Gastric Cancer

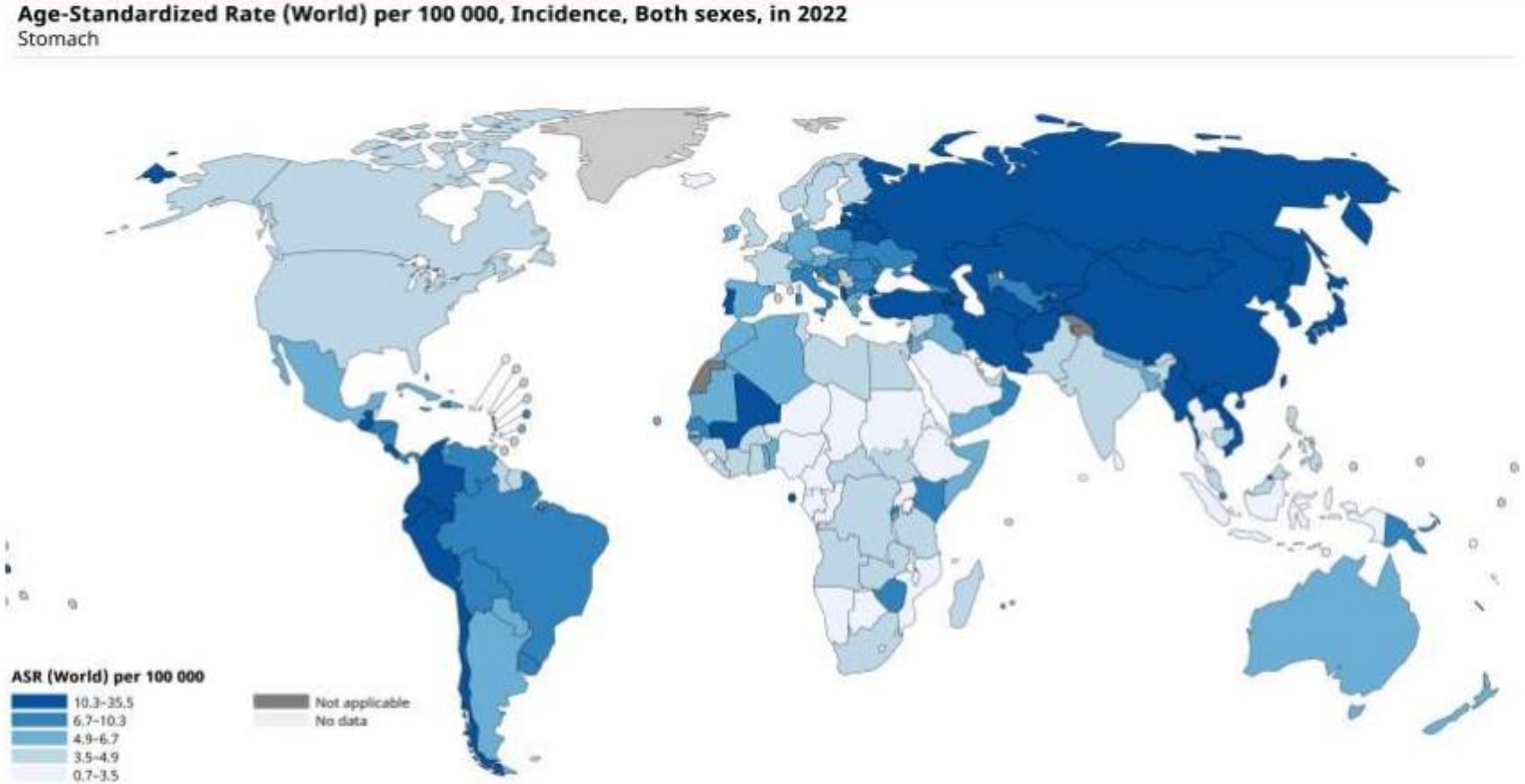
GASTRIC CANCER

- Fifth most common neoplasm in the world
- Decline secondary to controlling diet, smoking & helicobacter pylori infection
- Poor prognosis overall secondary to late presentation
- Mainstay of treatment has been centered around surgical resection
- There has been development in advanced endoscopic resection techniques
- Creation of “expanded criteria” for endoscopic resection in select patients

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Kim et al. Gastrointest Endoscopy Clin N Am 31 (2021) 563–579

GASTRIC CANCER INCIDENCE WORLDWIDE



Worldwide incidence of gastric cancer (both cardia and non-cardia) in year 2022, age-standardized to world population. Data source: GLOBOCAN 2022. Graph production: IARC (http://gco.iarc.fr/today), World Health Organization.

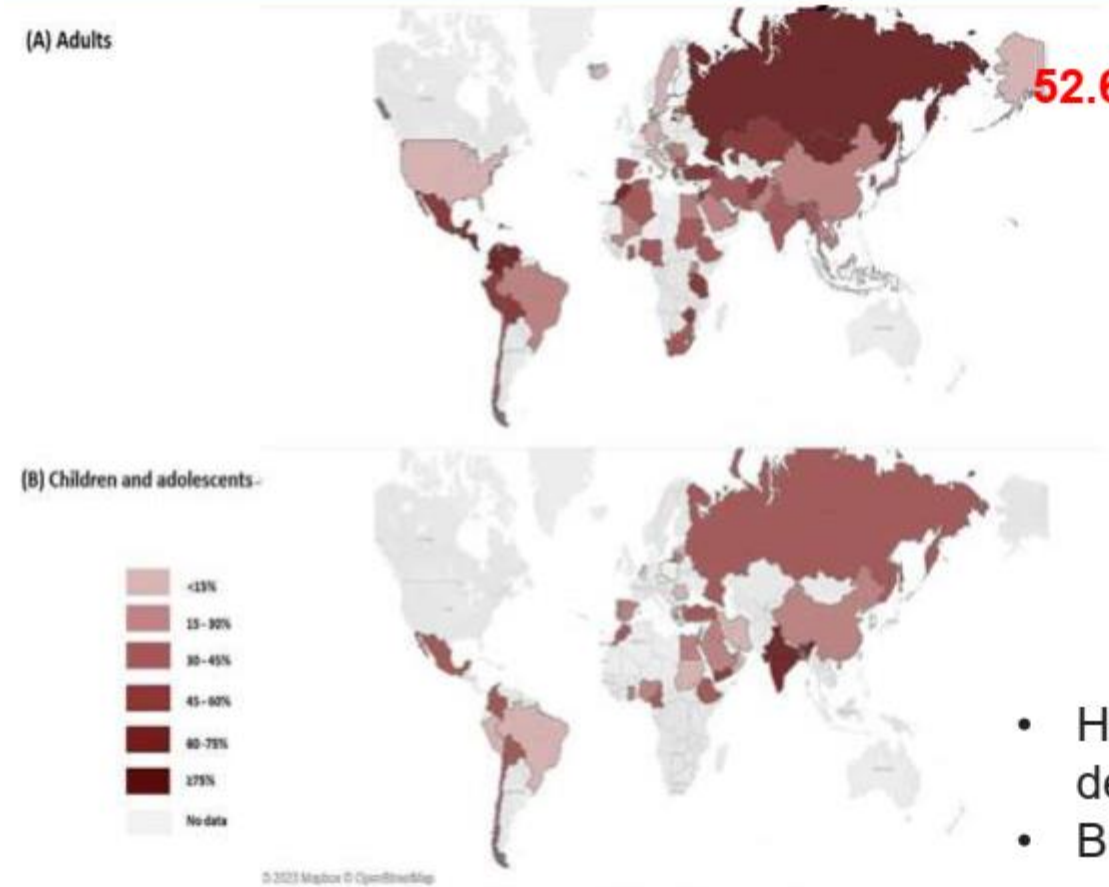
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Cancer TODAY | IARC
https://gco.iarc.who.int/today
Data version: Globocan 2022 - 08.02.2024
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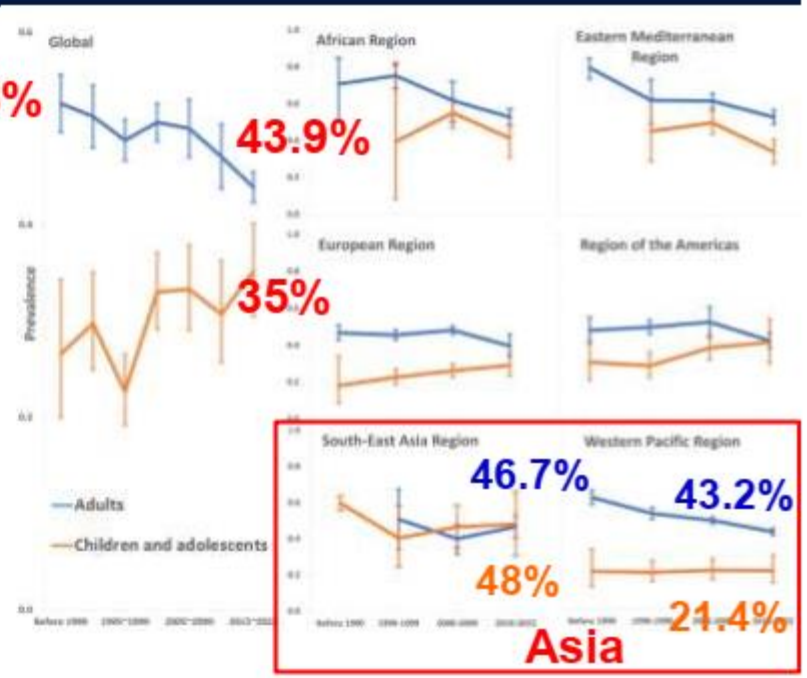
International Agency for Research on Cancer
World Health Organization

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Global Prevalence of *Helicobacter pylori* Infection



The latest (2010~2022) *H pylori* prevalence



- Has declined during the last 3 decades in adults
- But not in children and adolescents

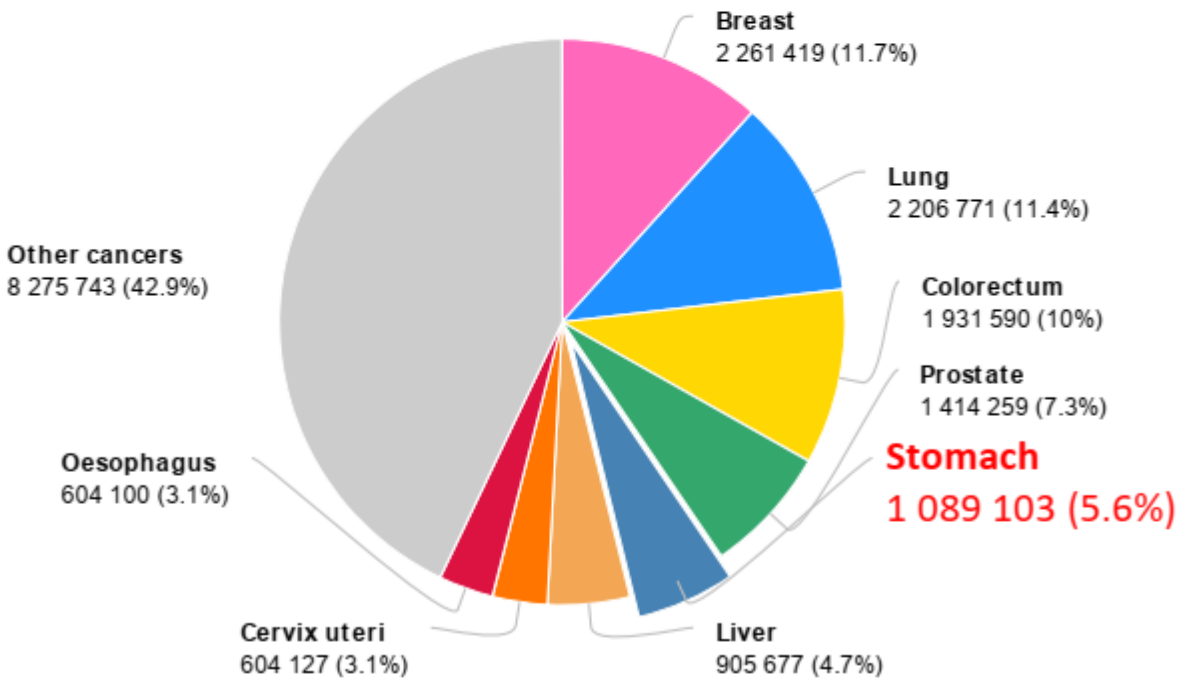
Chen et al. Gastroenterology 2024;166:605-619.

Gastric cancer

Total cases are still increasing!

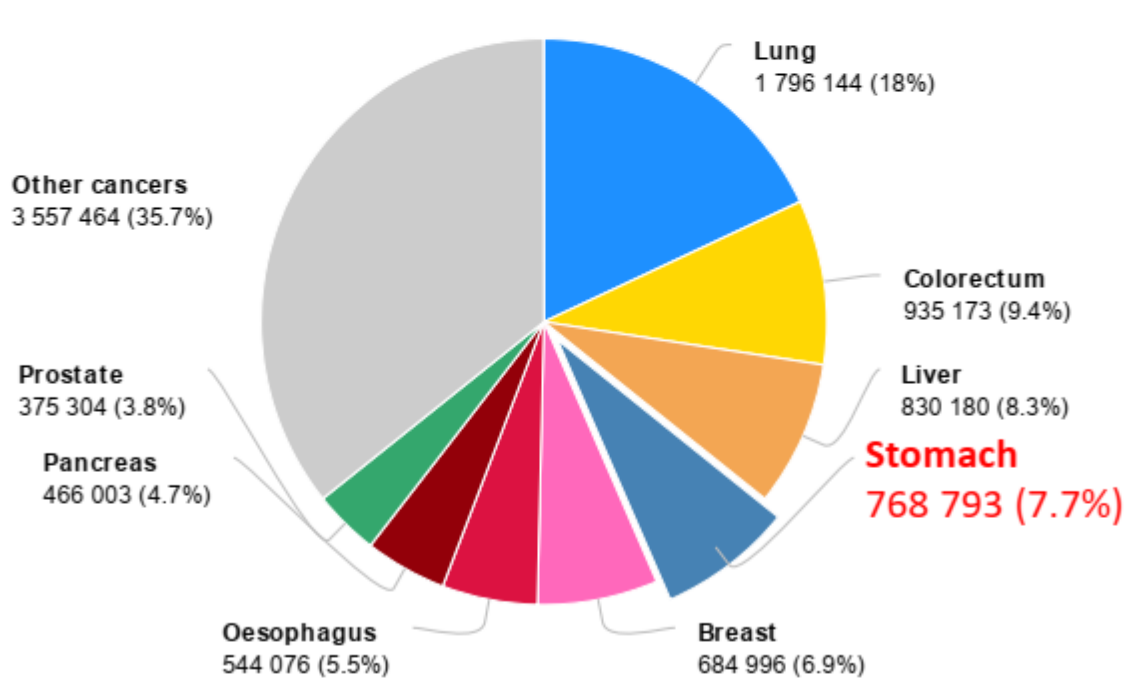
- 5th most frequently diagnosed cancer
- 4th leading cause of cancer deaths

Number of new cases in 2020, both sexes, all ages



Total: 19 292 789 cases

Number of deaths in 2020, both sexes, all ages



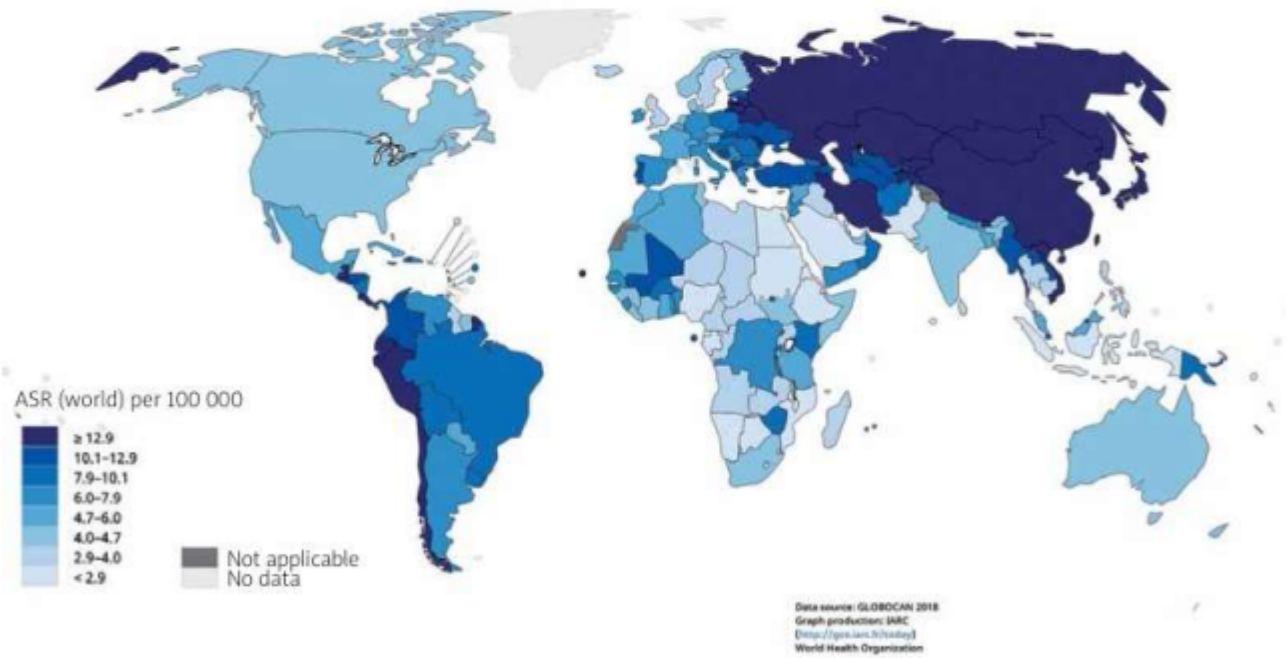
Total: 9 958 133 deaths

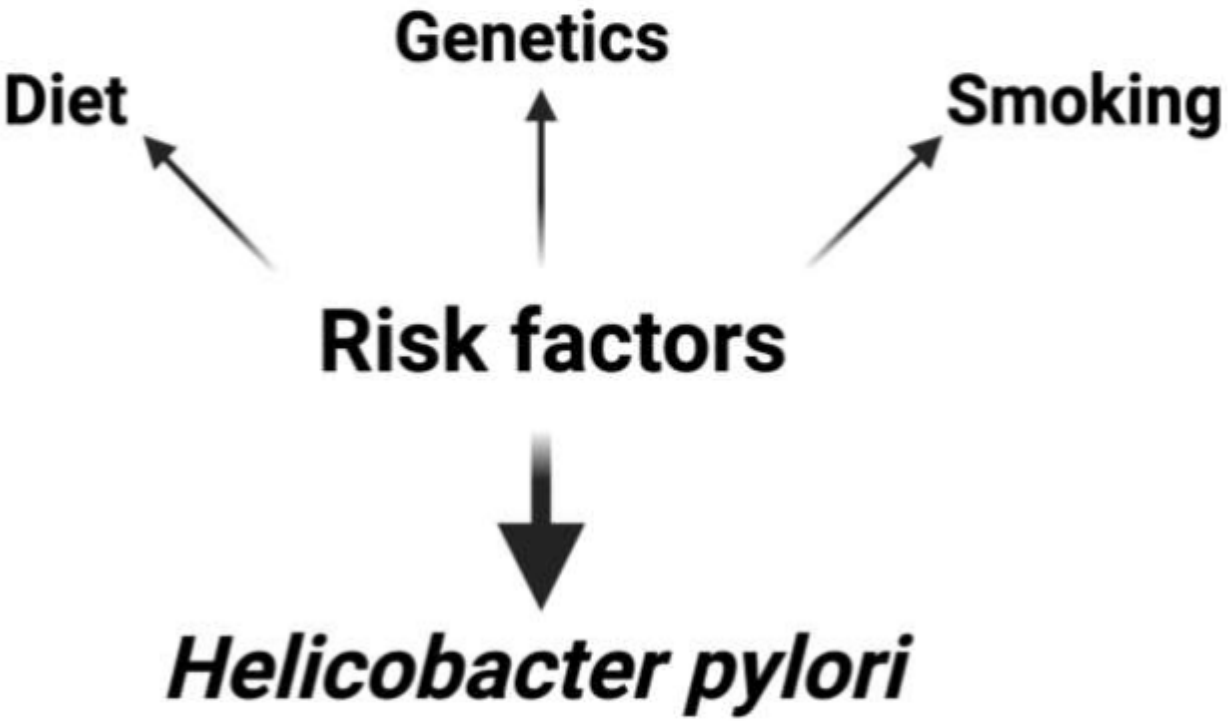
Gastric cancer

1 in 96

1 in 152

6 of every 10 diagnosed are 65 or older





GLOBOCAN 2020.; Ge *et al. Nat Commun.* 2018.; Oliveira *et al. Lancet Oncol.* 2015.; Etemadi *et al. Lancet. Gastroenterol Hepatol.* 2017.; Hardbower *et al. J Leukoc Biol.* 2014.; Gobert & Wilson. *Curr Top Microbiol Immunol.* 2017.

Human gastric cancer molecular subtypes -TCGA

ARTICLE

OPEN

doi:10.1038/nature13480

Comprehensive molecular characterization of gastric adenocarcinoma

The Cancer Genome Atlas Research Network*

GC is genetic heterogeneity!

Top mutations:
TP53 (40%-50%)
ARID1A (25%-35%)
KMT2D, *KMT2C* (10-20%)
Many others (5%-10%)

Chromosomal instability (CIN, 50%)

Mutations:
- High *TP53*

Amplifications:
- RTKs
- TFs
- Cell cycle genes

✓ Aneuploidy

Microsatellite instability (MSI, 22%)

Hypermethylation:
- *MLH1*

Mutations:
- *ARID1A* (>70%)
- *PIK3CA, PTEN …*
- Moderate *TP53*

✓ High mutations

Genomically stable (GS, 20%)

Mutations:
- *CDH1*
- *RHOA*
- Rare *TP53*

Fusions:
- *CLDN18-ARHGAP*

✓ Diffuse type

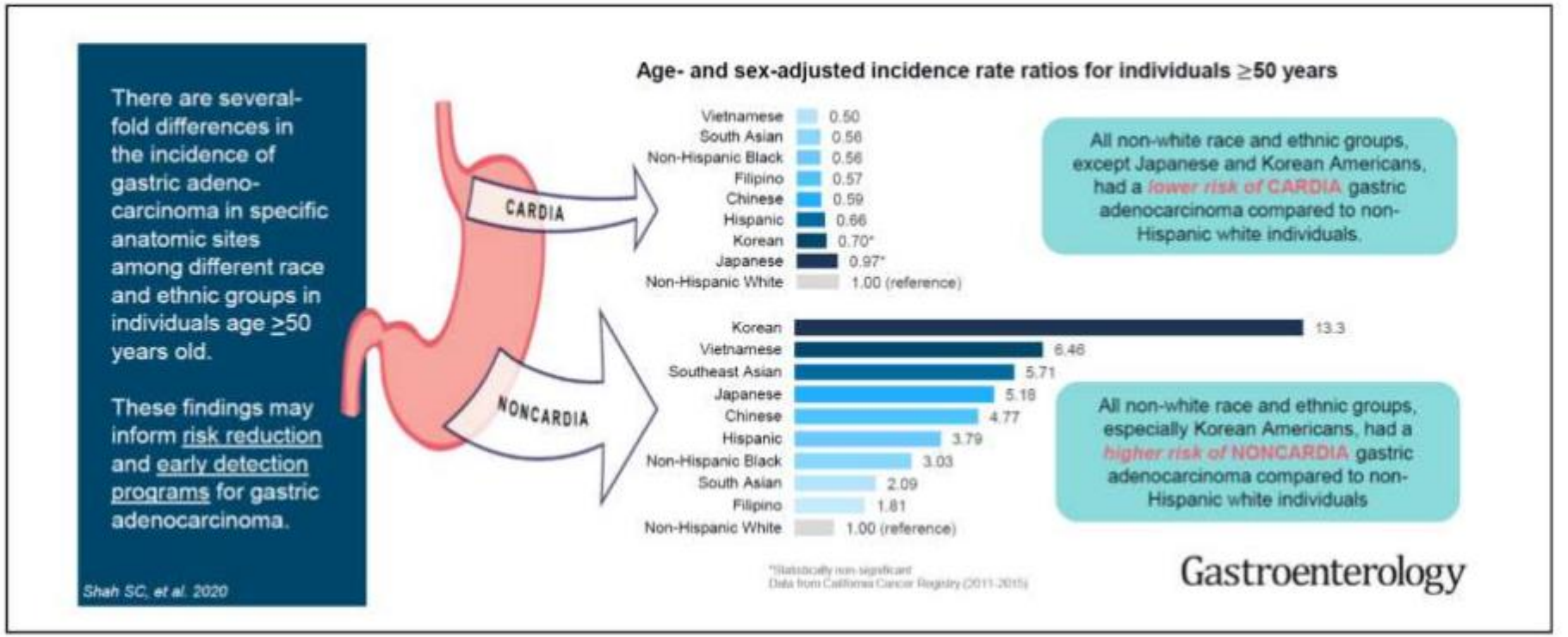
Epstein-Barr virus (EBV, 8%)

Hypermethylation:
- *CDKN2A*

Mutations:
- *ARID1A* (>40%)
- *PIK3CA*, rare *TP53*

Amplifications:
- *PDL1/2, JAK…*

CARDIA VS NON-CARDIA GASTRIC CANCERS



Data based on California Cancer Registry. Gastroenterology. 2020 Nov;159(5):1705-1714.e2.

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RISK FACTORS FOR NON-CARDIA GASTRIC CANCER

Factor	Direction of association
Environmental	
Hp infection[16,17]	↑↑
Presence of precursor lesions (AG or IM)[48,122–126]	↑↑
Smoking[21–23,28]	↑
Salt intake[24–26]	↑
Total, red, and processed meat intake[27,29]	↑
Alcohol consumption[31–33]	↑ (Heavy) ↓ (Moderate)
Obesity[30]	↔
Fresh fruit consumption[34,35]	↓
Vegetable consumption[34,35]	↓↔
Aspirin use[36,37]	↓
NSAID use[36,37]	↓↔

Gastroenterology. 2023 Apr;164(5):736-751

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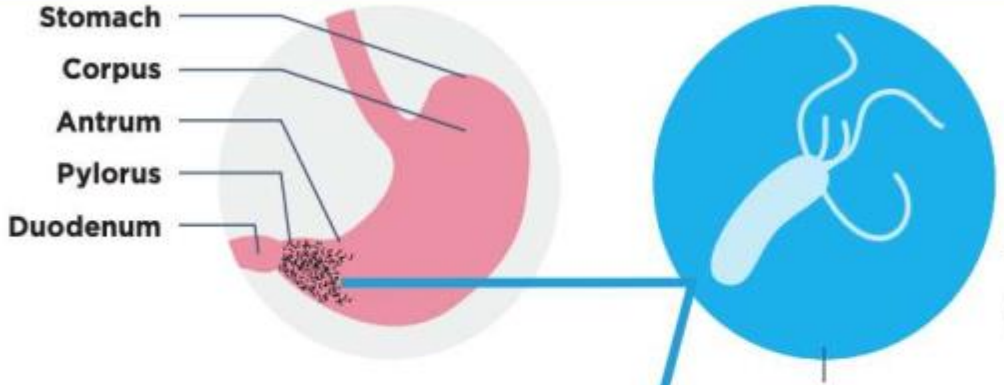
RISK FACTORS FOR CARDIA GASTRIC CANCER

Risk factor	Association with non-cardia gastric cancer	Association with cardia gastric cancer
H. pylori infection	RR 4.79	RR 1.98 (in China, South Korea and Japan)
Cigarette smoking	RR 1.60	RR 1.87
BMI ≥ 30 kg/m^2	NS	RR 1.82
Dietary factors		
Salt	OR 2.26	NS
Processed meats	RR 1.34	NS
Red meat	NS	NS
White meat	NS	NS
Vegetables	NS	NS
Fruit	NS	NS
Alcohol consumption	RR 1.19	NS
NSAID use	RR 0.70	NS

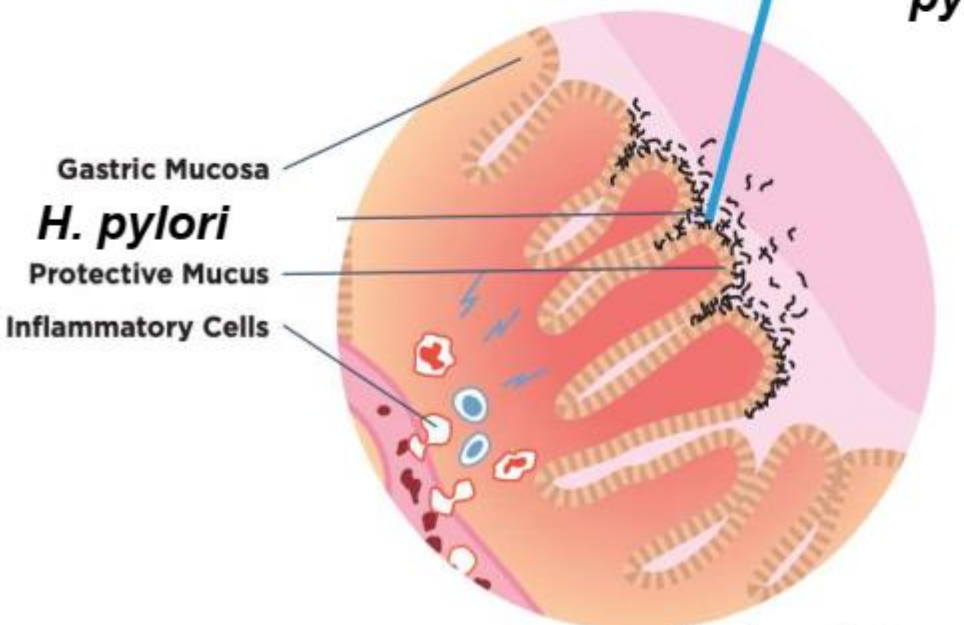
Nature Reviews Clinical Oncology volume 20, pages 338–349 (2023).

- Studies from Europe, Australia, and North America suggest null or inverse associations between Hp and CGA
- However, evidence from East Asia suggests a modest association between Hp and CGA
- Some of these discrepancies may relate to difficulties in ascertaining the tumor origin relative to GEJ.
- It may be that CGA in populations in Europe, the US, and Australia mainly involve distal esophagus, and in East Asians involve the proximal stomach

Helicobacter pylori



Helicobacter pylori



50% of individuals are infected

~87% Inflammation without neoplastic transformation

~10% Peptic ulcer disease

~1-3% Gastric adenocarcinoma

~0.1% Mucosa associated lymphoid tissue lymphoma

Hooi *et al. Gastroenterology*. 2017.; Wroblewski *et al. Clin Microbial Rev*. 2010.; Blaser. *J Clin Invest*. 1997.

Outcomes of *H. pylori* infection



~50% colonized with *H. pylori*

Gastritis

Gastric atrophy

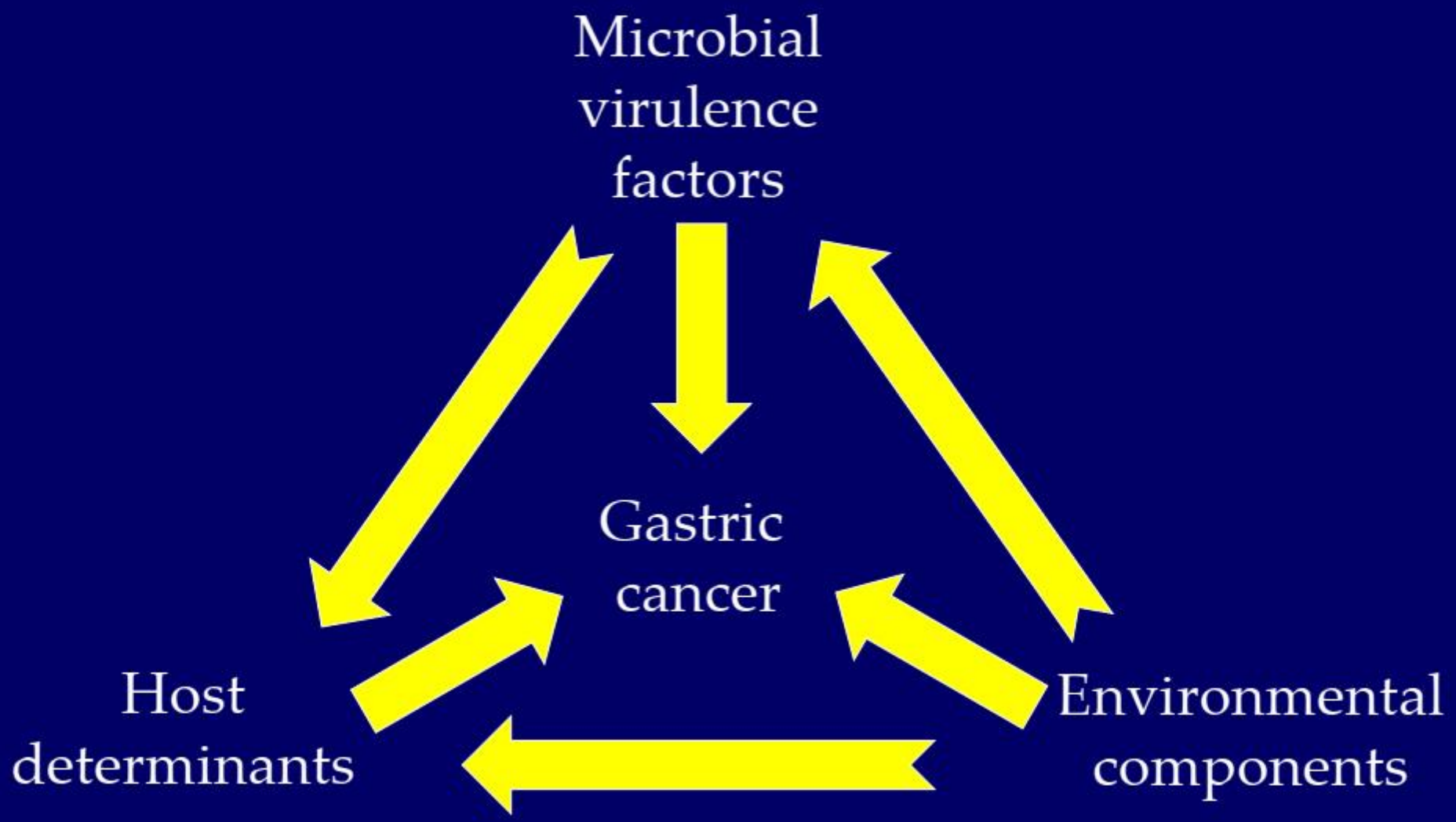
Gastric carcinoma
~1-3%

No significant disease
~90%

Increased acid

Duodenal ulceration
~10%

Factors involved in the development of gastric cancer



cag pathogenicity island

Strain-specific *H. pylori* locus associated with an increased risk of developing gastric cancer

Inactivation of *H. pylori cag* genes attenuates carcinogenic host responses *in vitro* and *in vivo*

Inflammatory phenotypes induced by *H. pylori*

Tissue-resident memory $CD8^+$ T cells (T_{RM}) play a role in acute *H. pylori* infection

H. pylori induces a T helper (Th) 17 biased immune response

Th 17 cells produce several proinflammatory cytokines including IL-17

Algood *et al., Immunohorizons*
Gerhard *et al., Gastroenterology*
Algood *et al., Journal of Immunology*

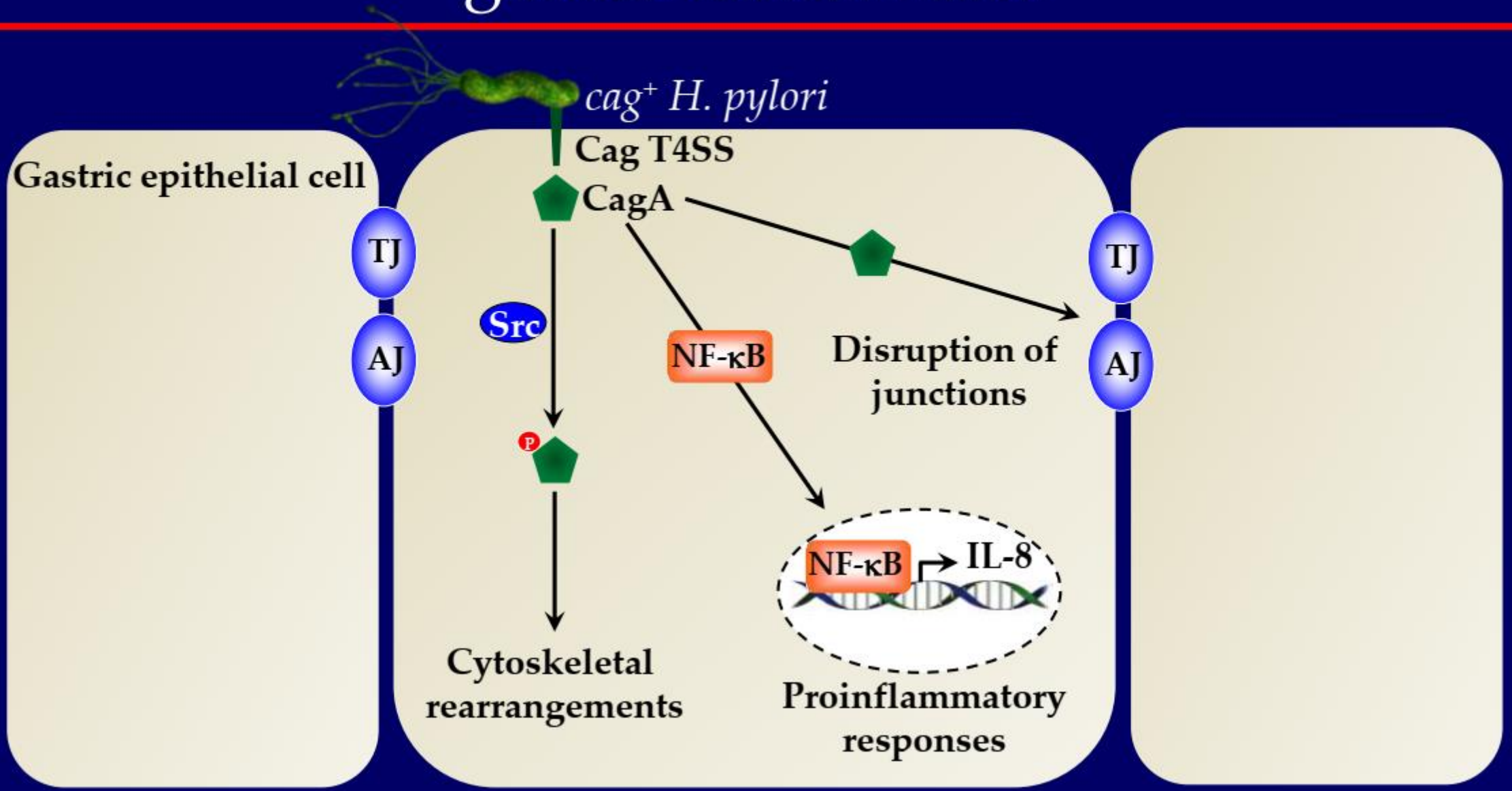
Inflammatory phenotypes induced by *H. pylori*

The IL-17 receptor (IL-17R) is expressed on epithelial cells, including gastric epithelial cells

IL-17-mediated responses are linked to carcinogenesis in the stomach and in other diseases

Algood *et al., Journal of Immunology*

The *H. pylori cag* pathogenicity island augments gastric cancer risk



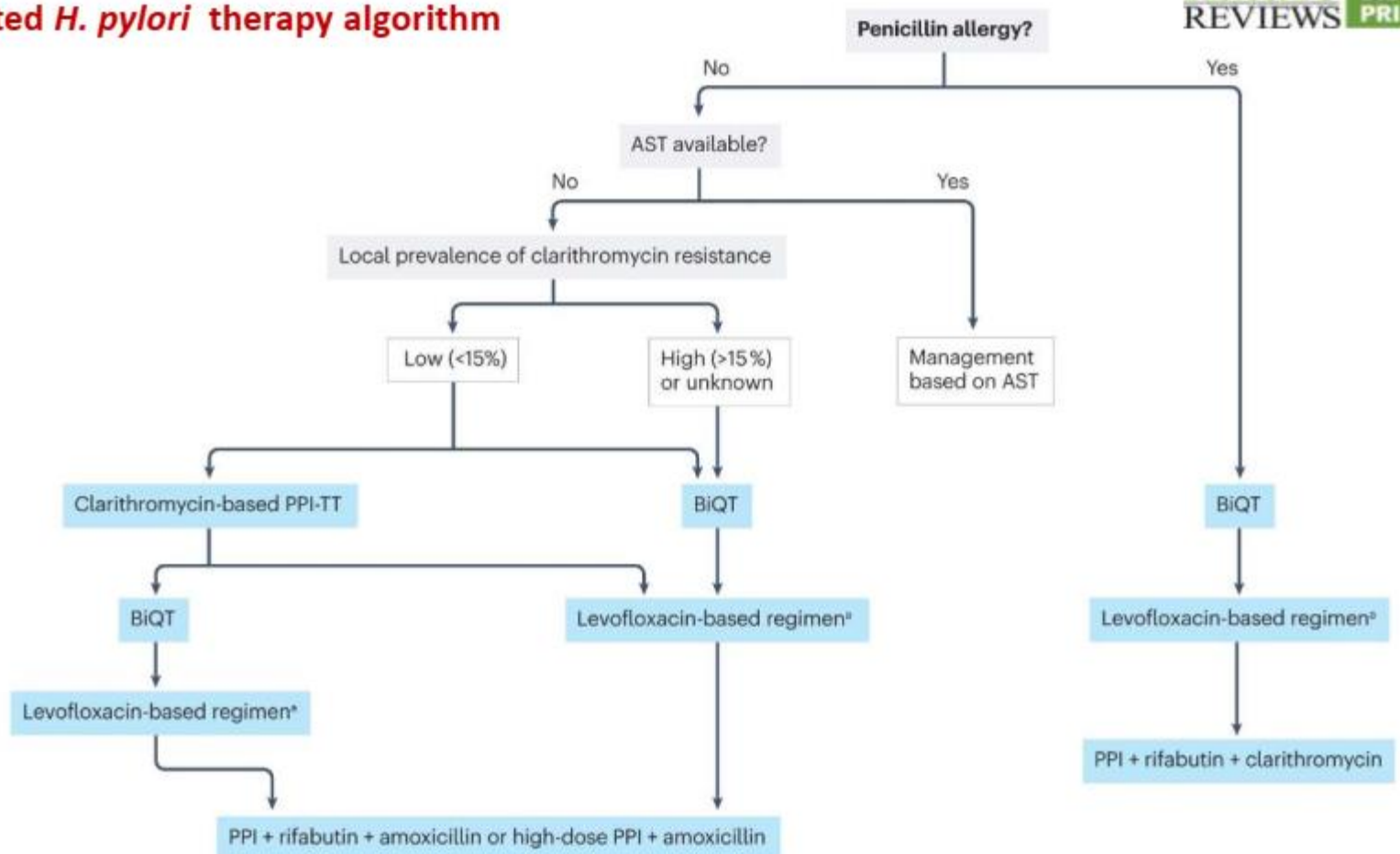
Iron deficiency increases the risk for gastric carcinogenesis

- Iron regulates microbial virulence and contributes to disease
- *H. pylori* infection is associated with iron deficiency
- Iron deficiency is associated with a high incidence of premalignant and malignant lesions of the stomach

Kato *et al.* 2022 *J Clin Med*
Hudak 2017 *Helicobacter*
Wenzhen *et al.* 2010 *Scand J Gastroenterol*
Pra *et al.* 2009 *Nutr Cancer*

Suggested *H. pylori* therapy algorithm

nature REVIEWS DISEASE PRIMERS



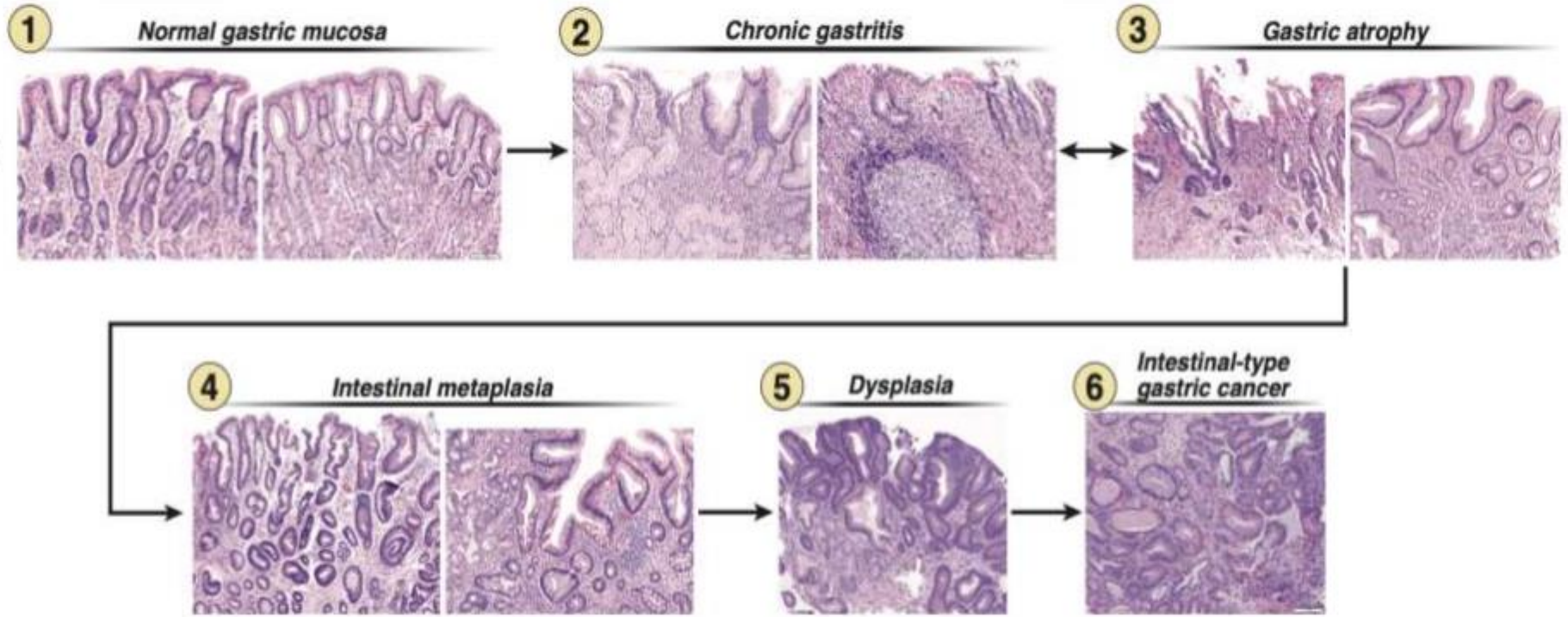
[a]Individual AST should be performed; levofloxacin-based regimen can be used if *H. pylori* is susceptible or community resistance is <15%; otherwise, use rescue therapy.

Malfertheiner P et al, Nat Rev Dis Primers. 2023 ;9:19.

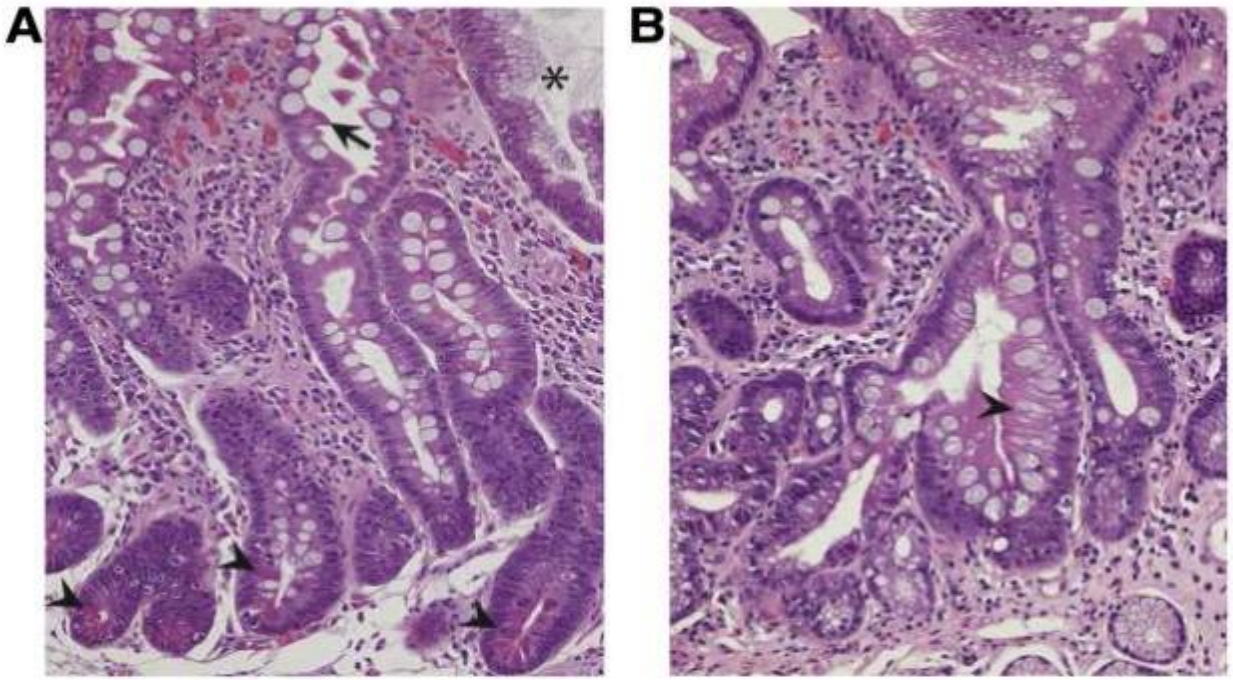
WHAT IS GIM

"Correa Cascade": gastritis to intestinal-type adenocarcinoma

- GIM is a precancerous, histopathologic change characterized by replacement of normal gastric oxyntic or antral mucosa by intestinal epithelium in response to chronic gastric inflammation
- The most common trigger is chronic *Helicobacter pylori* (*H pylori*) gastritis



Gastric intestinal metaplasia



Complete type GIM **Incomplete type GIM**

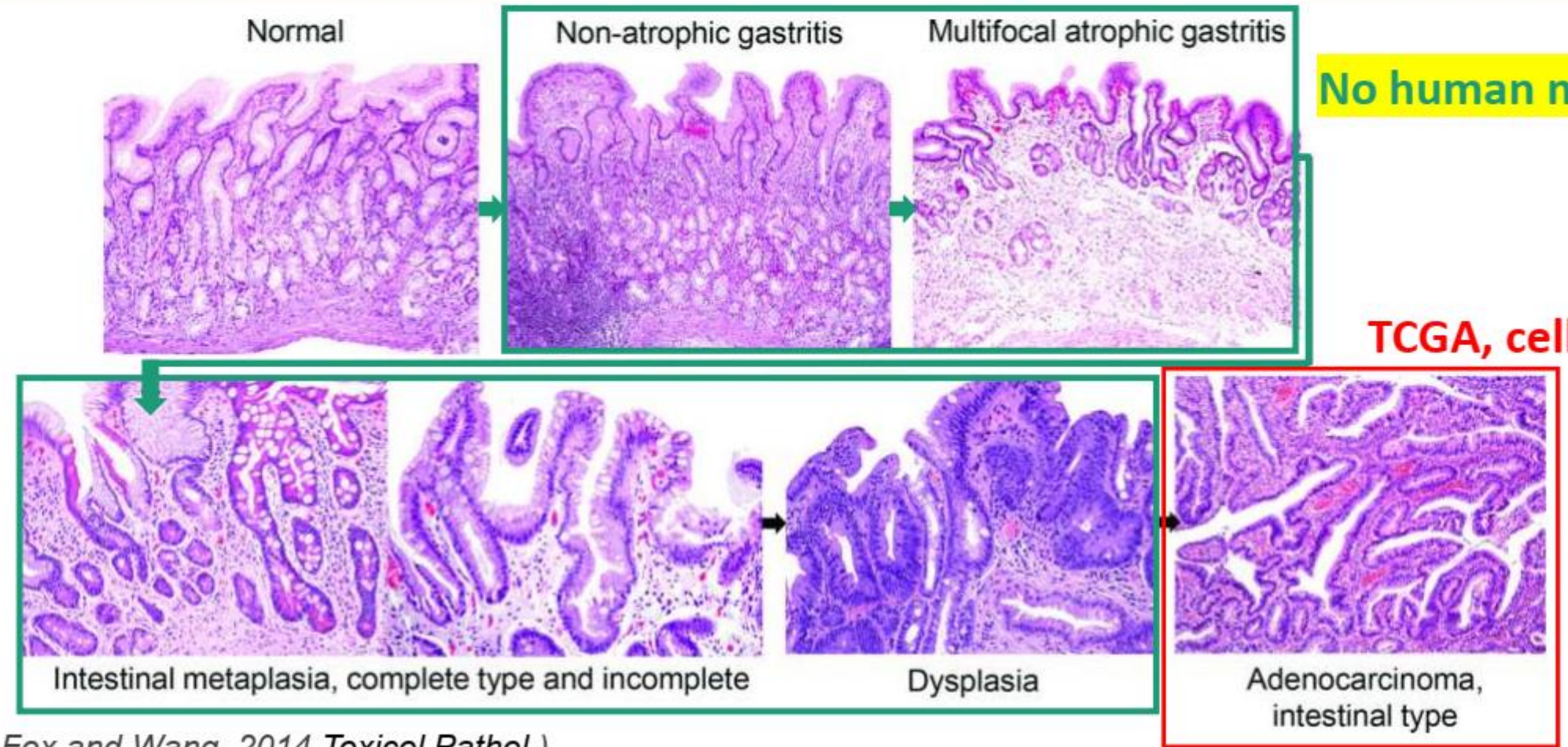
- Replacement of normal gastric epithelium with epithelium resembling the intestine

Shah and Piazuelo, et al. Gastroenterology 2020

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Pathogenesis of gastric cancer

Correa's cascade (1980s) : A **stepwise** progression of **pre-cancerous changes** in the stomach that can lead to the development of **gastric cancer**.



No human models!

TCGA, cell lines

*(Figures from Fox and Wang, 2014 **Toxicol Pathol.**)*

RISK OF PROGRESSION OF GASTRIC PRECANCEROUS CHANGES

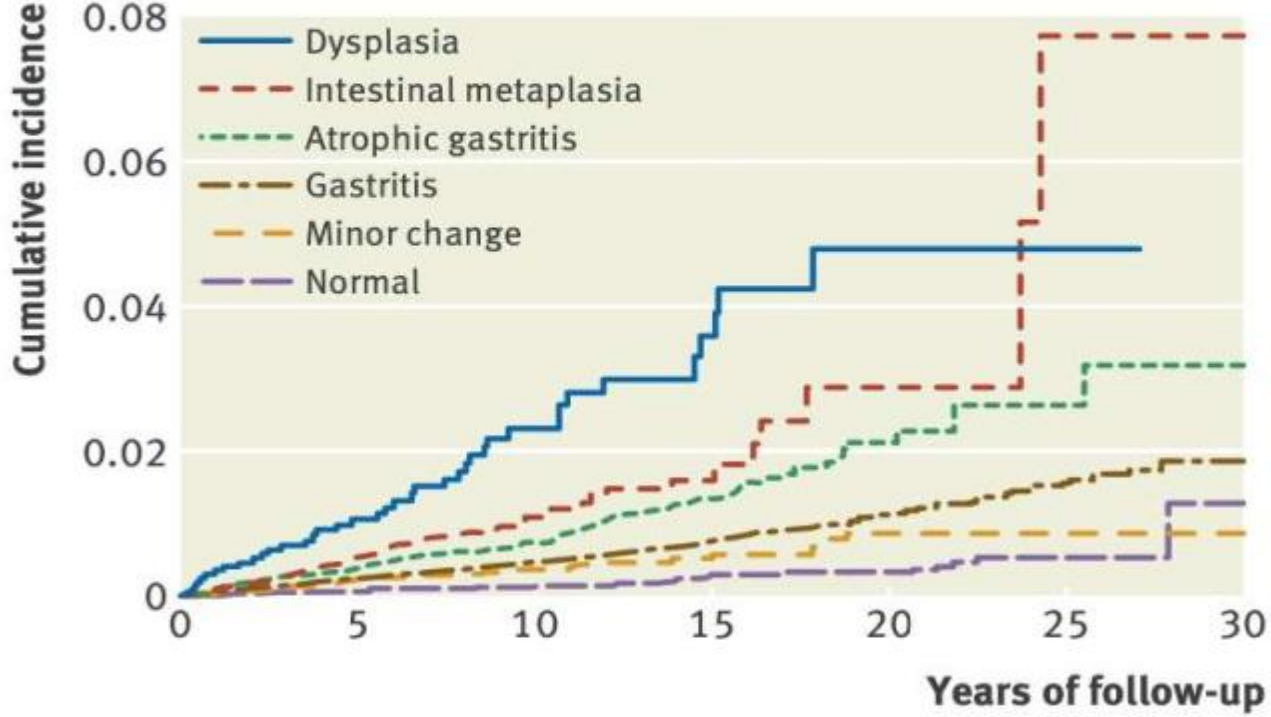


Fig 2 | Cumulative incidence of gastric cancer among patients with different baseline diagnoses. First two years of follow-up excluded

Cumulative risk of GC in people diagnosed with GIM (or at least moderate AG)

- *0.4% at 3 years*
- *1.1% at 5 years*
- *1.6% at 10 years*

Nondysplastic BE → Esophageal Ca

- ***0.1-0.3% per 1 year***

Adenoma <1cm → CRC

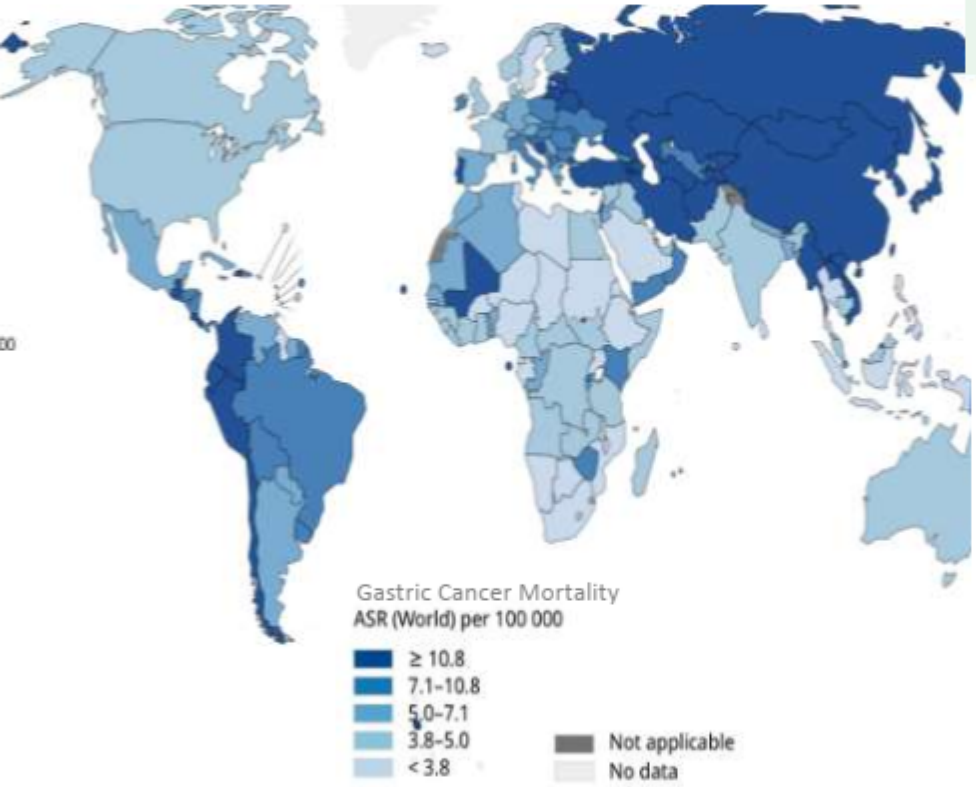
- ***0.4% per 5 year surveillance***

Cumulative proportion with global histologic **regression** of GIM

- ***29.7% at 1 year***
- ***19.4% at 3 years***
- ***25.9% at 5 years***

Song et. al BMJ 2015; Shah, Gawron et al *Gastroenterology* 2019

INTERNATIONAL GUIDELINES



At least *15 guidelines* worldwide comment on GIM surveillance

- ***European***
  - MAPS I, II
  - BSG
  - Italy
  - Spain
  - Germany
  - Maastricht VI*
- ***Americas***
  - USA (AGA, ACG (upcoming), ASGE*)
  - Chile
  - Brazil
- ***Asia-Pacific***
  - Kyoto*
  - Taipei*
  - Japan
  - China*

HIGHLY heterogeneous recommendations

- All advocate for *H. pylori* eradication if present
- All advocate for risk stratification of GIM phenotype
- Variable intervals depending on risk factors, ranging from every 1yr to 5yrs [*most q3yrs*]
- Only the Chilean and Japanese guidelines advocate for surveillance in "low-risk" GIM

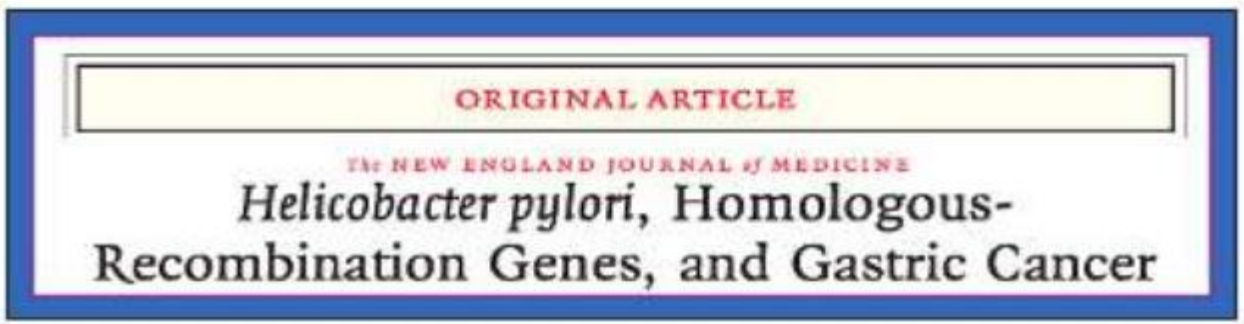
*Used consensus as opposed to GRADE methodology

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RISK FACTORS FOR GIM PROGRESSION

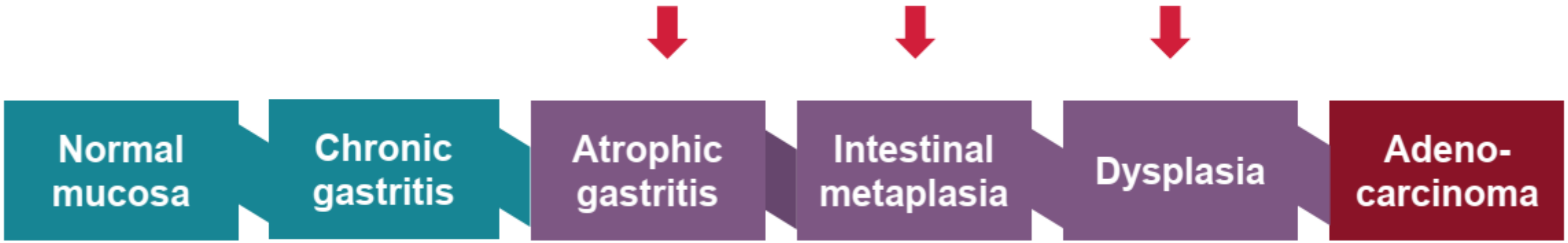
- **Advanced stages of Operative Link for Gastritis Assessment for Atrophy (OLGA) and Intestinal Metaplasia (OLGIM)**
  - OLGA/OLGIM III/IV (vs. 0/I)
- **Incomplete histological subtype**
  - **(vs. complete-type)**
- **Corpus-extended anatomic extent of AG/GIM**
  - **(vs. limited)**
- **Severity of atrophic gastritis/GIM**
- **Persistent *H. pylori***
- **Other factors?**
  - E.g. Host genetics, Non-*H pylori* microbiome, diet, smoking, family history of GC

		Relative risk or odds ratio of incident GC
H pylori eradication (vs persistent infection)	↓	RR 0.76 (95% CI: 0.36–1.61)
Family history of gastric cancer	↑	RR 4.53 (95% CI: 1.33–15.5)
OLGIM III/IV (vs OLGIM I/II)*	↑	RR 27.7 (95% CI: 3.75–204.9) OR 3.99 (95% CI: 3.05–5.21)
Incomplete histologic subtype (vs complete)	↑	RR 3.33 (95% CI: 1.96–5.64)
Extensive GIM (vs limited)	↑	RR 2.07 (95% CI: 0.97–4.42)



Pathogenesis cascade of noncardia gastric adenocarcinoma

Endoscopic Detection/Intervention



Correa et al. Gastroenterology 2007

Endoscopic imaging technologies

- **High-definition white-light endoscopy**
- Standard white-light endoscopy

- **Image-enhancing technologies**
  - Narrow band imaging (NBI)
  - Linked color imaging (LCI)
  - Blue laser imaging (BLI)
  - i-Scan

- *Magnifying endoscopy (not routinely available in the U.S.)*

GASTRIC CANCER

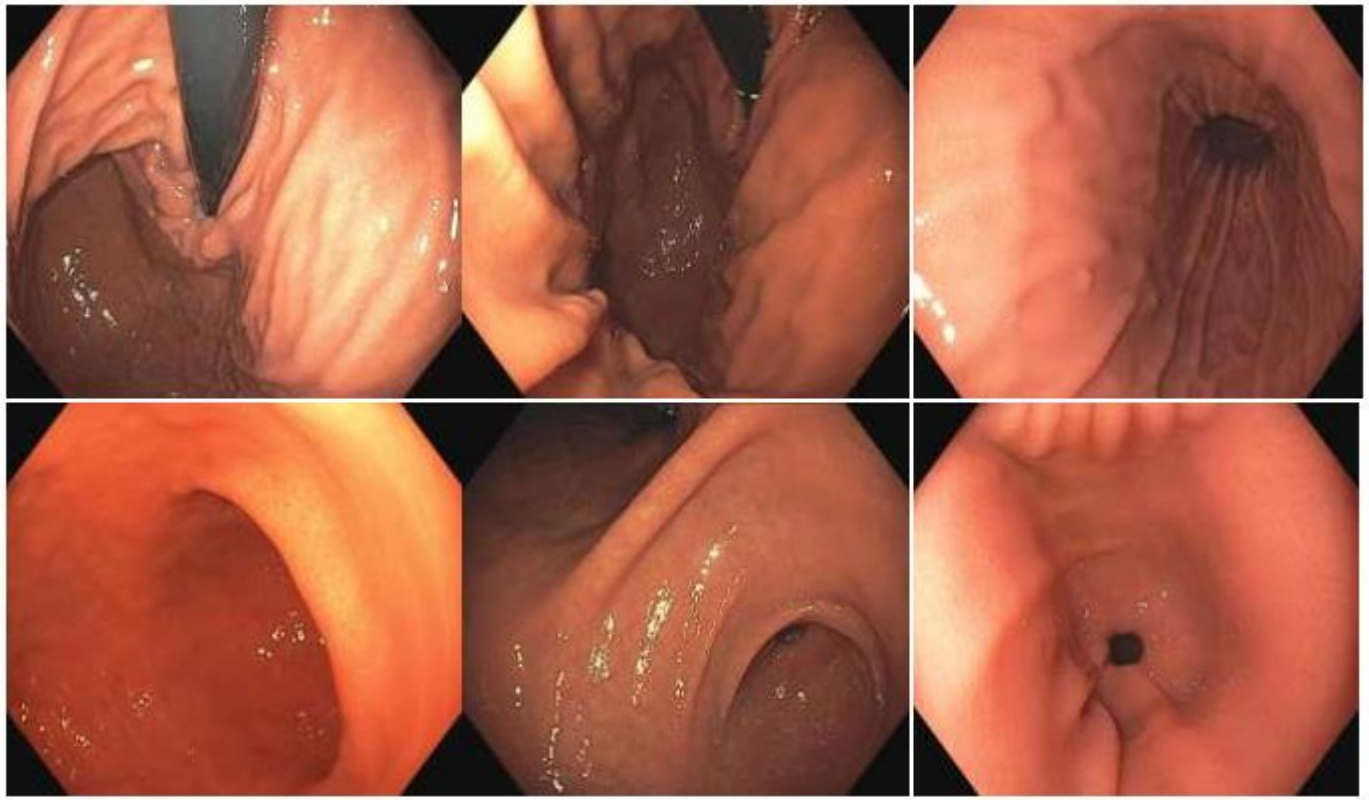
- Evolution in endoscopic resection technology & devices
- Three endoscopic resection techniques
  - Endoscopic mucosal resection (EMR)
  - Endoscopic submucosal dissection (ESD)
  - Endoscopic full thickness resection (EFTR)
    - Exposed & Non-Exposed* Full Thickness Resection
    - Exposed - Tunneled/Non-Tunneled

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A high-quality exam is essential

- Adequate insufflation
- Aspiration of fluid and debris
- Use defoaming agents (e.g. simethicone)
- Good photo-documentation

- Sufficient inspection time
  - ≥7 min → 2.5-fold higher odds of detecting high-risk gastric lesions

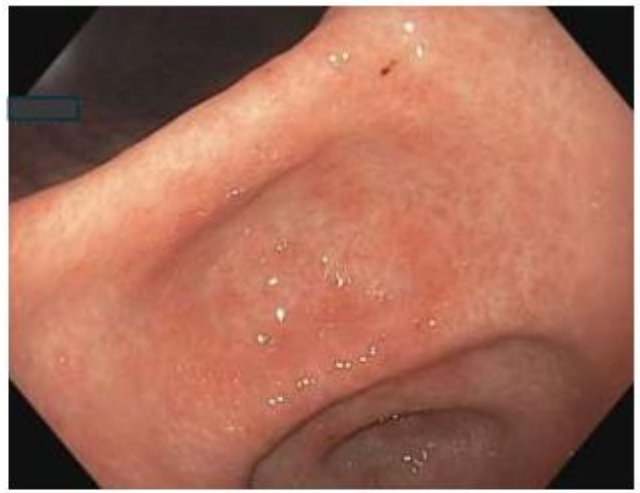


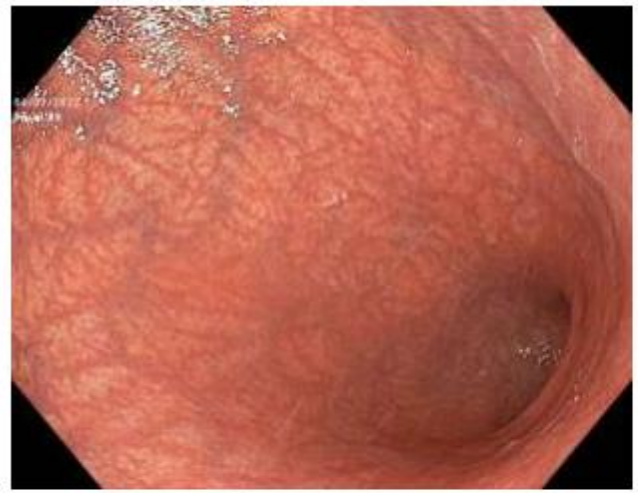
AGA CPU on high-quality endoscopy. Nagula and Shah et al. CGH 2024
Teh, et al. CGH 2015

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Endoscopic characteristics of atrophic gastritis

Pale appearance

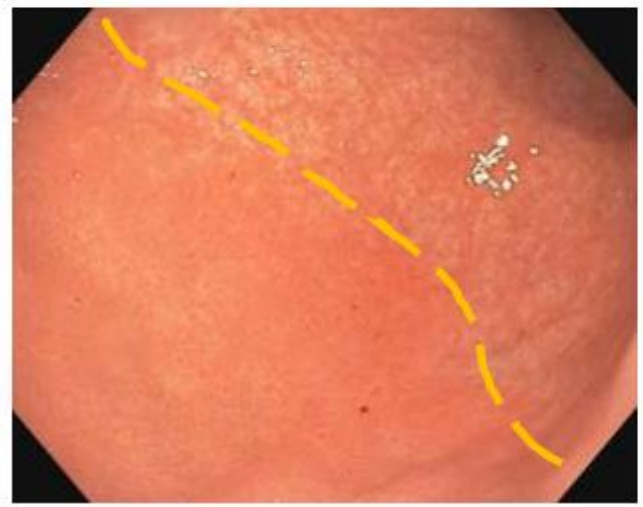




Increased visibility of vasculature

Loss of rugal folds

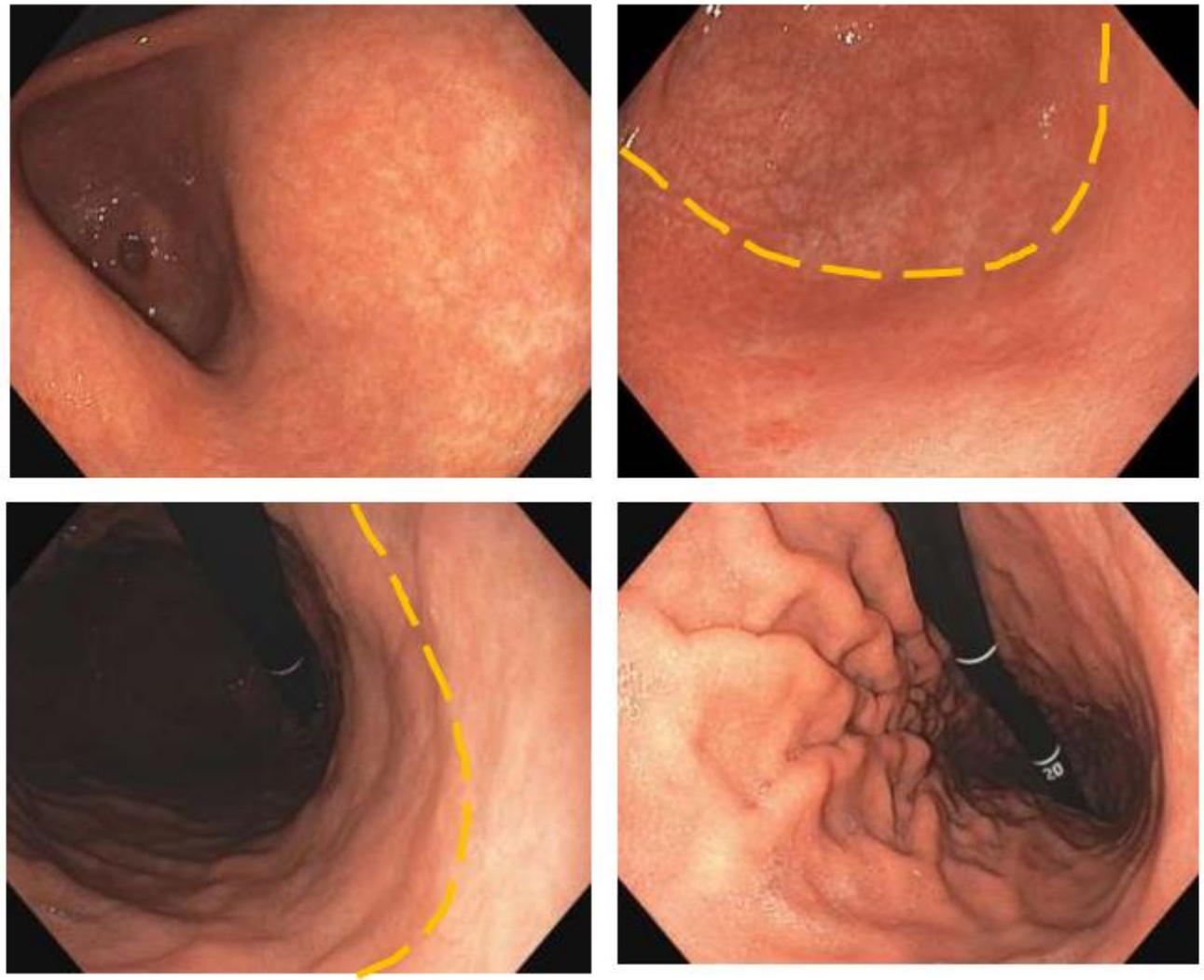




Atrophic border (HP-associated AG)

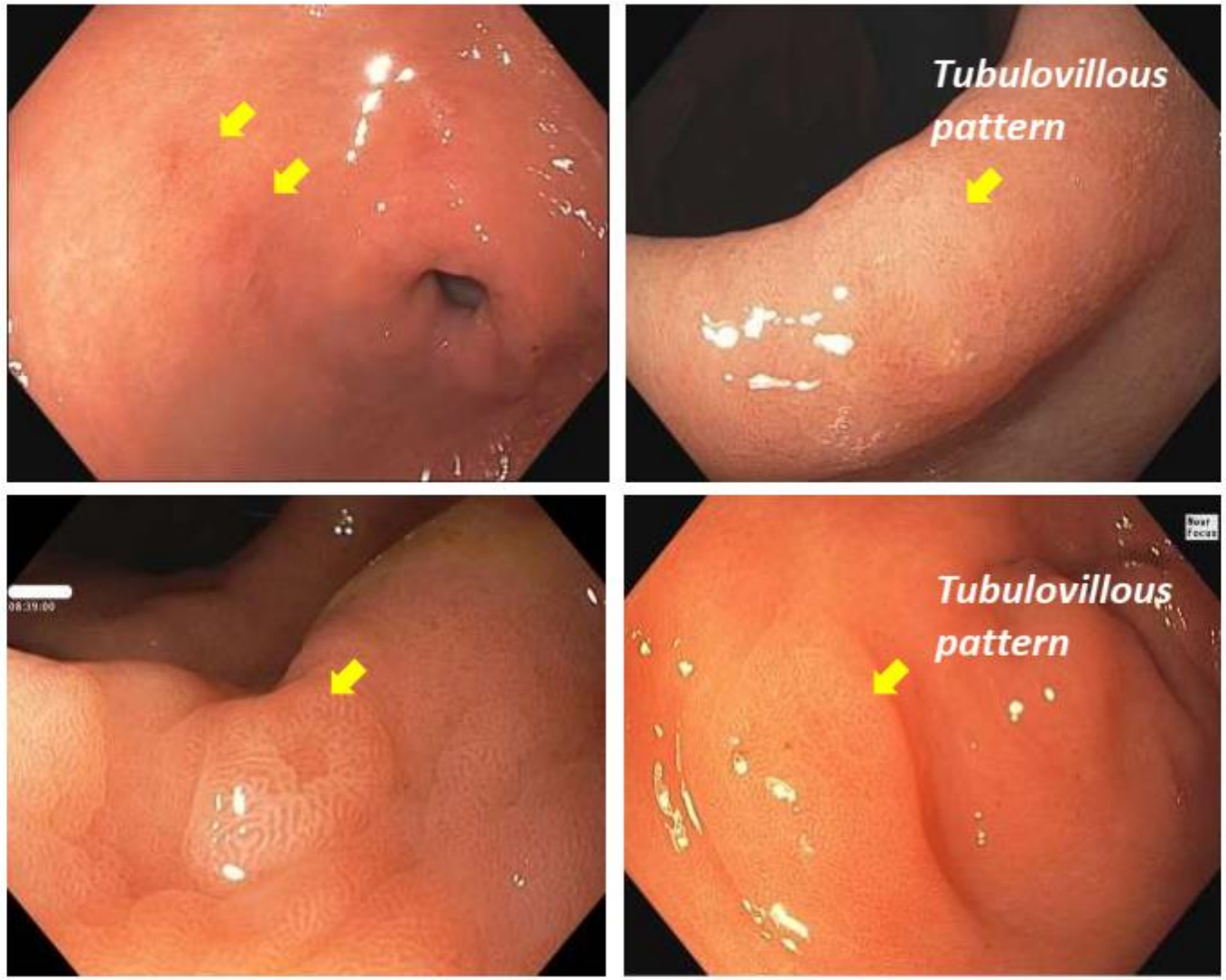
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H. pylori-associated atrophic gastritis (antrum → corpus)



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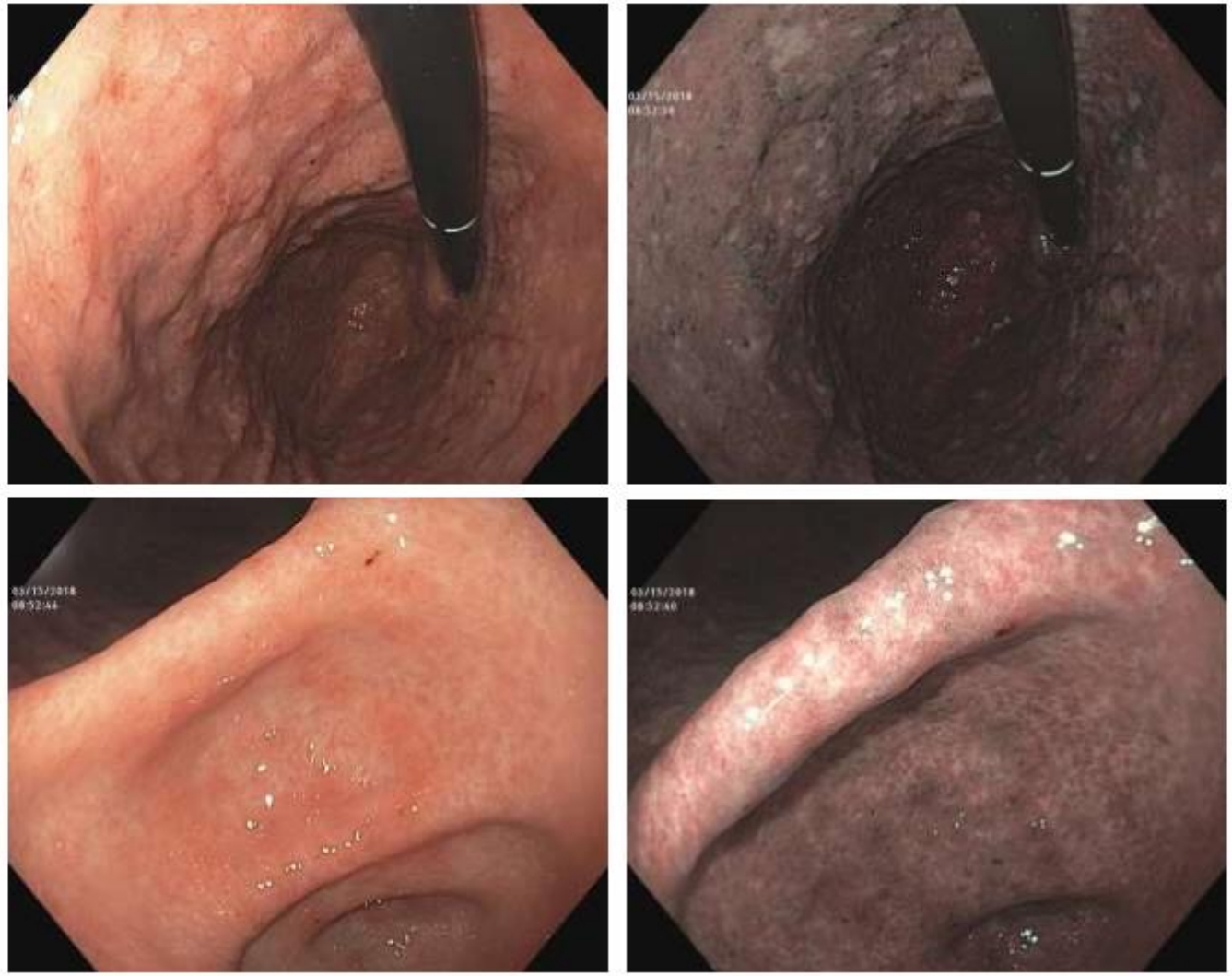
Endoscopic characteristics of GIM



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H. pylori-associated atrophic gastritis (pan-gastric atrophy)

White light



Narrow band imaging

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GIM on HD-WLE and NBI

White light





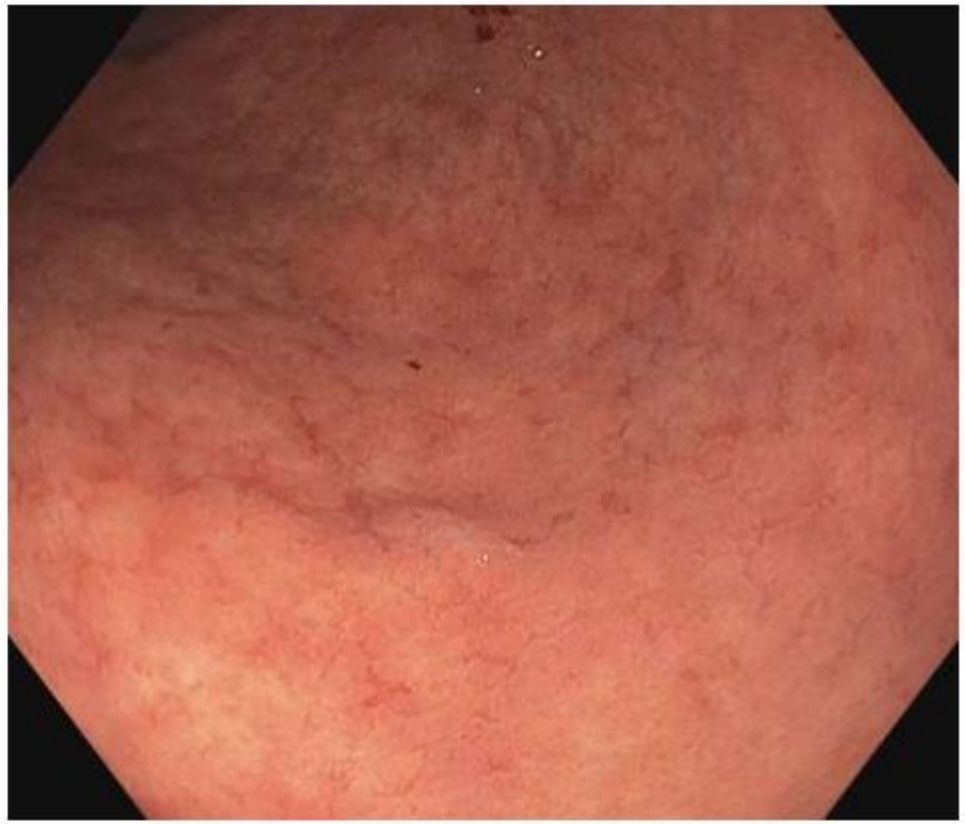
NBI



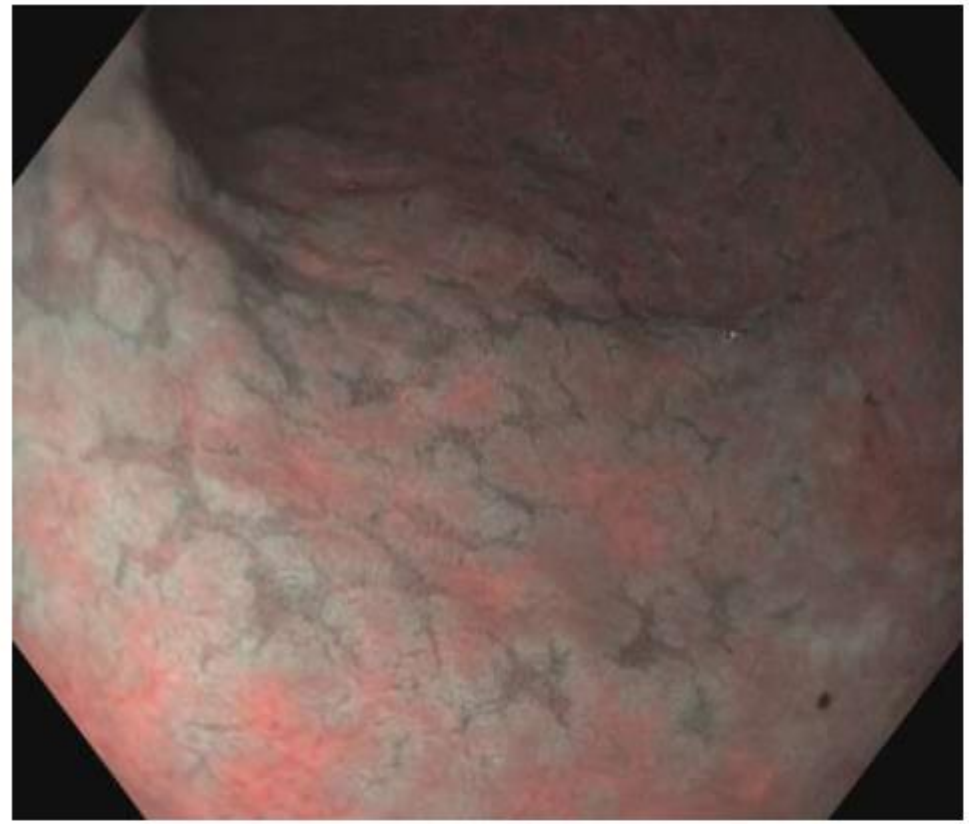


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Extensive GIM



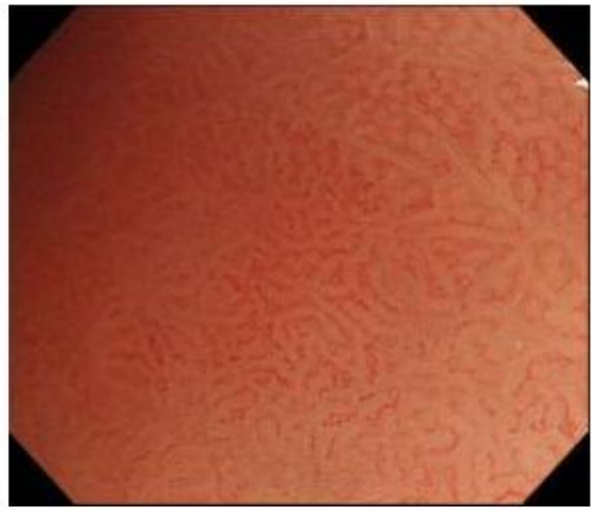
White light

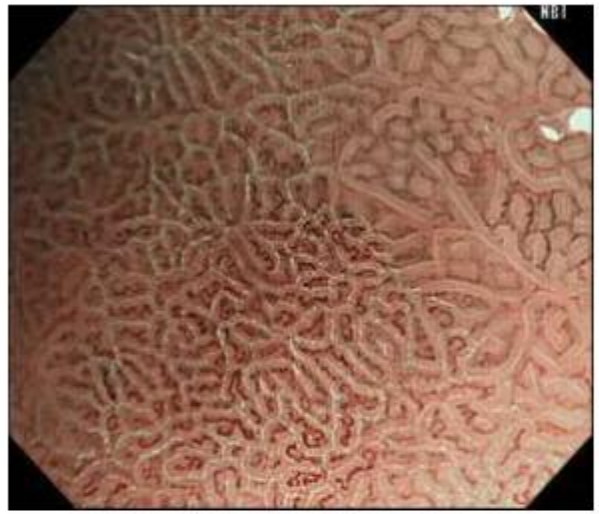


NBI

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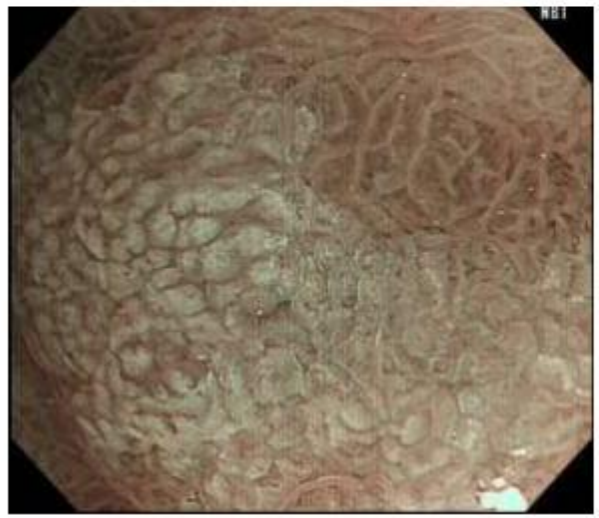
GIM on magnifying endoscopy





Light blue crest (LBC)



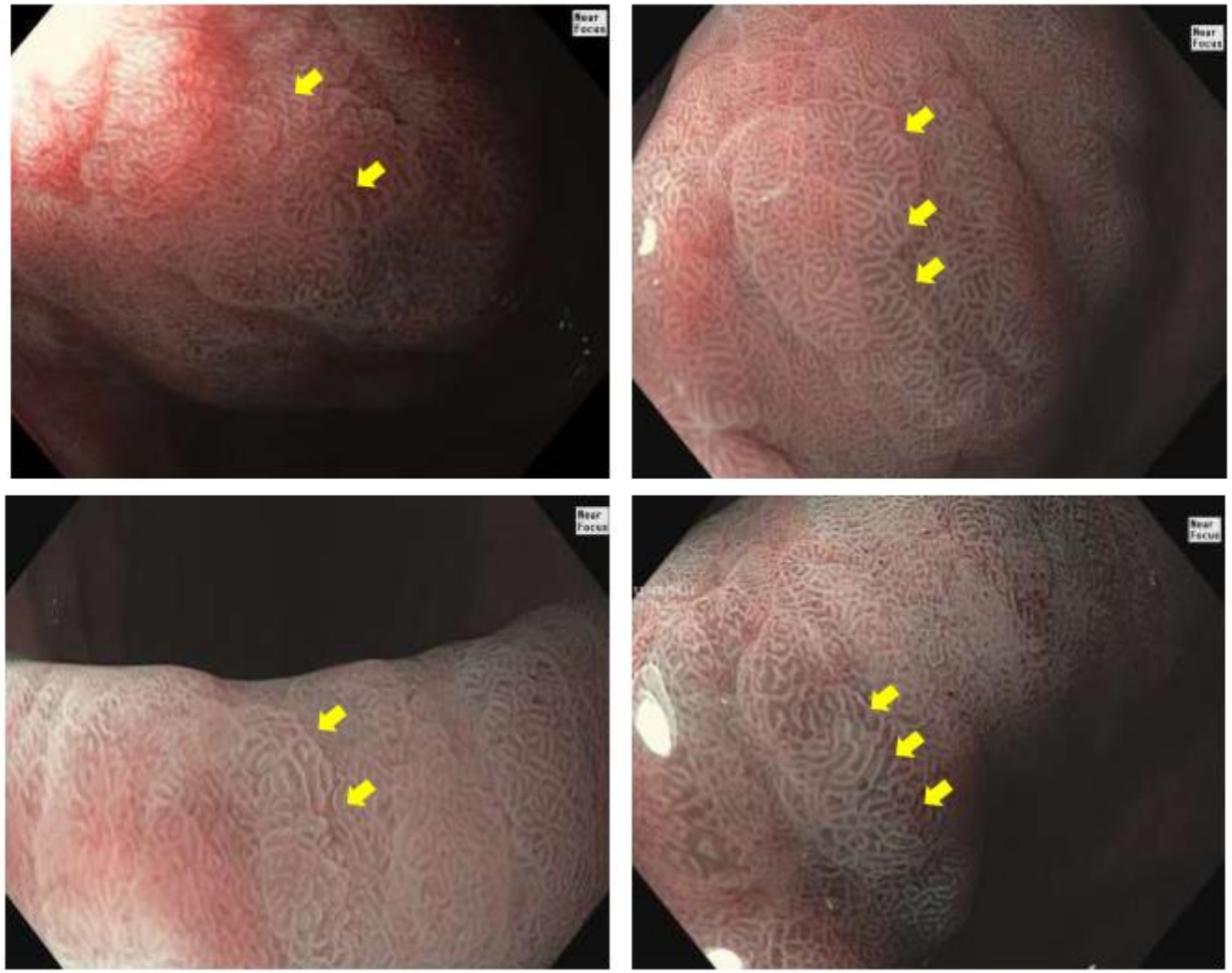


White opaque substance (WOS)

Shah and Li, et al. Gastroenterology 2021

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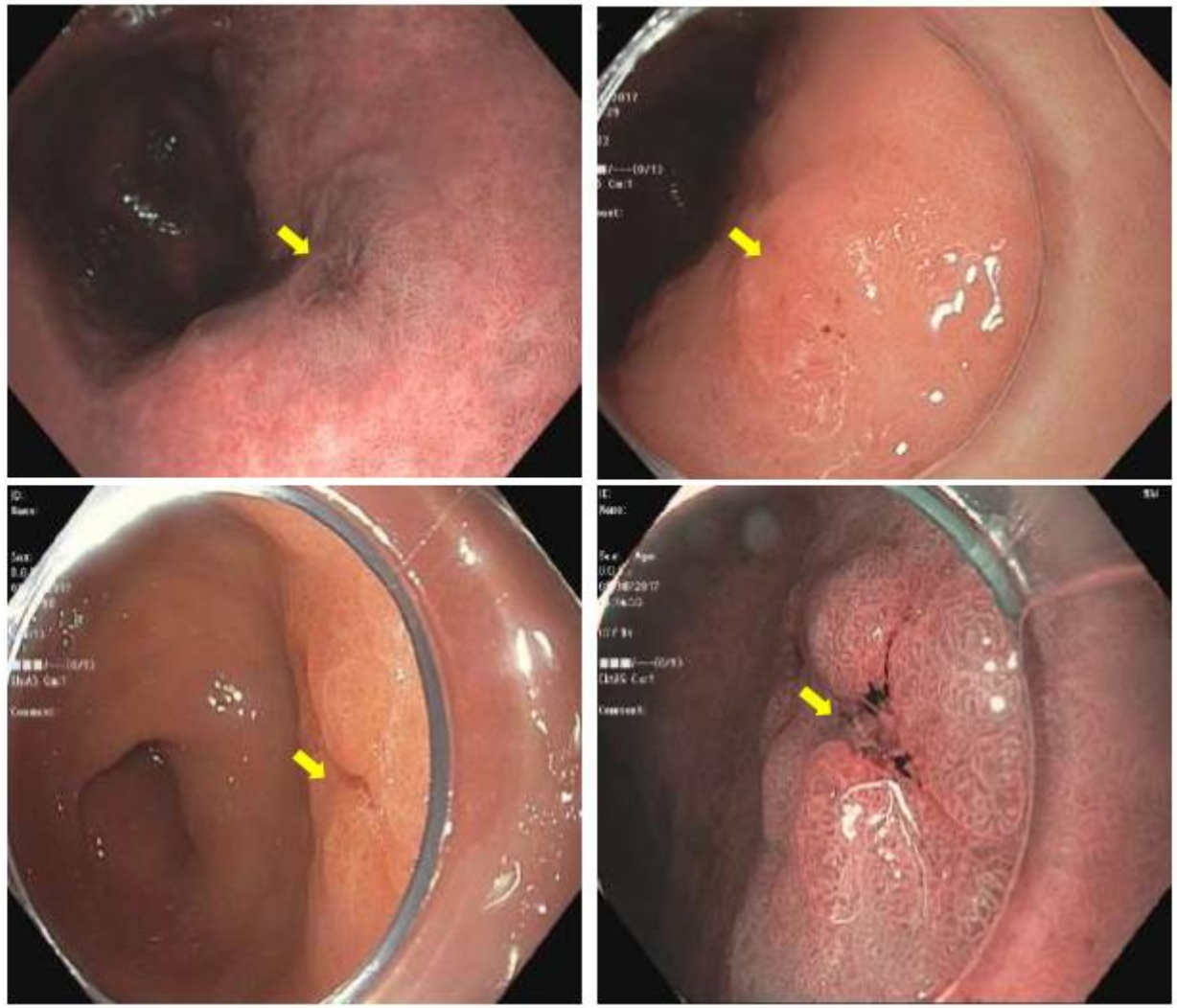
GIM: NBI with near focus



Light blue crests

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Dysplasia



Irregular mucosal vessels with loss of architecture

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AGA Institute Clinical Practice Update: Endoscopic Submucosal Dissection in the United States

Peter V. Draganov,[*] Andrew Y. Wang,[‡] Mohamed O. Othman,[§] and Norio Fukami[‖]

Best Practice Advice 2

- The safety and feasibility of endoscopic submucosal dissection (ESD) for early gastric cancer is well established.
- The absolute indications for curative endoscopic resection include moderately and well-differentiated, nonulcerated, mucosal lesions that are <2 cm in size.

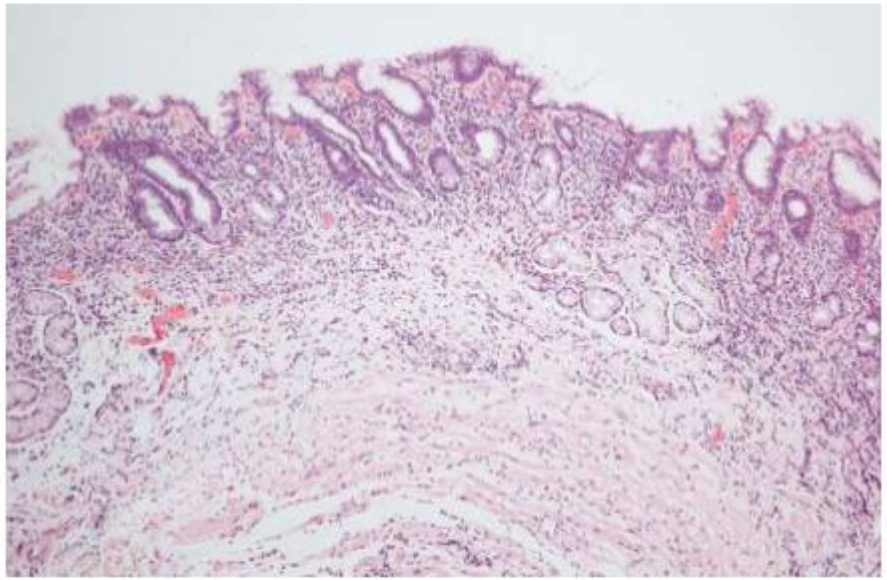
Best Practice Advice 3

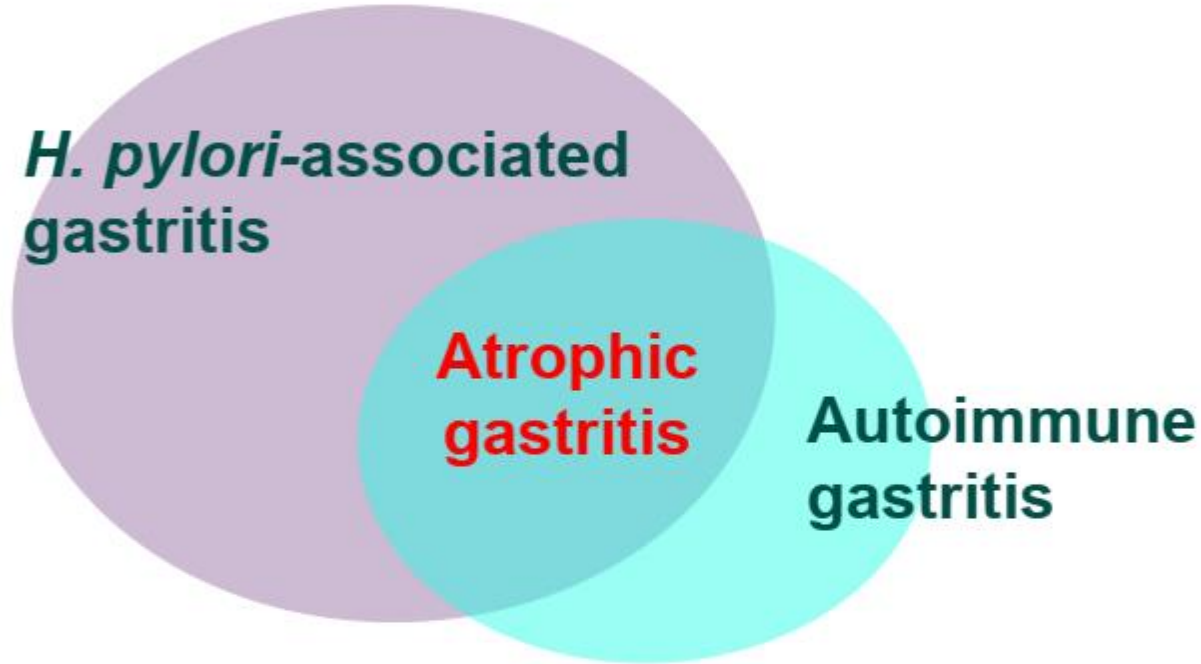
- Other relative (expanded) indications for gastric ESD include moderately and well-differentiated superficial cancers that are >2 cm, lesions <3 cm with ulceration or that contain early submucosal invasion, and poorly differentiated superficial cancers <2 cm in size.
- The risk of lymph node metastasis when ESD is performed for these indications is higher than when it is performed for absolute indications but remains acceptably low.

Clin Gastroenterol Hepatol 2019;17

Atrophic gastritis

- Replacement of gastric glandular structures with connective tissue or a different epithelium on a background of chronic inflammation





Correa et al. Gastroenterology 2007
Shah and Li, et al. Gastroenterology 2021

DIAGNOSIS OF AUTOIMMUNE GASTRITIS

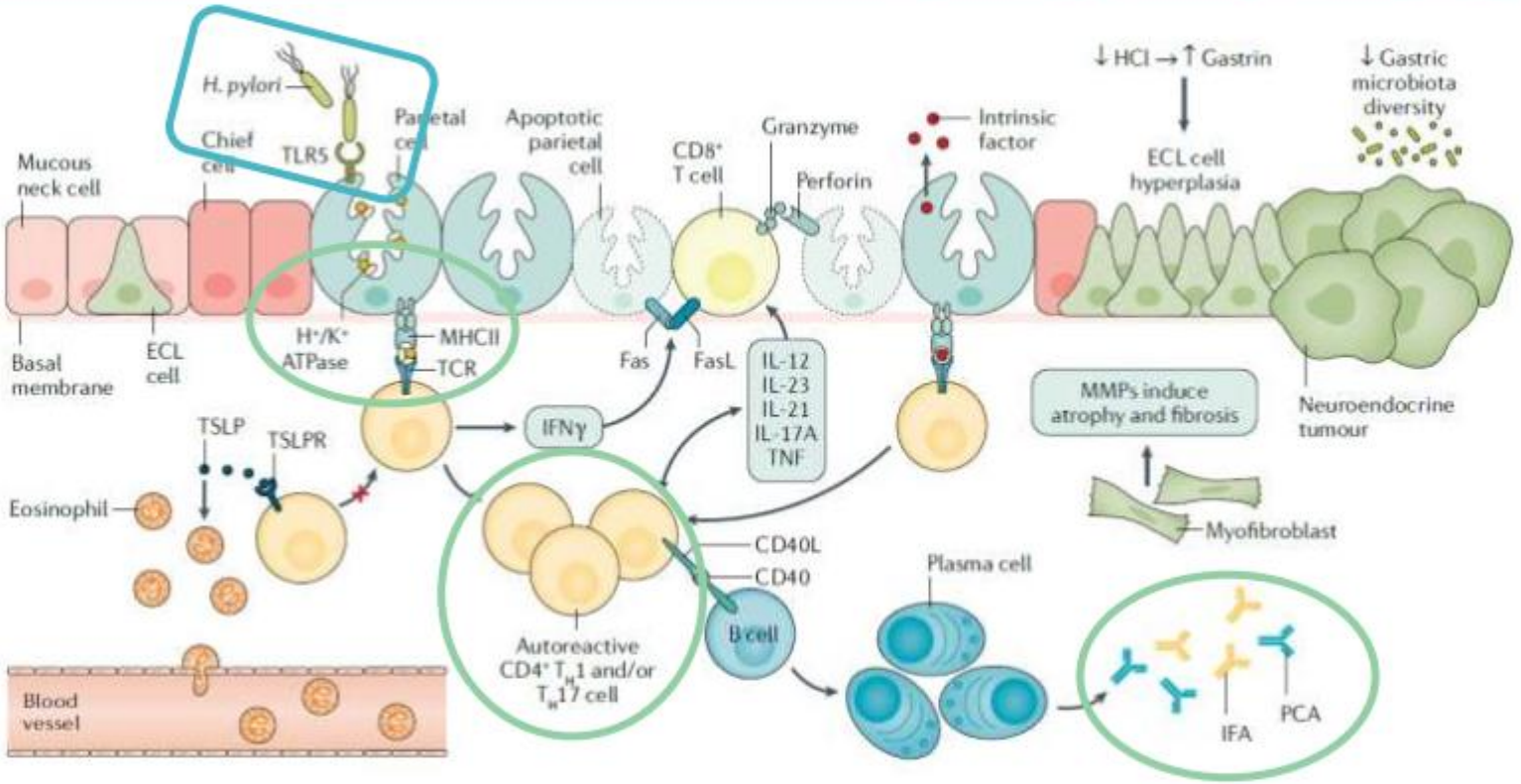
A multi-step process

- ✓Clinical suspicion
- ✓Non-invasive serological pre-endoscopic screening
- ✓Confirmation by histopathology on endoscopic biopsies

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PATHOGENESIS: PRIMARY AND SECONDARY AUTOIMMUNE GASTRITIS

Statement 2.5.4
"In a subset of patients, it is postulated that H. pylori *may trigger the autoimmune process leading to the atrophy of the oxyntic mucosa."*



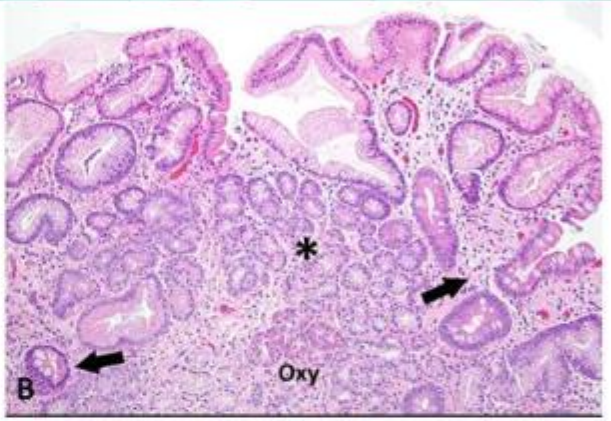
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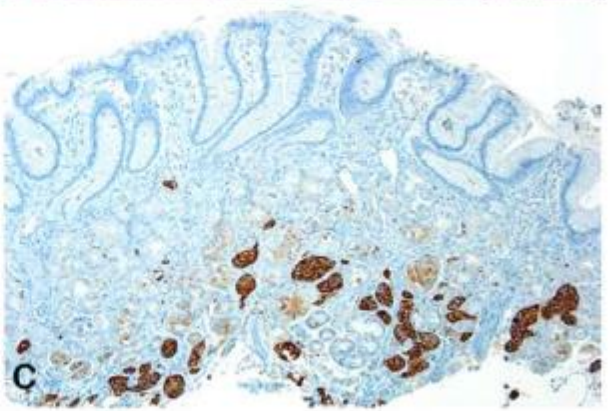
Lenti MV, et al. Nat Rev Dis Primers. 2020; Rugge M, et al Gut. 2024

DIAGNOSIS

Statement 2.5.3 *"Autoimmune **atrophic** gastritis can be diagnosed with a high degree of confidence based on endoscopic, histopathological and serological data."*

- "Autoimmune gastritis includes non- atrophic and atrophic stages; due to the paucity of clinical signs and symptoms, the non-atrophic autoimmune gastritis stage is rarely recognised."





Rugge M, et al. RE.GA.IN: the Real-World Gastritis Initiative - updating the updates. Gut.2024
Stolte M, et al. Active autoimmune gastritis without total atrophy of the glands. Z Gastroenterol 1992

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SEROLOGICAL BIOMARKERS

Gastric autoimmunity

Parietal cell abs (PCA)
80% sensitivity
90% specificity

Intrinsic factor abs (IFA)
30% sensitivity
100% specificity

PCA+ in *H.pylori* infection (~20%)
PCA and IFA ↓ with age↑

Corpus atrophy

Gastrin ↑
*70% sensitivity**
*98% specificity**

Pepsinogen I ↓
Pepsinogen ratio I/II ↓
*70% sensitivity**
*98% specificity**

Anti-secretory drugs and *H. pylori* infection ↑ gastrin levels
H. pylori may ↓ PGI/II ratio

Dottori L, et al. Clin Chemistry 2023

* Diagnostic performance of the whole panel test (gastrin17, pepsinogen, AbHp) extrapolated for corpus-restricted atrophic gastritis

CLNICAL SUSPICION

Family history
- Pernicious anemia
- Autoimmune gastritis
- Gastric cancer
- Neuroendrocrine tumors

Hematological cluster
- Anemia
  - iron deficiency
  - cobalamin deficiency

Gastroenterological cluster
- Dyspepsia
- Non-acid reflux

Neurological cluster
- Paresthesia
- Abnormal proprioception
- Ataxia
- Cognitive impairment
- Mood disorders-psychosis

Cobalamin deficiency-related
- Hyperhomocysteine-related ischemic cardiovascular events
- Infertility and miscarriage

Autoimmune comorbidities
- Autoimmune thyroiditis
- Type 1 diabetes
- Vitiligo
- Addison disease
- ....

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Green R, Nat Rev Dis Primers 2017, Lenti MV, Nat Rev Dis Primers 2020, Lahner E, Best Pract Res Clin Endocrinol Metab 2020, Miceli E, Dig Liv Dis 2023, Osmola M, Dig Dis 2023

PEPSINOGEN I: RELIABLE SEROLOGICAL MARKER

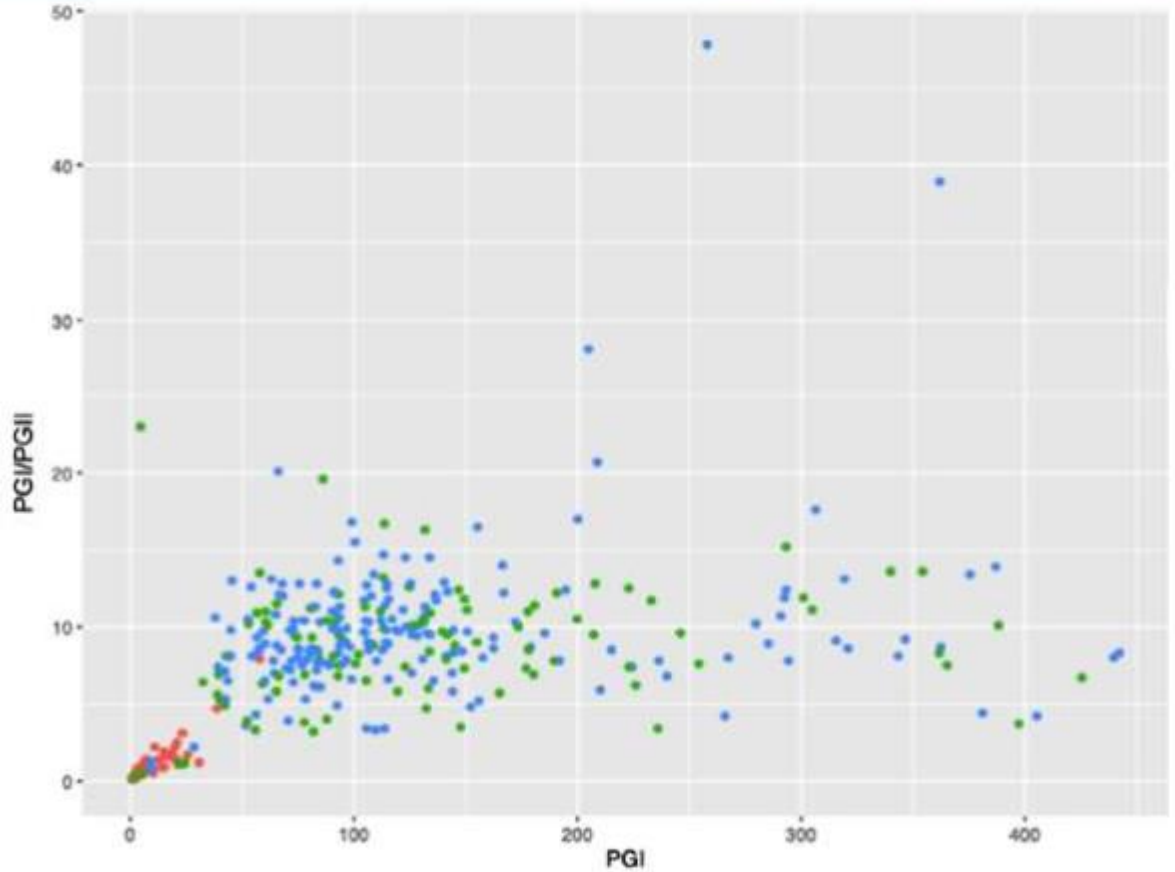
344 pts, 45% males; mean age 58.8 ±14.2 years

- non-atrophic gastritis	57.0%
- antrum-limited atrophic gastritis	20.2%
- corpus-limited atrophic gastritis	11.8%
- extensive atrophic gastritis	11 .0%

Diagnostic performances of PG I for the detection of autoimmune gastritis

	Sensitivity	Specificity
ELISA	97.7%	97.4%
CLEIA	95.6%	97.1%

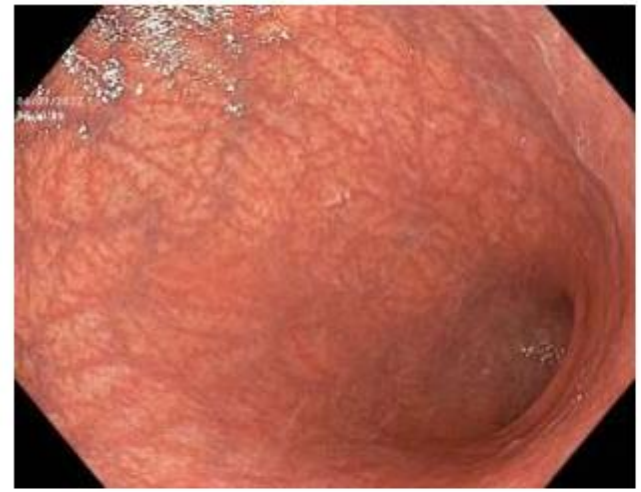
Chapelle N, et L Dig Lig Dis 2023



Distribution of pts according to PGI and PGI/PGII ratio depending on the presence of atrophic gastritis.

Gastric atrophy due to autoimmune gastritis





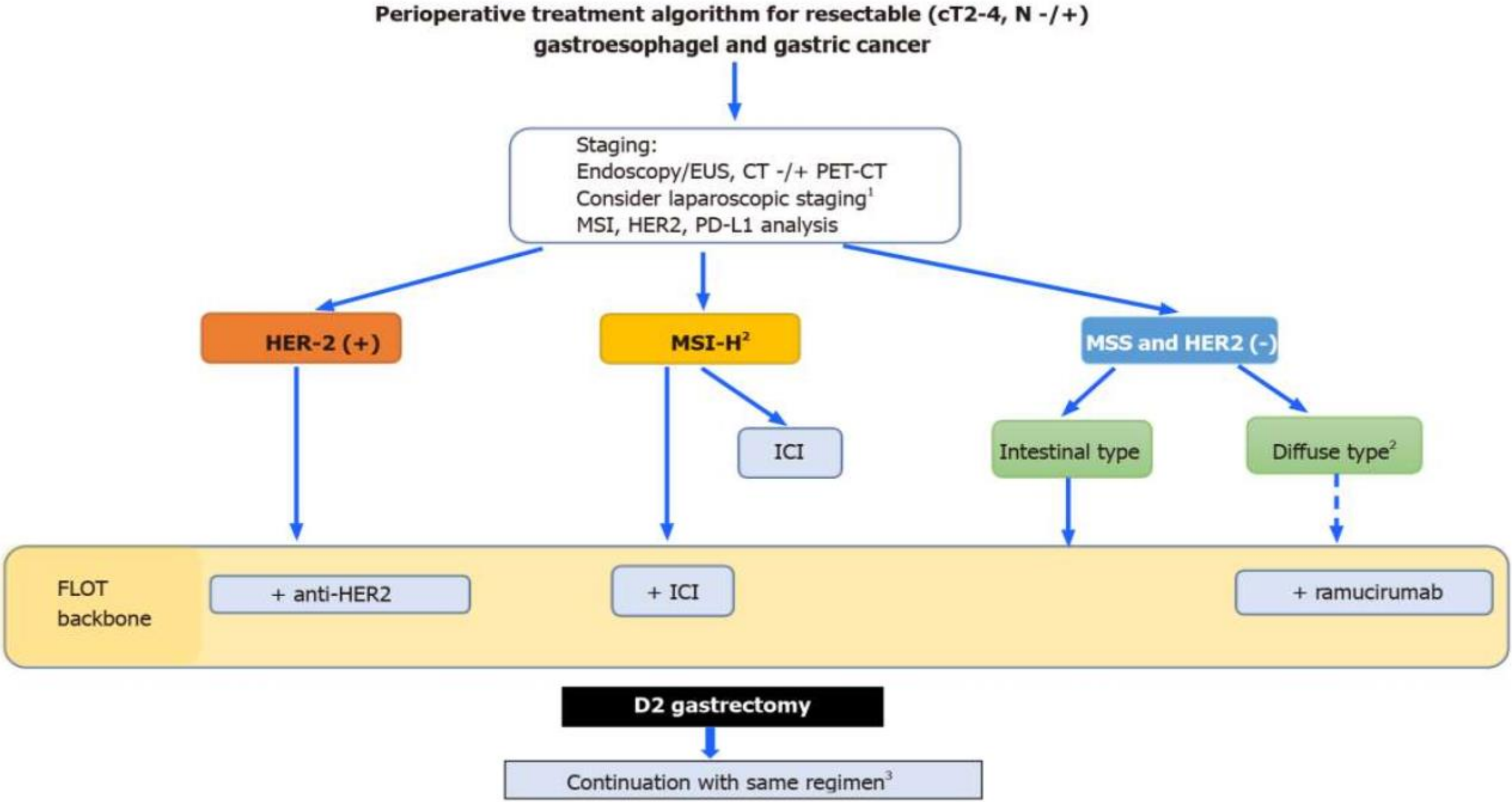
Atrophy of the corpus





Sparing of the antrum

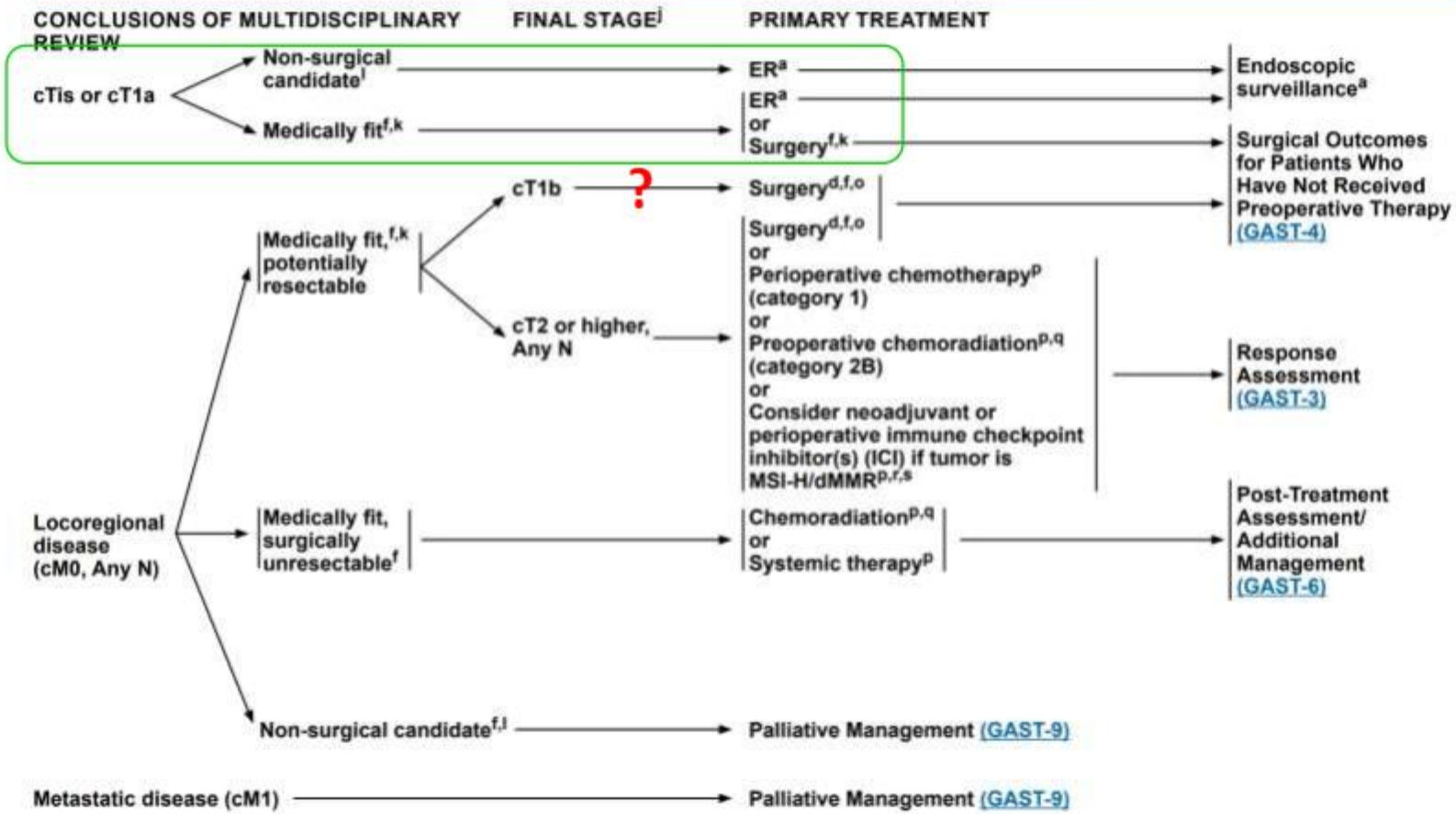
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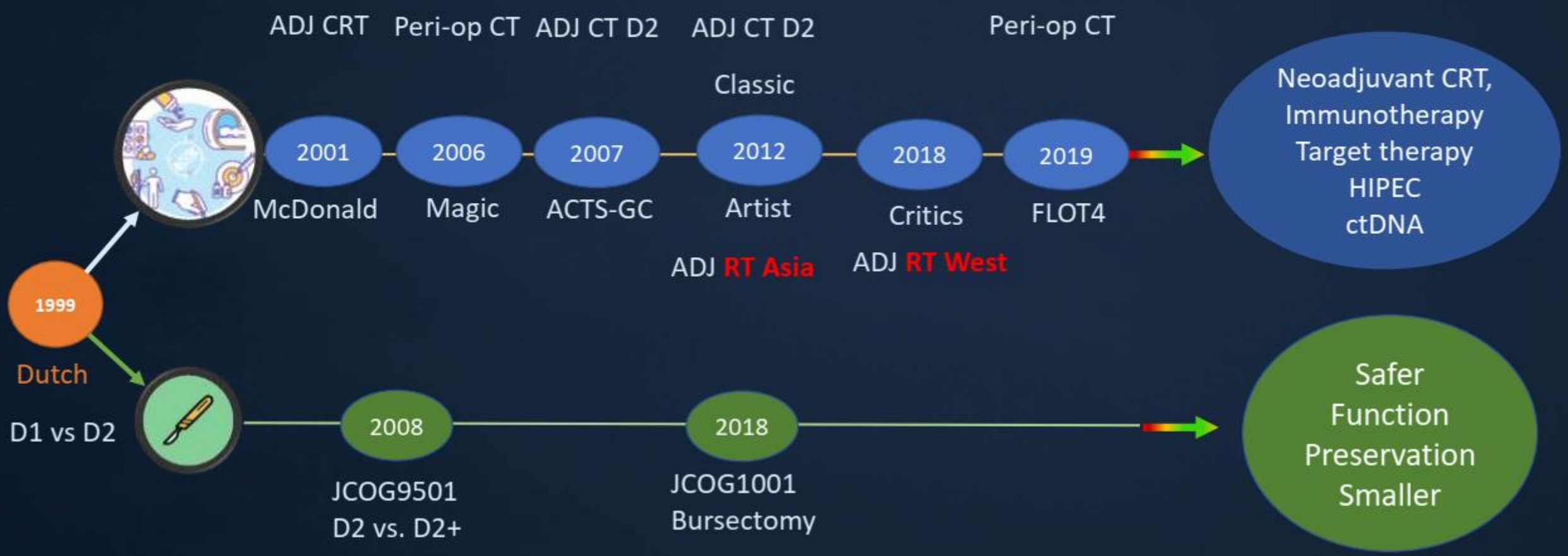
DOI: 10.4240/wjgs.v15.i3.323 **Copyright** ©The Author(s) 2023.

NCCN Guidelines Version 1.2024
Gastric Cancer

NCCN Guidelines Index
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Discussion



Gastric Cancer Treatment in the last two decades



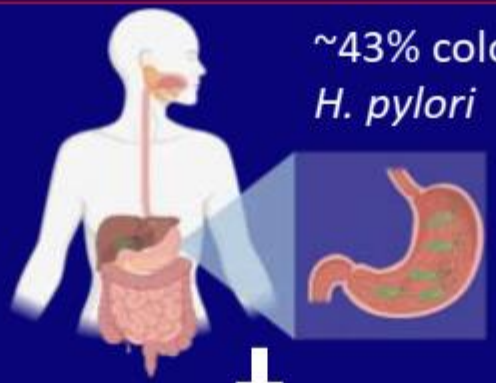
TAKE-HOME MESSAGES

- **GIM is a common precancerous condition**
  - Overall prevalence ~5% in the US, but with marked variability (up to 40% in high-risk groups)
- **Like other preneoplastic GI conditions, GIM *overall* is associated with a low risk of GC (~1.6% cumulative risk over 10years), but some groups have significantly higher risk** (e.g. advanced OLGA/OLGIM, extensive GIM, incomplete GIM, family history, persistent *H pylori*).
- **International guidelines are consistent in that they stress the need to risk-stratify patients to inform endoscopic management**
  - Low-risk phenotypes *may not warrant* ongoing endoscopic follow-up
  - Ideally, we will have more precise methods of risk stratification (tissue-based vs non-invasive)
- **There is a critical need for high-quality evidence to inform recommendations re: GC screening and GIM surveillance in the US** (e.g., prospective trials comparing clinical outcomes of surveillance vs no surveillance, and optimal intervals)
- **There is a critical need for active training efforts to improve endoscopic detection of gastric preneoplastic and neoplastic lesions in the US**

OVERVIEW

- Epidemiology of GIM
- GIM and risk for gastric cancer
- International guidelines for gastric cancer prevention in patients with GIM
  - Role of endoscopy: surveillance vs. no surveillance
- Clinical impact and cost-effectiveness of GIM surveillance in the US

Outcomes of *H. pylori* infection



~43% colonized with *H. pylori*

Gastritis

Gastric atrophy → Gastric carcinoma **~1-3%**

No significant disease **~90%**

Increased acid → Duodenal ulceration **~10%**

KEY TAKEAWAYS

- While the US has modest incidence as a whole, there are subpopulations at high risk for gastric cancer.
- The risk factors for cardia and non-cardia cancers are distinct
- Racial/ethnic minorities are at increased risk for non-cardia gastric cancers
- Older age/male sex are risk factors for both cardia and non-cardia cancers
- Geographic ‘hotspots’ may include areas with high proportions of immigrants, racial minorities, and areas of poverty and low education
- Rural and poor counties may have later stages of diagnosis and worsened survival from gastric cancer

Take-home points

- A high-quality inspection of the entire gastric mucosa is essential in detecting gastric premalignant changes
- White light endoscopy alone has insufficient sensitivity in detecting GIM or dysplasia
- Image-enhancing techniques (such as NBI) significantly improve detection

- Endoscopic characteristics of atrophic gastritis
  - Mucosal pallor, loss of gastric folds, increased visibility of submucosal vasculature, atrophic border (*H. pylori*-associated)

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Take-home points (continued)

- Endoscopic characteristics of GIM and dysplasia
  - GIM: mucosal tubulovillous pattern, light blue crests, white opaque substance
  - Dysplasia: irregular mucosal vessel patterns and loss of architecture

- Risk-stratification
  - Hinges on high-quality biopsies and pathologic diagnosis
  - Take biopsies from both antrum/incisura and corpus, and place specimens in separate bottles
  - Take additional targeted biopsies of any visible mucosal abnormalities

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CASE

46yo non-Hispanic White female h/o refractory *H. pylori* infection s/p successful eradication with rifabutin triple therapy (2023) presents for EGD to evaluate persistent epigastric pain. No alarm features.

- Born and raised in Bronx, NY. 2nd gen immigrant from Russia. Software engineer. Nonsmoker, rare alcohol
- Family history: Father passed away from complications of a bleeding 'gastric ulcer' in Russia
- **EGD**
  - 'Gastric erythema and mild nodularity of the antrum only. Random biopsies obtained from antrum and corpus, and placed in separately labeled jars'.
- **Histology**
  - Antrum: Mild chronic gastritis, negative for *H. pylori* including IHC. Intestinal metaplasia in 2 of 3 samples, incomplete-type.
  - Corpus: Mild chronic gastritis. Negative for *H. pylori*. Negative for intestinal metaplasia or dysplasia

BACK TO THE CASE…

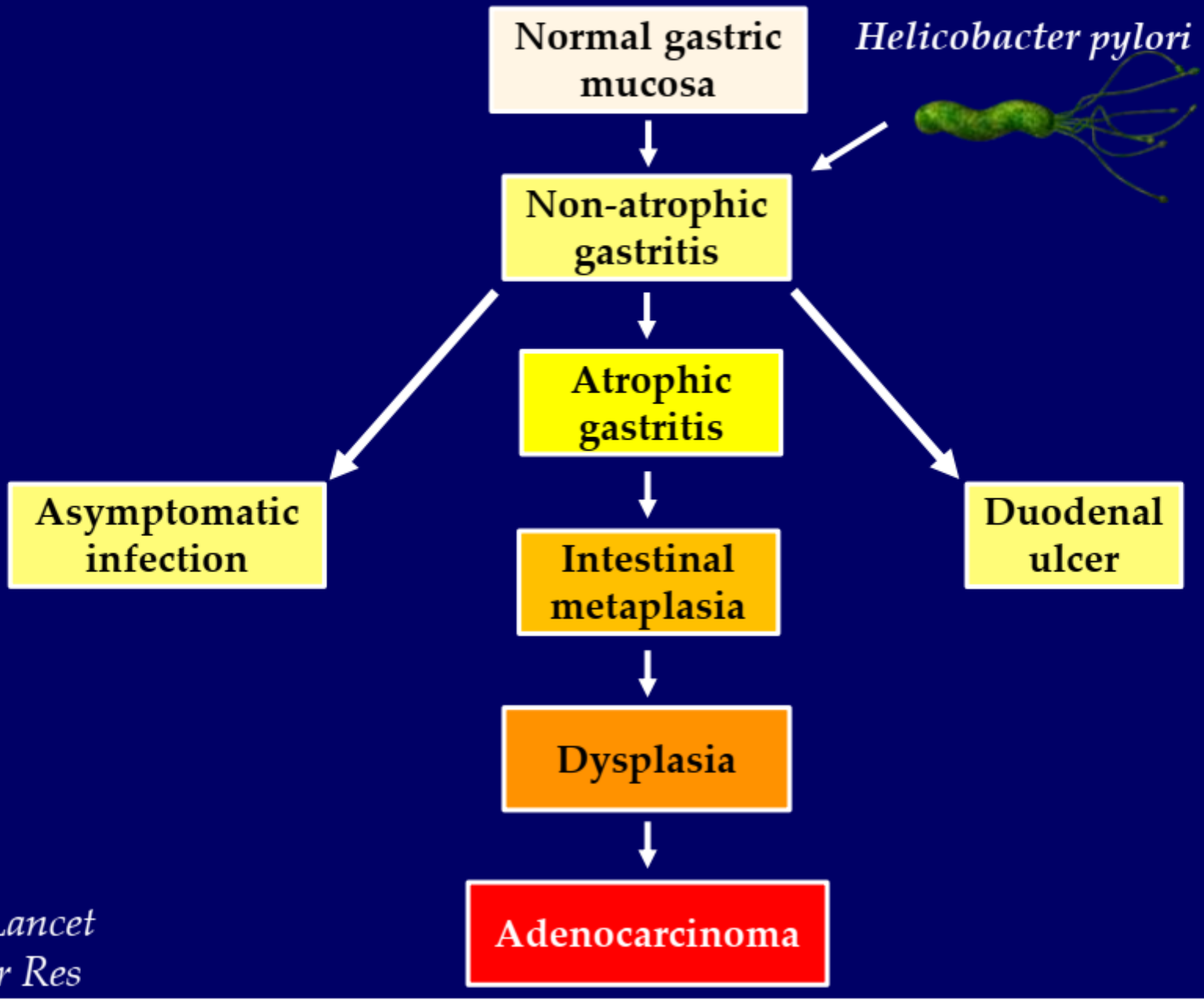
46yo non-Hispanic White F with ***antral limited GIM***…

Surveillance vs. no surveillance???

- ✓***Incomplete-type GIM***
- ✓***History of persistent H. pylori (now eradicated)***
- ✓***Ethnic background (albeit 2nd generation)***
- ✓***Possible family history***
- ✓***OLGIM score?***

OLGIM Staging		Corpus			
		No IM (score 0)	Mild IM (score 1)	Moderate IM (score 2)	Severe IM (score 3)
Antrum	No IM (score 0) (including incisura angularis)	STAGE 0	STAGE I	STAGE II	STAGE II
	Mild IM (score 1) (including incisura angularis)	STAGE I	STAGE I	STAGE II	STAGE III
	Moderate IM (score 2) (including incisura angularis)	STAGE II	STAGE II	STAGE III	STAGE IV
	Severe IM (score 3) (including incisura angularis)	STAGE III	STAGE III	STAGE IV	STAGE IV

Outcomes of *Helicobacter pylori* infection



Correa *et al.* 1975 *Lancet*
Correa 1992 *Cancer Res*

Case

- A 63-year-old man who presented with frequent epigastric pain which did not improve after 4 weeks of Omeprazole 20mg twice daily
- EGD showed a normal esophagus and mild gastritis at the gastric body and antrum. No mass or ulcer was noted. Random biopsies were obtained to rule out *H. pylori.*
- Pathology: Gastric antral and oxyntic mucosa with mild chronic gastritis. Intestinal metaplasia with goblet cells, indefinite for dysplasia. No *H. pylori* organisms were identified.

- ***What should be the next step?***

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What information is missing?

- Any known demographic risk factors?
  Born in Taiwan and moved to the U.S. at age 38.
- How was the quality of the exam?

What information is missing?

- Any known demographic risk factors?
  Born in Taiwan and moved to the U.S. at age 38.
- How was the quality of the exam?

- Was high-definition endoscope used?
  Yes. NBI – No.
- Which segments of gastric mucosa were biopsied?
  Random gastric biopsies, placed in one specimen bottle (a total of 3 fragments)

Impression: EGD with inadequate quality

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MISSED NEOPLASTIC LESIONS: "THE ELEPHANT IN THE ROOM"

The SUCCESS of endoscopic surveillance of GIM hinges on not missing lesions

…Identifying early GC underlies the efficacy of screening and surveillance

- Studies reporting false-negative rates for GC during screening endoscopy range from ***4.6% to 25.8%***
- Very subtle lesions, especially *H. pylori*-negative early GCs
- Unmet need for quality metrics and training in improving detection of (pre)neoplasia, especially in the US
- Artificial intelligence



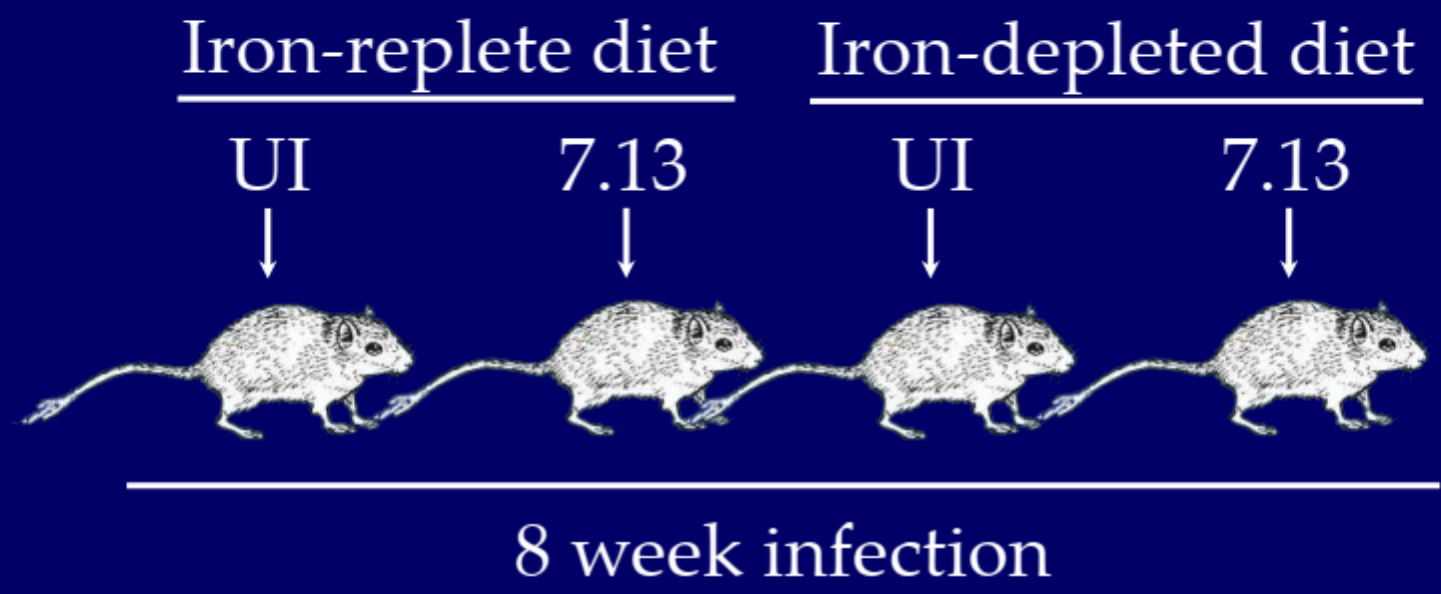
Stock photo, Google

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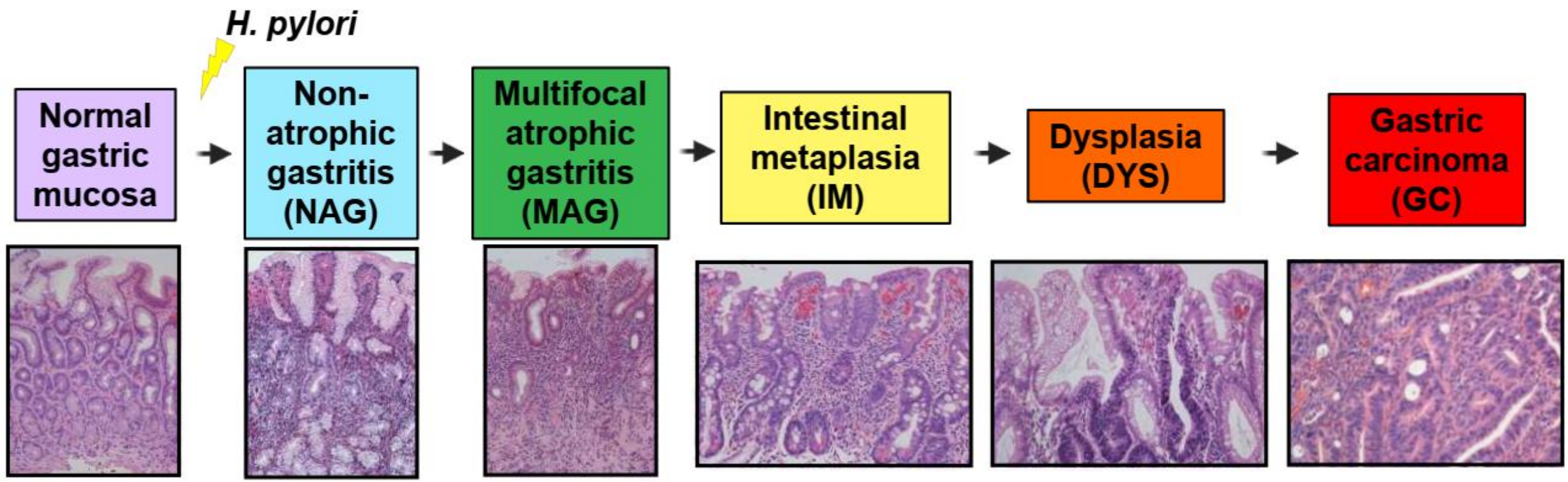
Ikenoyama Y et al. *Dig Endoscopy* 2021; 33:141-150; Yao K. *Ann Gastroenterol*. 2013;26:11-22

Effect of iron deficiency in *H. pylori*-induced gastric carcinogenesis in Mongolian gerbils

Assess the role of iron deficiency in *H. pylori*-induced gastric carcinogenesis



Correa cascade of gastric carcinogenesis

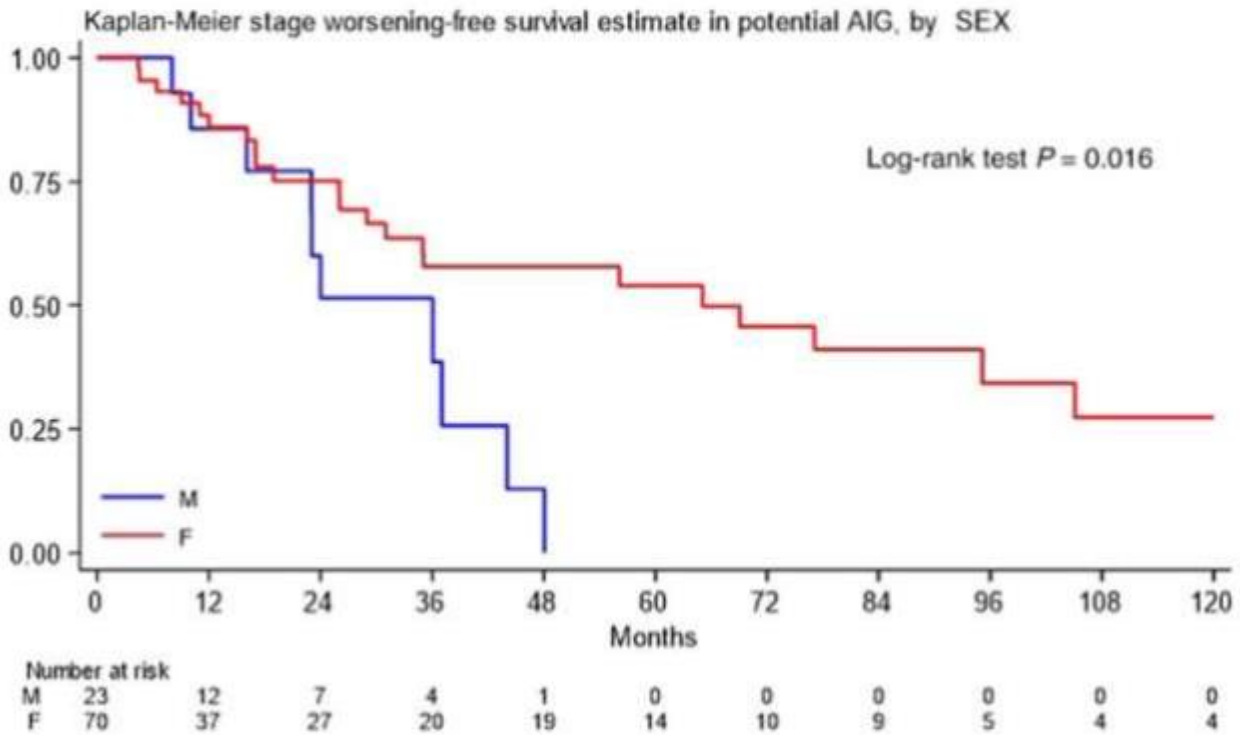


Correa *Cancer Res.* 1992.; Correa, Piazuelo, & Wilson. *Am J Gastroenterol.* 2010.

PROGRESSION FROM POTENTIAL TO OVERT AUTOIMMUNE GASTRITIS

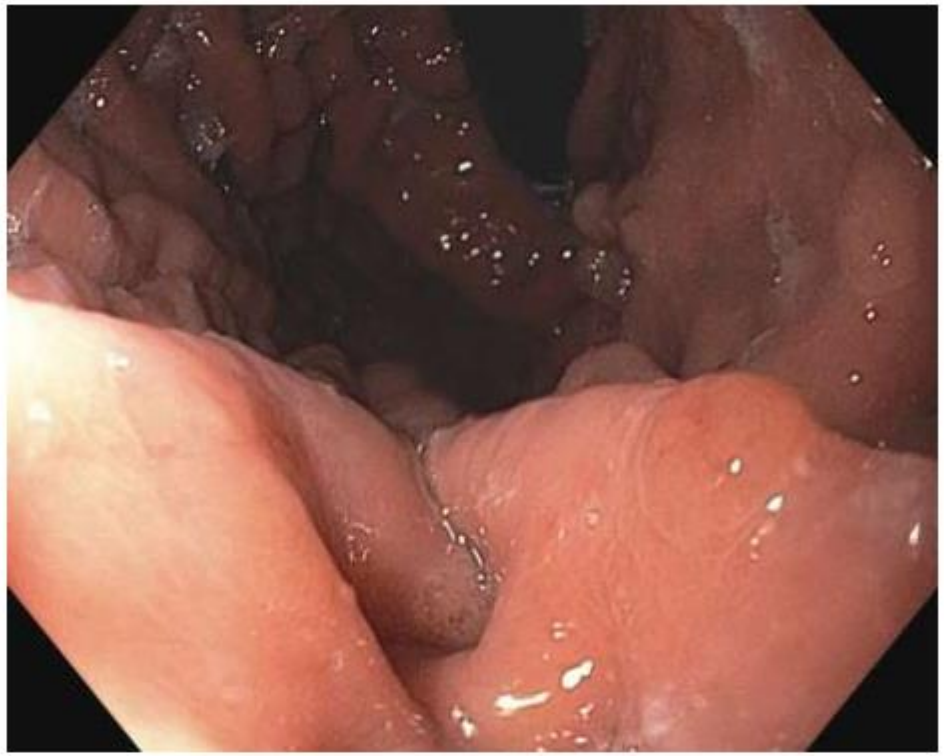
Progression rate:
10.8 per 100 pers/yr
n=34/93 (36.6%) of stage 0 patients

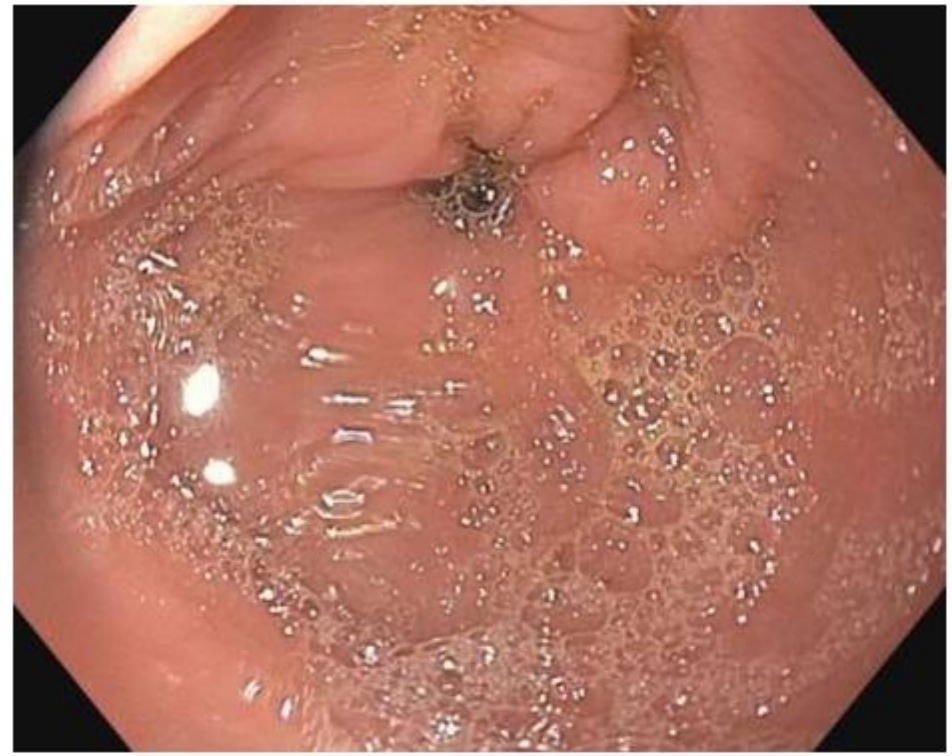
- ✓ HR for female sex 0.39, 95%CI 0.17-0.86, p=0.021
- ✓ Age, 1° family history of autoimmune gastritis, and autoimmune comorbidities were not associated



Miceli E, Lenti MV, et al. Am J Gastroenterol 2024

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