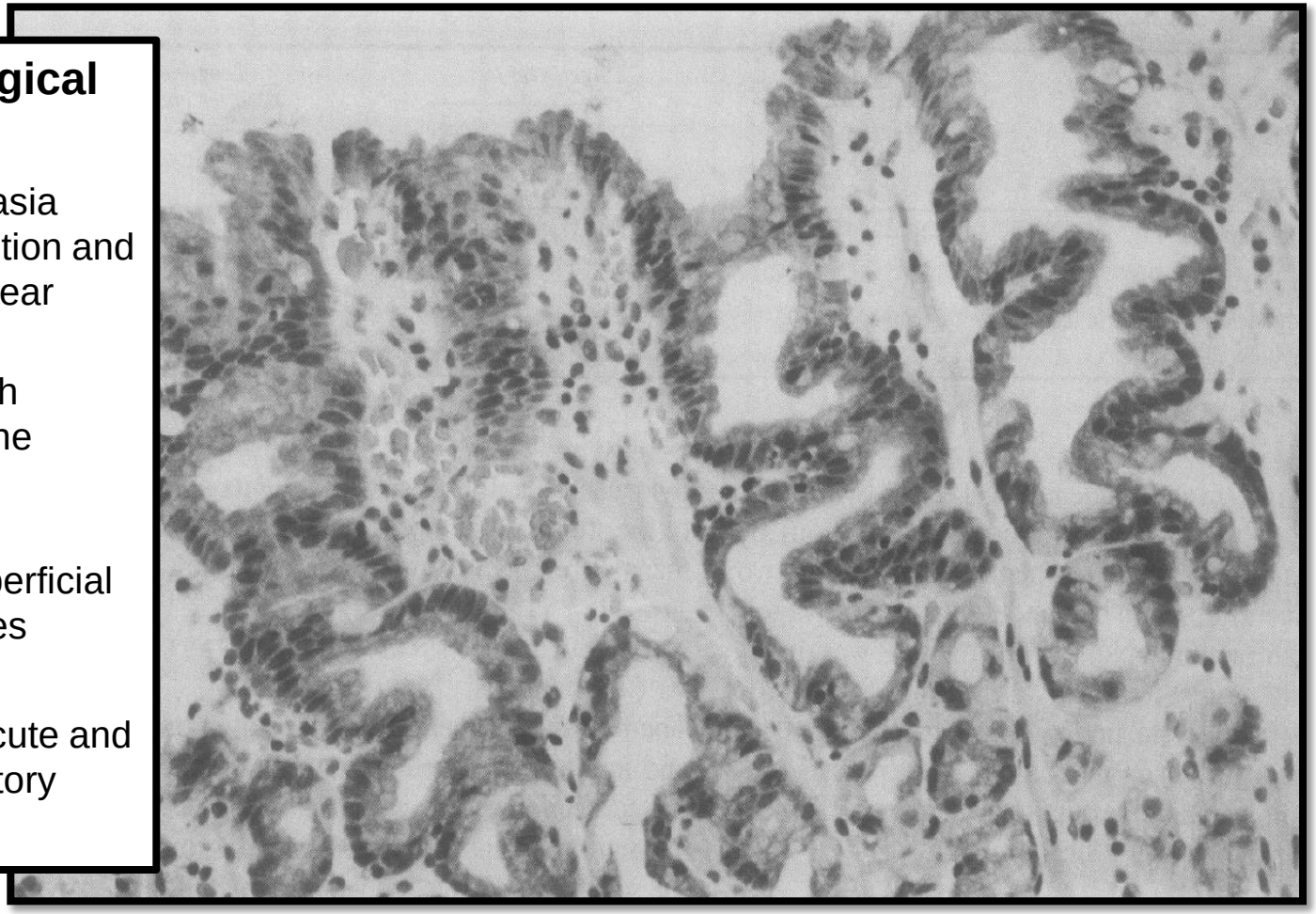
Medizinische Universität Graz

Reflux gastritis: distinct histopathological entity?

MF DIXON,* HJ O'CONNOR,† ATR AXON,† RFJG KING,‡ D JOHNSTON‡

*From the University Departments of *Pathology and ‡Surgery, and the †Gastroenterology Unit, General Infirmary at Leeds, Leeds*

- **Basic morphological features**
  - Foveolar hyperplasia (with mucin depletion and mild reactive nuclear changes)
  - Ascending smooth muscle fibres in the lamina propria
  - Vasodilation and congestion of superficial mucosal capillaries
  - Stromal oedema
  - Paucity of both acute and chronic inflammatory cells



Dixon et al. J Clin Pathol 1986

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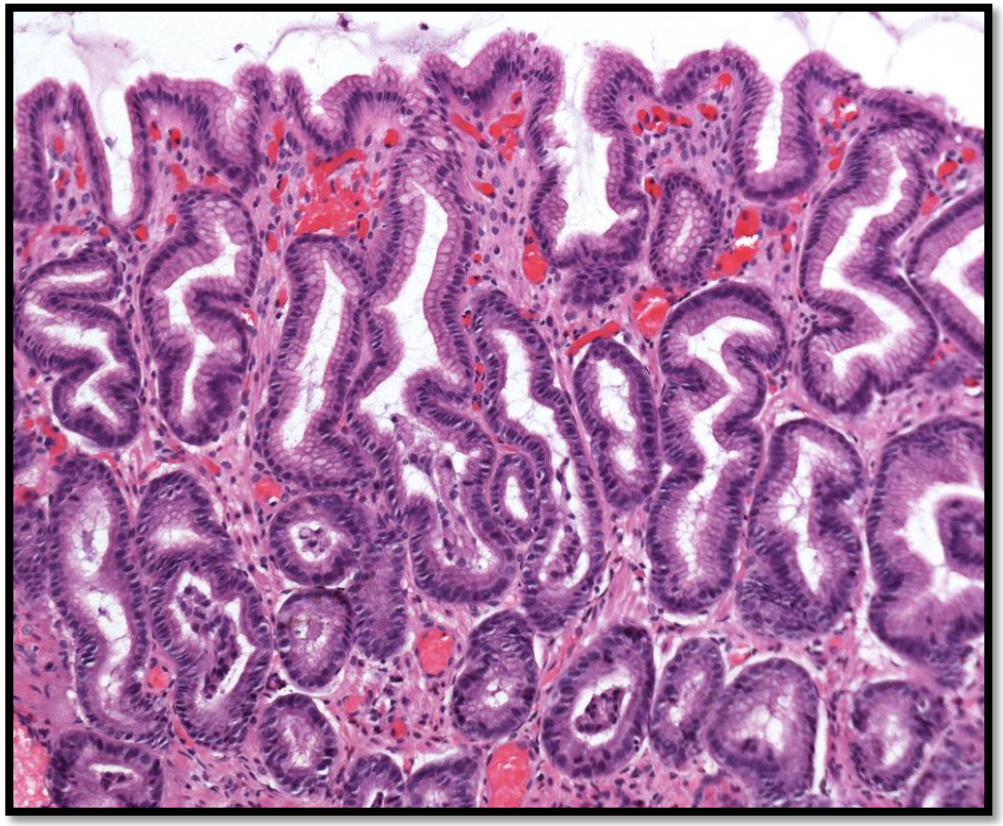
Original Article

Evolving patterns in the diagnosis of reactive gastropathy: Data from a prospective Central European multicenter study with proposal of a new histologic scoring system

Eva-Maria Wolf[a], Wolfgang Plieschnegger[b], Bertram Schmack[c], Hartmut Bordel[d], Bernd Höfler[e], Andreas Eherer[f], Tilman Schulz[g], Michael Vieth[g], Cord Langner[a,*]



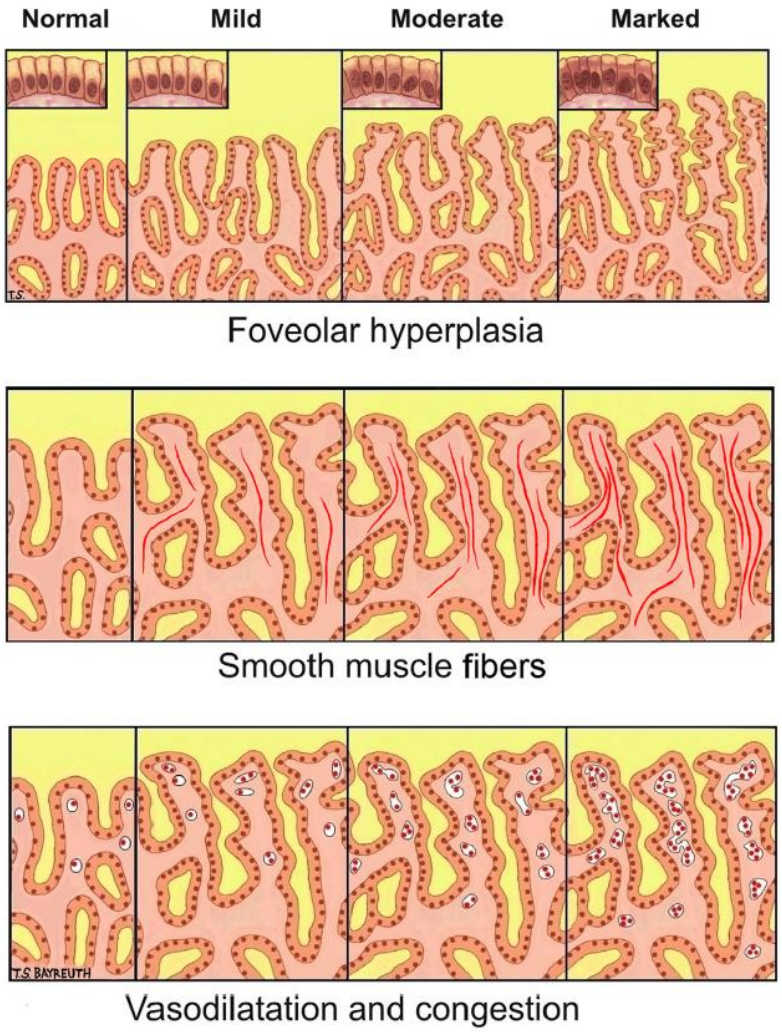


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Table 1
Histologic parameters of gastritis related to the presence of *Helicobacter* infection.

	Helicobacter negative ($n=913$)	*Helicobacter* positive ($n=210$)	p value
Foveolar hyperplasia			
Absent	230 (25.2%)	87 (41.4%)	<0.001
Grade 1	491 (53.8%)	108 (51.4%)	
Grade 2	138 (15.1%)	15 (7.1%)	
Grade 3	54 (5.9%)	0 (0%)	
Smooth muscle fibers in lamina propria			
Absent	541 (59.3%)	201 (95.7%)	<0.001
Grade 1	244 (26.7%)	9 (4.3%)	
Grade 2	103 (11.3%)	0 (0%)	
Grade 3	25 (2.7%)	0 (0%)	
Vasodilatation and congestion of lamina propria			
Absent	471 (51.6%)	91 (43.3%)	<0.001
Grade 1	277 (30.3%)	113 (53.8%)	
Grade 2	104 (11.4%)	5 (2.4%)	
Grade 3	61 (6.7%)	1 (0.5%)	
Chronic inflammation			
Absent	535 (58.6%)	4 (1.9%)	<0.001
Grade 1	357 (39.1%)	44 (21%)	
Grade 2	21 (2.3%)	160 (76.2%)	
Grade 3	0 (0%)	2 (1%)	
Active inflammation			
Absent	904 (99%)	13 (6.2%)	<0.001
Grade 1	6 (0.7%)	108 (51.4%)	
Grade 2	2 (0.2%)	86 (41%)	
Grade 3	1 (0.1%)	3 (1.4%)	

Contents lists available at ScienceDirect

Pathology – Research and Practice

journal homepage: www.elsevier.com/locate/prp

Medizinische Universität Graz

Original Article

Evolving patterns in the diagnosis of reactive gastropathy: Data from a prospective Central European multicenter study with proposal of a new histologic scoring system

Eva-Maria Wolf[a], Wolfgang Plieschnegger[b], Bertram Schmack[c], Hartmut Bordel[d], Bernd Höfler[e], Andreas Eherer[f], Tilman Schulz[g], Michael Vieth[g], Cord Langner[a,*]

Table 1
Histologic parameters of gastritis related to the presence of *Helicobacter* infection.

	Helicobacter negative ($n=913$)	*Helicobacter* positive ($n=210$)	*p* value
Foveolar hyperplasia			
Absent	230 (25.2%)	87 (41.4%)	<0.001
Grade 1	491 (53.8%)	108 (51.4%)	
Grade 2	138 (15.1%)	15 (7.1%)	
Grade 3	54 (5.9%)	0 (0%)	
Smooth muscle fibers in lamina propria			
Absent	541 (59.3%)	201 (95.7%)	<0.001
Grade 1	244 (26.7%)	9 (4.3%)	
Grade 2	103 (11.3%)	0 (0%)	
Grade 3	25 (2.7%)	0 (0%)	
Vasodilatation and congestion of lamina propria			
Absent	471 (51.6%)	91 (43.3%)	<0.001
Grade 1	277 (30.3%)	113 (53.8%)	
Grade 2	104 (11.4%)	5 (2.4%)	
Grade 3	61 (6.7%)	1 (0.5%)	
Chronic inflammation			
Absent	535 (58.6%)	4 (1.9%)	<0.001
Grade 1	357 (39.1%)	44 (21%)	
Grade 2			
Grade 3			
Active inflammatio			
Absent	9		
Grade 1			
Grade 2			
Grade 3			

Table 2
Histologic parameters related to the endoscopic diagnosis of gastritis.

	No endoscopic gastritis ($n=589$)	Endoscopic gastritis ($n=534$)	*p* value
Foveolar hyperplasia			
Absent	179 (30.3%)	138 (25.8%)	<0.001
Grade 1	340 (57.7%)	259 (48.5%)	
Grade 2	66 (11.2%)	87 (16.3%)	
Grade 3	4 (0.7%)	50 (9.4%)	
Smooth muscle fibers in lamina propria			
Absent	423 (71.8%)	319 (59.7%)	<0.001
Grade 1	134 (22.8%)	119 (22.3%)	
Grade 2	29 (4.9%)	74 (13.9%)	
Grade 3	3 (0.5%)	22 (4.1%)	
Vasodilatation and congestion of lamina propria			
Absent	318 (54%)	244 (45.7%)	<0.001
Grade 1	216 (36.7%)	174 (32.6%)	
Grade 2	44 (7.5%)	65 (12.2%)	
Grade 3	11 (1.9%)	51 (9.6%)	
Chronic inflammation			
Absent	300 (50.9%)	239 (44.8%)	0.083
Grade 1	201 (34.1%)	200 (37.5%)	
			0.37

Improvement of endoscopic gastritis diagnosis is not only related to improved technology (and skills of the endoscopist) but also to changes in epidemiology

Which are the (morphological and clinical) consequences of chronic gastritis?

[CANCER RESEARCH 48, 3554–3560, July 1, 1988]

Perspectives in Cancer Research

Medizinische Universität Graz

A Human Model of Gastric Carcinogenesis[1]

Pelayo Correa

90% of malignant gastric tumors (carcinomas, lymphomas) are caused by Helicobacter pylori!

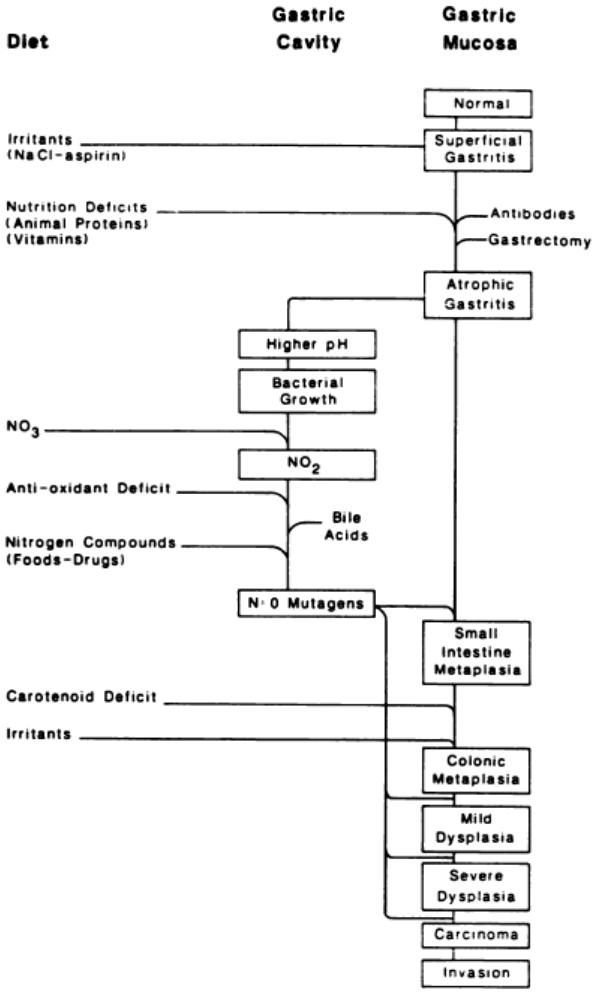

Fig. 1. Hypothesis of gastric cancer etiology.

Correa. Cancer Research 1988

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Digestive and Liver Disease

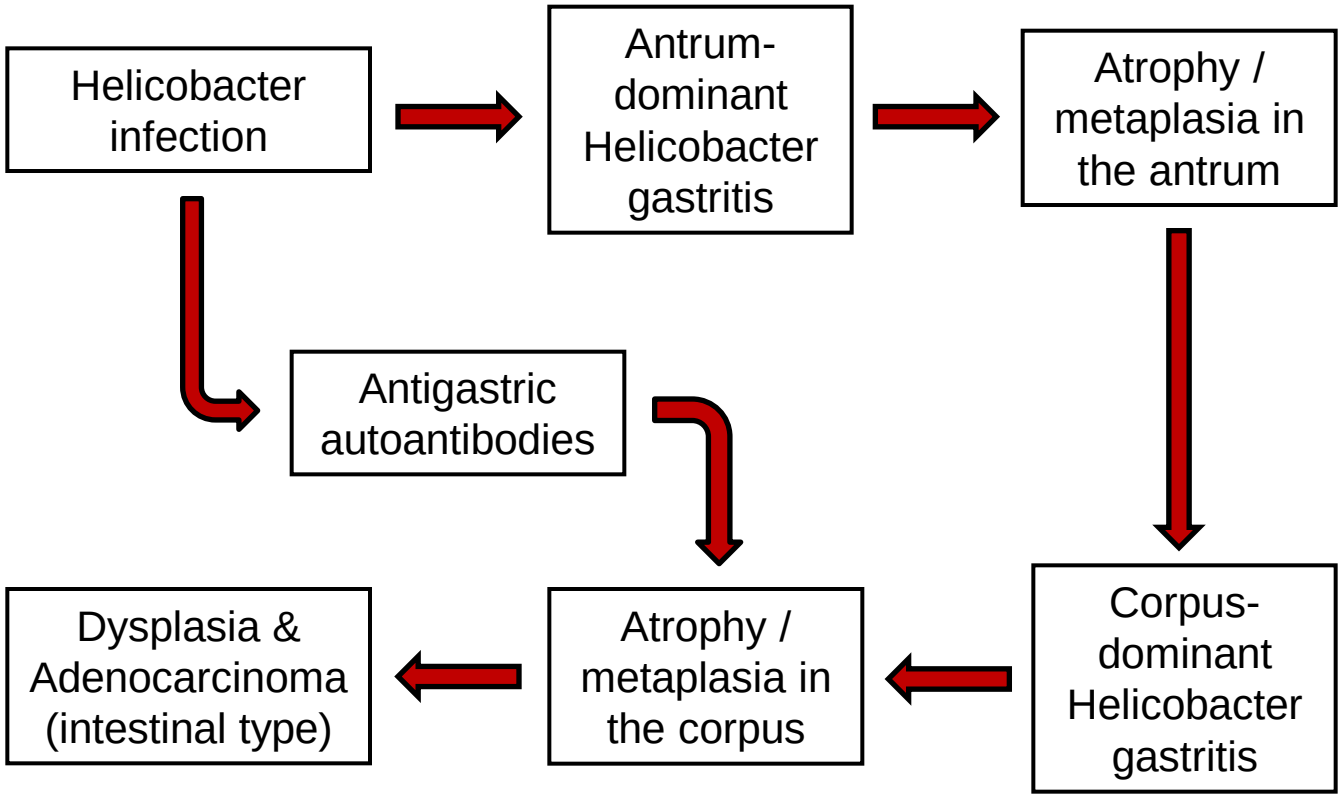
journal homepage: www.elsevier.com/locate/dld

Medizinische Universität Graz

Alimentary Tract

Changing prevalence patterns in endoscopic and histological diagnosis of gastritis? Data from a cross-sectional Central European multicentre study

Eva-Maria Wolf[a], Wolfgang Plieschnegger[b], Michael Geppert[c], Bernd Wigginghaus[d], Gabriele M. Höss[e], Andreas Eherer[f], Nora I. Schneider[a], Almuthe Hauer[g], Peter Rehak[h], Michael Vieth[i], Cord Langner[a,*]



Wolf et al. Dig Liver Dis 2014

[CANCER RESEARCH 48, 3554–3560, July 1, 1988]

Perspectives in Cancer Research

Medizinische Universität Graz

A Human Model of Gastric Carcinogenesis[1]

Pelayo Correa

Gastritis

Atrophy / Metaplasia

Dysplasia

Adenocarcinoma

Suitable for risk stratification

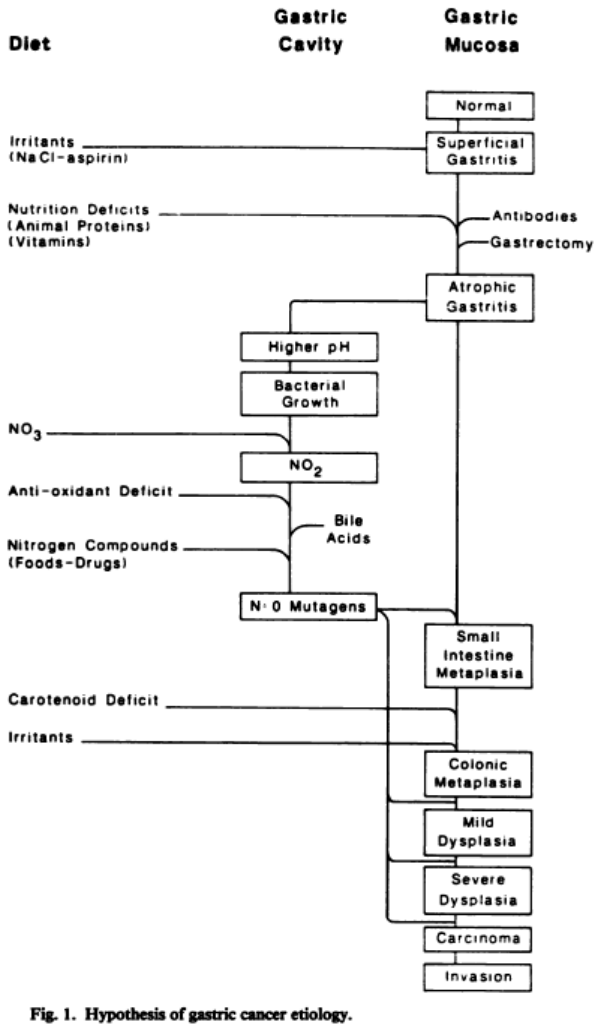
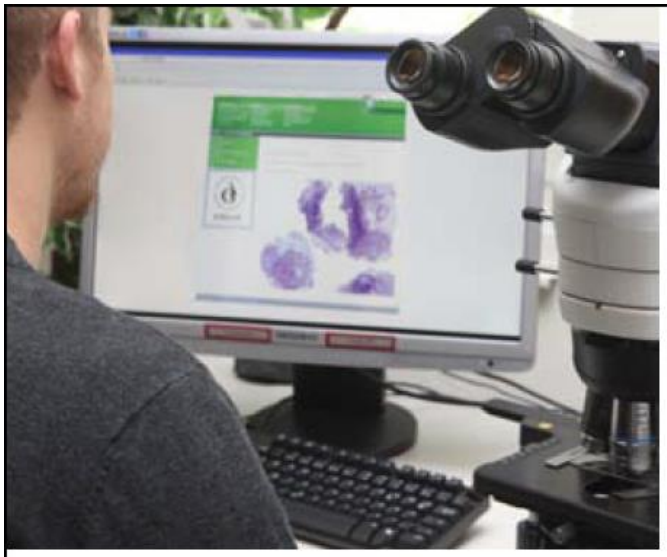


Fig. 1. Hypothesis of gastric cancer etiology.

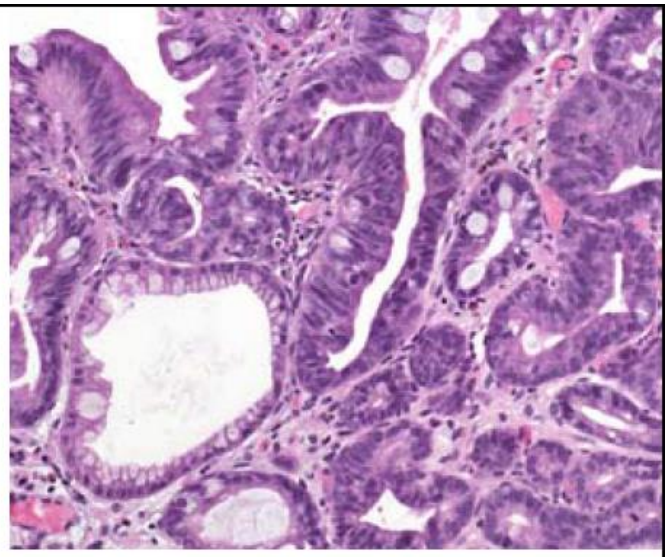
Correa. Cancer Research 1988

Medizinische Universität Graz



European Network of Gastrointestinal Pathology

ENGIP



European Network of Gastrointestinal Pathology

www.medunigraz.at/engip

www.facebook.com/ENGIP

Medizinische Universität Graz

HELICOBACTER PYLORI INFECTION AND THE DEVELOPMENT OF GASTRIC CANCER

NAOMI UEMURA, M.D., SHIRO OKAMOTO, M.D., SOICHIRO YAMAMOTO, M.D., NOBUTOSHI MATSUMURA, M.D., SHUJI YAMAGUCHI, M.D., MICHIO YAMAKIDO, M.D., KIYOMI TANIYAMA, M.D., NAOMI SASAKI, M.D., AND RONALD J. SCHLEMPER, M.D.

TABLE 2. THE DEVELOPMENT OF GASTRIC CANCER IN *H. PYLORI*–POSITIVE PATIENTS ACCORDING TO ABNORMALITIES AT BASE LINE.

ABNORMALITIES AT BASE LINE	ALL *H. PYLORI*–POSITIVE PATIENTS (N=1246)	*H. PYLORI*–POSITIVE PATIENTS WITH GASTRIC CANCER (N=36)	RELATIVE RISK (95% CI)*	*H. PYLORI*–POSITIVE PATIENTS WITH INTESTINAL-TYPE CANCER (N=23)	*H. PYLORI*–POSITIVE PATIENTS WITH DIFFUSE-TYPE CANCER (N=13)
	no.	no. (%)		no.	
Grade of atrophy					
None or mild†	381	3 (0.8)	1.0	0	3
Moderate	657	18 (2.7)	1.7 (0.8–3.7)	9	9
Severe	208	15 (7.2)	4.9 (2.8–19.2)	14	1
Distribution of gastritis					
Antrum predominant†	699	2 (0.3)	1.0	0	2
Pangastritis	337	14 (4.2)	15.6 (6.5–36.8)	4	10
Corpus predominant	210	20 (9.5)	34.5 (7.1–166.7)	19	1
Intestinal metaplasia					
Absent†	782	6 (0.8)	1.0	1	5
Present	464	30 (6.5)	6.4 (2.6–16.1)	22	8

*CI denotes confidence interval.

†Patients in this category served as the reference group.

Uemura et al. N Engl J Med 2001

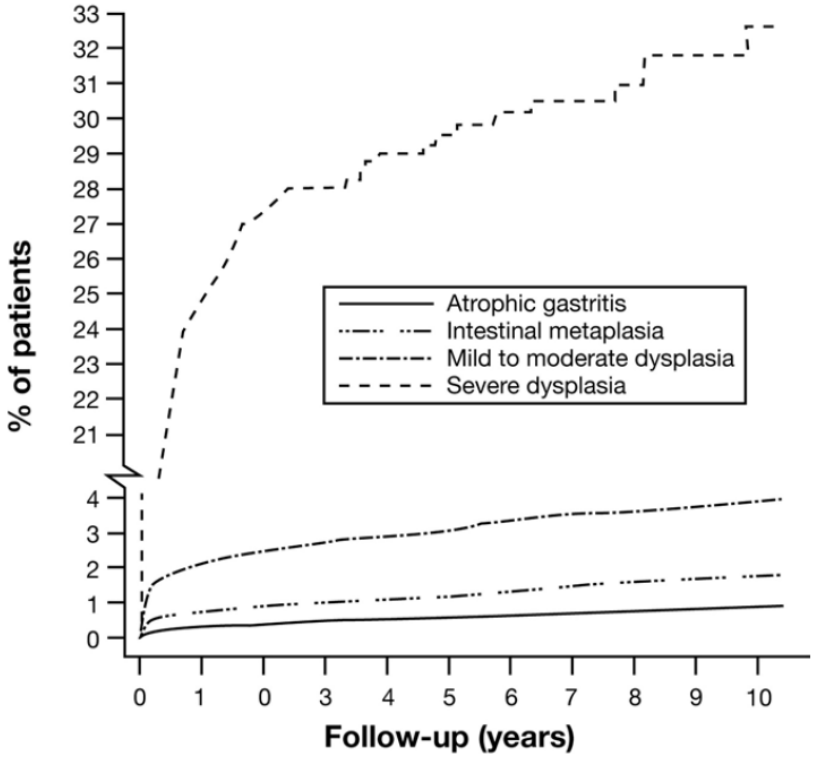
GASTROENTEROLOGY 2008;134:945–952

Medizinische Universität Graz

Gastric Cancer Risk in Patients With Premalignant Gastric Lesions: A Nationwide Cohort Study in the Netherlands

ANNEMARIE C. DE VRIES,* NICOLE C. T. VAN GRIEKEN,‡ CASPAR W. N. LOOMAN,§ MARIËL K. CASPARIE,‖ ESTHER DE VRIES,§ GERRIT A. MEIJER,‡ and ERNST J. KUIPERS*,¶

*Department of Gastroenterology and Hepatology, §Department of Public Health, ¶Department of Internal Medicine, Erasmus MC University Medical Center, Rotterdam; ‡Department of Pathology, VU University Medical Center, Amsterdam; and ‖Prismant, Utrecht; The Netherlands



In total, 22,365 (24%) patients were diagnosed with atrophic gastritis, 61,707 (67%) with intestinal metaplasia, 7616 (8%) with mild-to-moderate dysplasia, and 562 (0.6%) with severe dysplasia.

The annual incidence of gastric cancer was 0.1% for patients with atrophic gastritis, 0.25% for intestinal metaplasia, 0.6% for mild-to-moderate dysplasia, and 6% for severe dysplasia within 5 years after diagnosis.

De Vries et al. Gastroenterology 2008

Medizinische Universität Graz

Incidence of gastric cancer among patients with gastric precancerous lesions: observational cohort study in a low risk Western population

Huan Song,[1] Isabella Guncha Ekheden,[1] Zongli Zheng,[1] Jan Ericsson,[2] Olof Nyrén,[1] Weimin Ye[1]

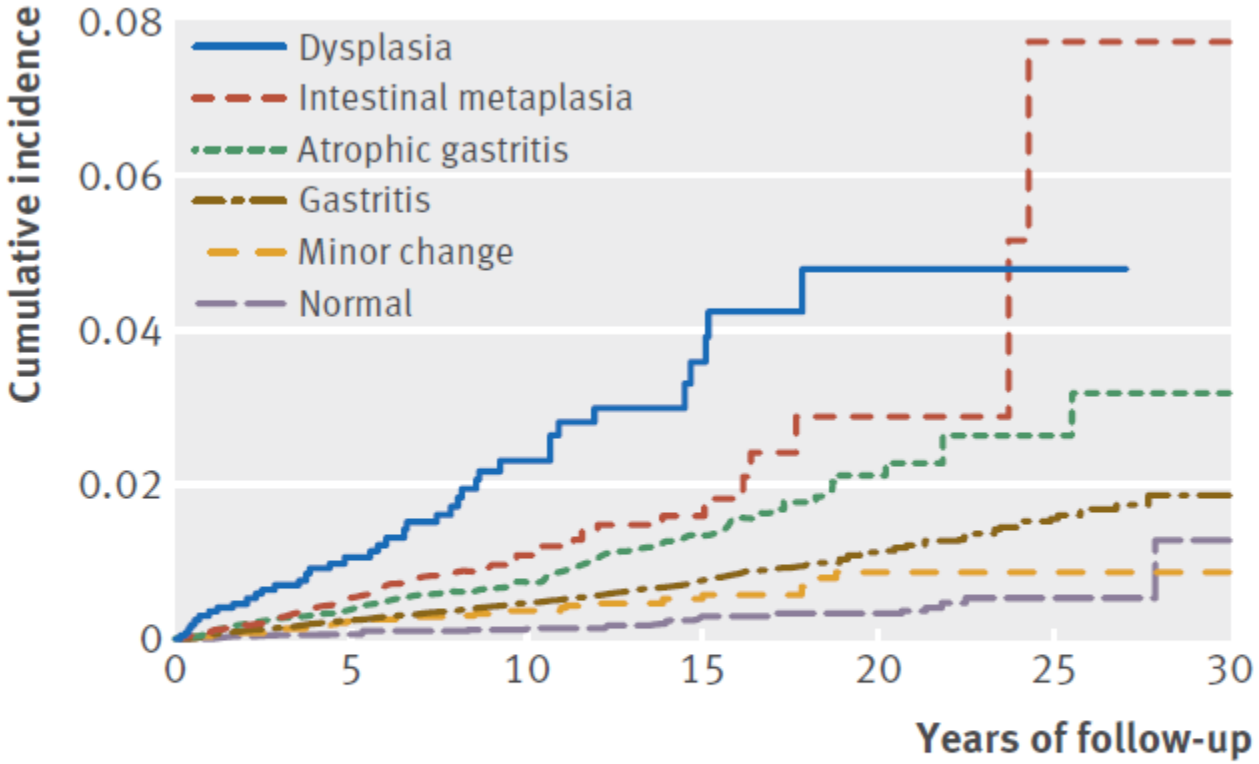


Fig 2 | Cumulative incidence of gastric cancer among patients with different baseline diagnoses. First two years of follow-up excluded

"Our data predict that about 1 in 256 people with normal mucosa, 1 in 85 with gastritis, 1 in 50 with atrophic gastritis, 1 in 39 with intestinal metaplasia, and 1 in 19 with dysplasia will develop gastric cancer within 20 years after gastroscopy"

Song et al. BMJ 2015

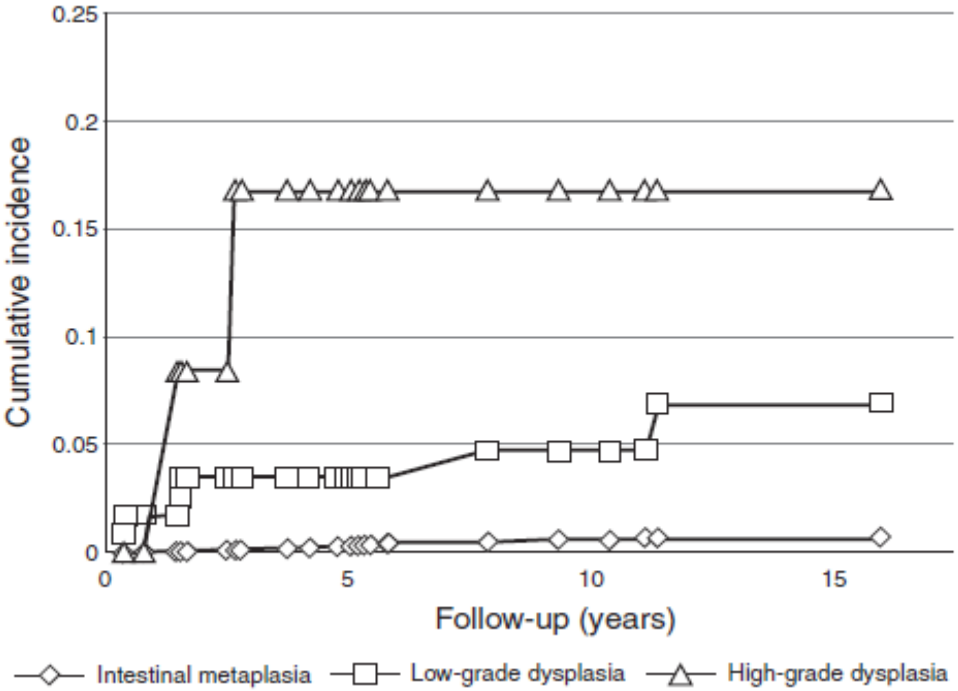
CME

Risks and Predictors of Gastric Adenocarcinoma in Patients with Gastric Intestinal Metaplasia and Dysplasia: A Population-Based Study

Dan Li, MD[1], Marita C. Bautista, MD[1], Sheng-Fang Jiang, MS[2], Paras Daryani, MD[1], Marilyn Brackett[3], Mary Anne Armstrong, MA[2], Yun-Yi Hung, PhD[2], Debbie Postlethwaite, RNP, MPH[2] and Uri Ladabaum, MD, MS[4]

Table 2. Follow-up of patients with gastric intestinal metaplasia and dysplasia

	Intestinal metaplasia	Low-grade dysplasia	High-grade dysplasia
Total number at baseline endoscopy, *n*	4,146	141	44
Age at diagnosis of adenocarcinoma			
Median	77	79	75
Interquartile range, years	70–80	73–83	72–79
Gender			
Female, *n* (%)	2,149 (51.8%)	71 (50.4%)	15 (34.1%)
Male, *n* (%)	1,997 (48.2%)	70 (49.6%)	29 (65.9%)
Follow-up time, years			
Median	7.1	6.1	0.14
Interquartile range, years	2.6–9.6	2–10.5	0–2
Number of gastric adenocarcinoma during first year, *n* (%)	20 (0.5%)	5 (3.5%)	26 (59.1%)
Number of gastric adenocarcinoma after first year, *n* (%)	17 (0.4%)	6 (4.3%)	2 (4.5%)
Time to diagnosis of gastric adenocarcinoma (excluding cases during first year), years			
Median	6.1	2.6	3.1
Interquartile range, years	4.7–6.8	1.4–8.9	2.5–3.7



The incidence rate of gastric adenocarcinoma was 0.72/1,000 person-years in patients with intestinal metaplasia, with a **relative risk of 2.56** (95% CI 1.49–4.10) compared with the Kaiser Permanente member population, and 7.7/1,000 person-years for low-grade dysplasia, with a relative risk of 25.6 (95% CI, 9.4–55.7).

Li et al. Am J Gastroenterol 2016

Aliment Pharmacol Ther 2002; 16: 1249–1259.

Medizinische Universität Graz

Gastric mucosal atrophy: interobserver consistency using new criteria for classification and grading

M. RUGGE†, P. CORREA‡, M. F. DIXON§, R. FIOCCA¶, T. HATTORI**, J. LECHAGO††, G. LEANDRO‡‡, A. B. PRICE§§, P. SIPPONEN¶¶, E. SOLCIA***, H. WATANABE††† & R. M. GENTA‡‡‡

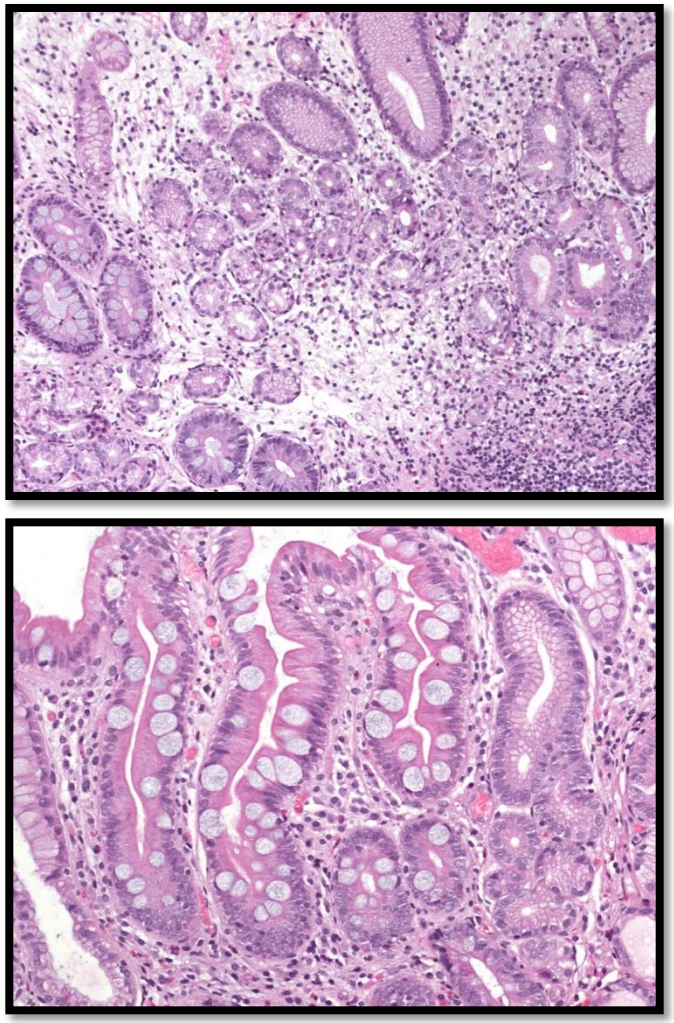
Proposed classification

Most participants subscribed to the following statements.

(a) Two main types of atrophy can be recognized: one characterized by the loss of glands, accompanied by fibrosis or fibromuscular proliferation in the lamina propria, and one characterized by the replacement of the normal (native) glands with metaplastic glands (i.e. glands not normally belonging to that area).

(b) By modifying the definition of atrophy from the 'loss of glands' to the 'loss of *appropriate* glands', both metaplastic and non-metaplastic atrophy would be included.

(c) Both metaplastic and non-metaplastic atrophy can be allocated to one of three grades of severity, using grading criteria modelled on those suggested by the original and the updated Sydney System.[6, 21]



Rugge et al. Aliment Pharmacol Ther 2002

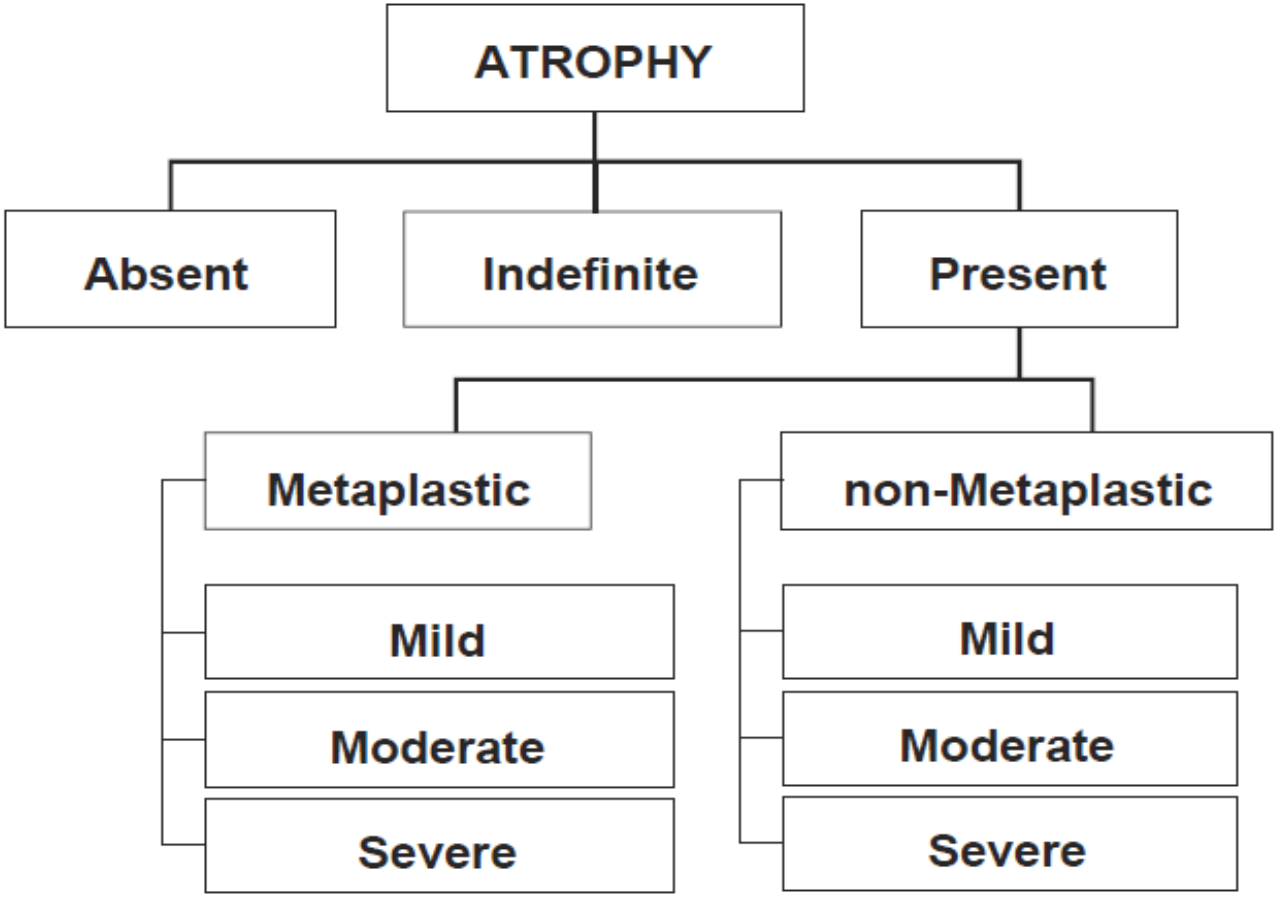
Human Pathology (2005) **36**, 228–233

Current topics

Medizinische Universität Graz

Staging and grading of chronic gastritis

Massimo Rugge MD, Robert M. Genta MD*



Rugge and Genta Hum Pathol 2005

Human Pathology (2005) **36**, 228–233

Current topics

Medizinische Universität Graz

Staging and grading of chronic gastritis

Massimo Rugge MD, Robert M. Genta MD*

Operative **L**ink for **G**astritis **A**ssess-ment (*OLGA*)

ANTRUM	CORPUS: No Atrophy (score 0)	CORPUS: Mild Atrophy (score 1)	CORPUS: Moderate Atrophy (score 2)	CORPUS: Severe Atrophy (score 3)
No Atrophy (score 0) (including *incisura angularis*)			STAGE II	STAGE III
Mild Atrophy (score 1) (including *incisura angularis*)			STAGE II	STAGE III
Moderate Atrophy (score 2) (including *incisura angularis*)	STAGE II	STAGE II		
Severe Atrophy (score 3) (including *incisura angularis*)	STAGE III	STAGE III		

Benign Conditions cluster in stages 0-II

Neoplastic Lesions cluster in stages III-IV

Rugge and Genta Hum Pathol 2005

ORIGINAL ARTICLE: Clinical Endoscopy

Medizinische Universität Graz

The staging of gastritis with the OLGA system by using intestinal metaplasia as an accurate alternative for atrophic gastritis

Lisette G. Capelle, MD, Annemarie C. de Vries, MD, PhD, Jelle Haringsma, MD, Frank Ter Borg, MD, PhD, Richard A. de Vries, MD, PhD, Marco J. Bruno, MD, PhD, Herman van Dekken, MD, PhD, Jos Meijer, MD, Nicole C. T. van Grieken, MD, PhD, Ernst J. Kuipers, MD, PhD

Rotterdam, Deventer, Groningen, Arnhem, Amsterdam, The Netherlands

TABLE 2. Proposal for the OLGIM staging system

		Corpus			
	IM score	**Not fat: no IM (score 0)**	**Mild IM (score 1)**	**Moderate IM (score 2)**	**Severe IM (score 3)**
Antrum (including incisura angularis)	No IM (score 0)	Stage 0	Stage I	Stage II	Stage II
	Mild IM (score 1)	Stage I	Stage I	Stage II	Stage III
	Moderate IM (score 2)	Stage II	Stage II	Stage III	Stage IV
	Severe IM (score 3)	Stage III	Stage III	Stage IV	Stage IV

IM, Intestinal metaplasia; *OLGIM*, operative link on gastric intestinal metaplasia assessment.

Capelle et al. GIE 2010

Medizinische Universität Graz

The staging of gastritis with the OLGA system by using intestinal metaplasia as an accurate alternative for atrophic gastritis

Lisette G. Capelle, MD, Annemarie C. de Vries, MD, PhD, Jelle Haringsma, MD, Frank Ter Borg, MD, PhD, Richard A. de Vries, MD, PhD, Marco J. Bruno, MD, PhD, Herman van Dekken, MD, PhD, Jos Meijer, MD, Nicole C. T. van Grieken, MD, PhD, Ernst J. Kuipers, MD, PhD

Rotterdam, Deventer, Groningen, Arnhem, Amsterdam, The Netherlands

TABLE 5. Interobserver agreement (kappa values) for different stages of the OLGA and OLGIM staging systems

Stage(s)	OLGA	OLGIM
0-IV	0.38	0.58
0	0.56	0.88
I	0.19	0.48
II	0.29	0.31
III	0.36	0.48
IV	0.48	0.59
III-IV	0.48	0.61

OLGA, operative link on gastritis assessment; *OLGIM*, operative link on gastric intestinal metaplasia assessment.

Capelle et al. GIE 2010

Gastric Cancer (2018) 21:579–587
https://doi.org/10.1007/s10120-018-0812-3

REVIEW ARTICLE

The significance of OLGA and OLGIM staging systems in the risk assessment of gastric cancer: a systematic review and meta-analysis

Hu Yue[1,2] · Liu Shan[1] · Lv Bin[1,2]

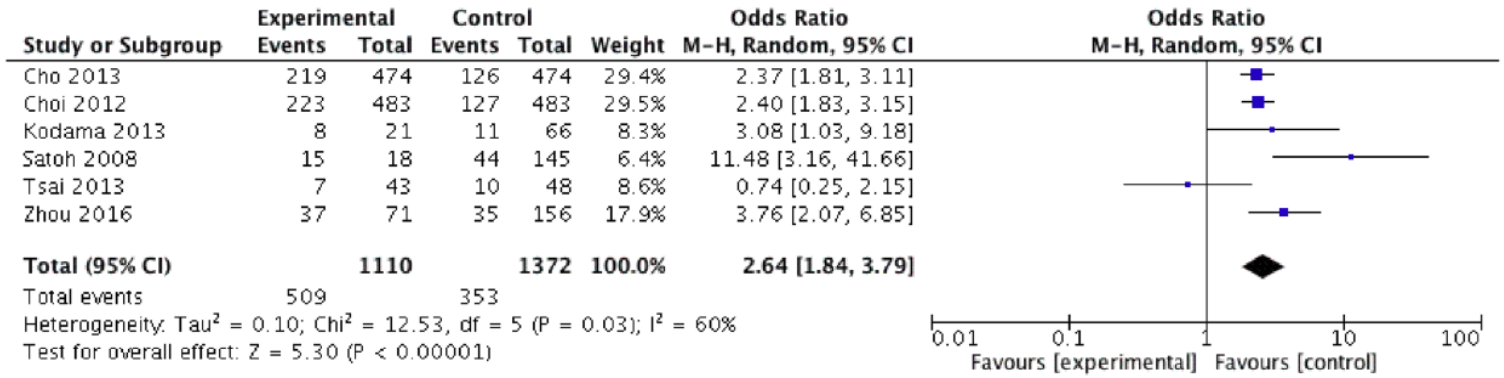


Fig. 2 Forest plot of odds ratio (OR) for gastric cancer (GC) of high stage of OLGA versus low stage in case–control studies. The cumulative GC risk among patients with OLGA stage III/IV was 2.64 (95% CI 1.84–3.79; $I^2 = 60\%$; $n = 6$)

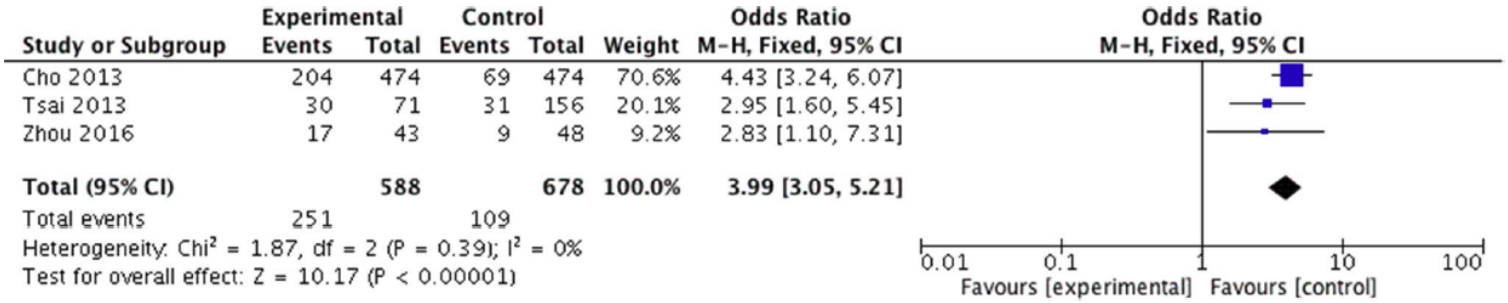


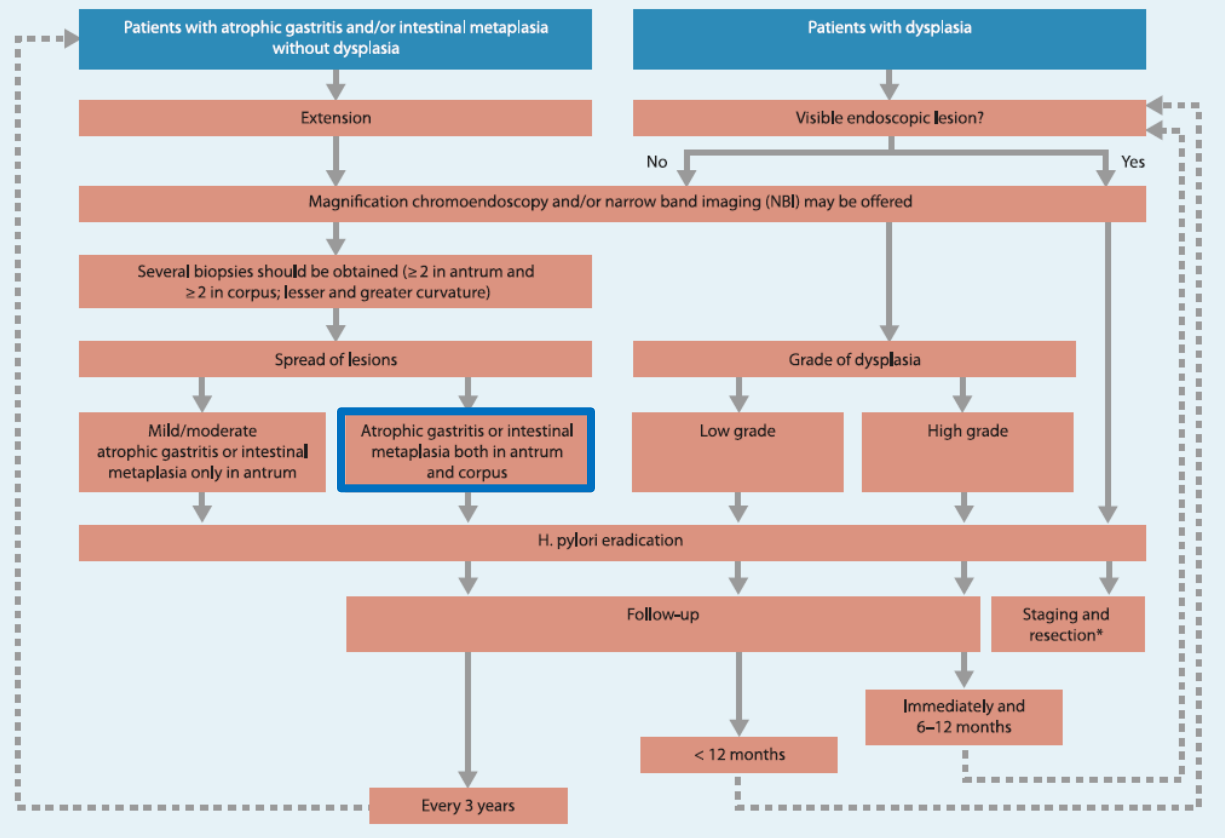
Fig. 3 Forest plot of odds ratio (OR) for gastric cancer (GC) of high stage of OLGIM versus low stage in case–control studies. The cumulative GC risk among patients with OLGIM stage III/IV was 3.99 (95% CI 3.05–5.21; $I^2 = 0\%$; $n = 3$)

Virchows Arch (2012) 460:19–46
DOI 10.1007/s00428-011-1177-8

ORIGINAL ARTICLE

Medizinische Universität Graz

Management of precancerous conditions and lesions in the stomach (MAPS): guideline from the European Society of Gastrointestinal Endoscopy (ESGE), European Helicobacter Study Group (EHSG), European Society of Pathology (ESP), and the Sociedade Portuguesa de Endoscopia Digestiva (SPED)



Dinis-Ribeiro et al. Virchows Arch 2012

Medizinische Universität Graz

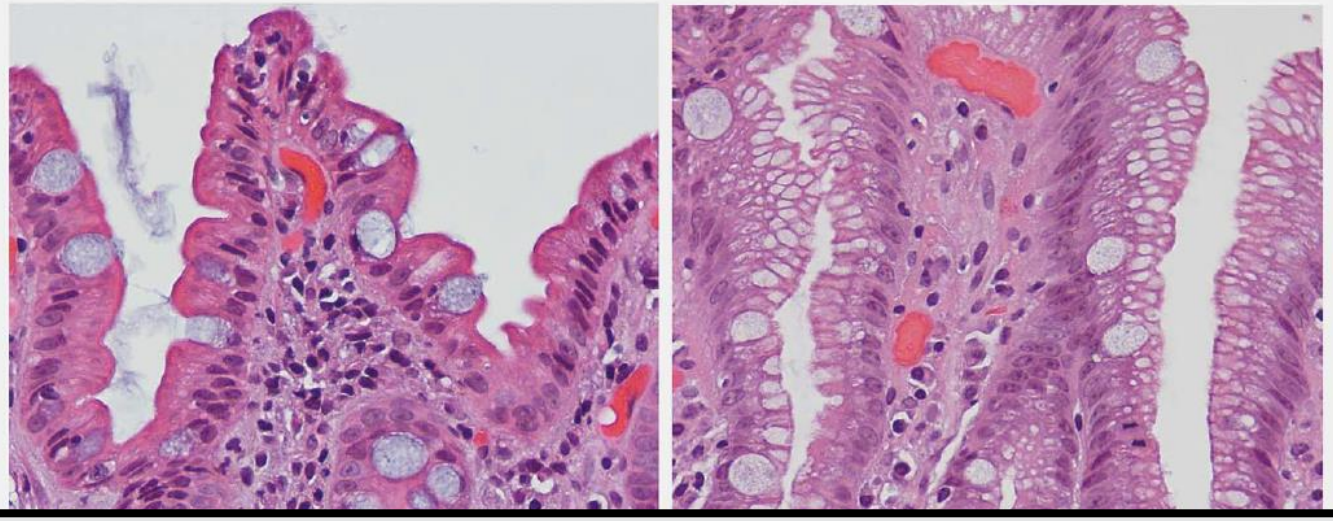
Final question:
Does subtyping of intestinal metaplasia matter?

IJC
International Journal of Cancer

Medizinische Universität Graz

Utility of subtyping intestinal metaplasia as marker of gastric cancer risk. A review of the evidence

Carlos A. González[1], José M. Sanz-Anquela[2], Javier P. Gisbert[3] and Pelayo Correa[4]



The identification and surveillance of patients with preneoplastic lesions at high risk of progressing to gastric cancer (GC) represents the most effective way of reducing the burden of GC. The incomplete type of intestinal metaplasia (IM) could be considered as the best candidate for surveillance. However, the usefulness of subtyping of IM has been considered by some authors as limited and inconsistent. A search was carried out to identify all cross-sectional (n=14) and follow-up (n=10) studies that assessed the risk of GC among subjects with different types of IM. Out of the 14 cross-sectional studies, 13 reported that the prevalence of incomplete IM was statistically significantly higher in GC than in other gastric lesions. Out of the ten follow-up studies, six found a statistically significant association between incomplete IM and subsequent GC risk. The relative risks of GC were from 4- to 11-fold higher for the presence of incomplete type in comparison to complete type or in comparison to the absence of incomplete type, among the studies that reported the magnitude of the risk. According to this comprehensive review, most of the scientific evidence supports the utility of subtyping IM as a predictor of GC risk. Recognizing its usefulness by gastroenterologists should encourage pathologists to subtype IM.

Gonzalez et al. J Gastroenterol 2013

WILEY AP&T Alimentary Pharmacology & Therapeutics

Medizinische Universität Graz

The risk of gastric cancer in patients with gastric intestinal metaplasia in 5-year follow-up

R. Pittayanon[1,3] | R. Rerknimitr[1] | N. Klaikaew[2] | A. Sanpavat[2] | S. Chaithongrat[1] | V. Mahachai[1] | P. Kullavanijaya[1] | A. Barkun[3]

TABLE 2 Univariable analysis of associated factors and relative risk in patient with high-risk and low-risk final pathology of gastric adenocarcinoma

Risk factors	High-risk final pathology (N=6)	Low-risk final pathology (N=85)	*P*-value	Relative risk (RR) (95%CI)
Sex, male (%)	100	48.2	.027	2.07
OLGA staging				
Stage 0	0	2 (2.4%)	.51	0.62 (0.15-2.57)
Stage I	5 (83.3%)	56 (65.9%)		
Stage II	1 (16.7%)	19 (22.4%)		
Stage III	0	3 (3.5%)		
Stage IV	0	0		
Missing data	0	5 (5.9%)		
OLGIM staging				
Stage 0	0	0	.56	0.75 (0.28-2.00)
Stage I	4 (66.7%)	56 (65.9%)		
Stage II				
Stage III				
Stage IV				
Missing				
Initial path				

Results: At initial presentation, 81 of the 91 patients (89%) had complete IM, whereas the remaining 11% had a study entry diagnosis of incomplete IM. No cancer developed amongst patients with complete IM. In contrast, five of the 10 patients exhibiting incomplete IM (50%) progressed to high-grade dysplasia (n=2) or cancer (n=3). Male gender (P=.027), and incomplete IM (P=.001) were associated with high-risk histology (dysplasia or cancer) by study end.

Conclusion: Male patients and those with incomplete IM are at greatest risk of developing dysplasia or early gastric cancer.

Pittayanon et al. Aliment Pharmacol Ther 2017

IJC
International Journal of Cancer

Medizinische Universität Graz

Risk of gastric cancer among patients with gastric intestinal metaplasia

Liming Shao, Peiwei Li, Jun Ye, Jiamin Chen, Yuehua Han, Jianting Cai and Xinliang Lu

Table 2. Subgroup analyses of IM and risk of gastric cancer

Factor	No. of studies	Pooled OR (95% CI)	Heterogeneity	
			I^2 (%)	*P*
IM subtype				
Antrum IM	5	4.06 (2.79–5.91)	27.4	0.239
Corpus IM	5	7.39 (4.94–11.06)	37.8	0.169
Complete IM	4	1.55 (0.91–2.65)	46.9	0.130
Incomplete IM	6	9.48 (4.33–20.78)	75.4	0.001
Gastric cancer subtype				
GCC	2	1.93 (1.15–3.24)	19.2	0.266
GNCC	4	4.98 (3.12–7.95)	81.0	0.001
Design				
Cohort	11	3.36 (2.44–4.64)	78.9	<0.001
Case control or Cross-sectional	10	3.50 (2.02–6.06)	86.4	<0.001
Country of Origin				
East Asia	14	3.99 (2.78–5.73)	72.8	<0.001
Western countries	7	2.95 (1.91–4.57)	88.5	<0.001
Sample size				
Large	10	2.64 (1.96–3.56)	81.4	<0.001
Small	11	4.68 (3.07–7.13)	67.0	0.001

Abbreviation: IM, intestinal metaplasia.
Large sample size was larger than 1,000 patients while small sample size was ≤1,000.

Shao et al. Int J Cancer 2018

Take home messages

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- The diagnosis of gastritis needs to include the aetiology of disease – mixed forms may occur and should be reported
- Diagnosis of HP on H&E stained slides is feasible (but ancillary techniques should be used if appropriate)
- The Sydney System should be used for the reporting of HP gastritis, post-HP gastritis and gastritis with uncertain aetiology (it should not be used for autoimmune gastritis and reactive gastropathy)
- Pseudopolyps in autoimmune gastritis represent an important diagnostic pitfall (DD hyperplastic polyp, NET)
- Diagnosis of gastric neuroendocrine tumours needs to include the assessment of associated conditions (NET types I – III)
- Atrophy and intestinal metaplasia are important preneoplastic lesions: chronic inflammation – metaplasia – dysplasia – carcinoma sequence (with follow-up recommendations according to MAPS Guidelines)
- Subtyping of intestinal metaplasia (complete versus incomplete) matters and should be performed

Thank you very much for your kind attention!

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