Overview of Gastric Pathology:
Non-Neoplastic Diseases
Structural Units of the Normal Gastric Mucosa

Antral-Type

Fundic-Type
Non-Neoplastic Diseases of the Stomach

- Developmental abnormalities
- Chronic gastritis
- Acute gastritis
- Gastric ulcers
- Mucosal hypertrophy
- Infections
- Vascular disorders
- Systemic disorders
Patterns of Injury

• *Acute Injury:*
  – Edema, congestion, and hemorrhage
  – *Acute inflammation* (neutrophils and eosinophils)
  – Erosions and ulcers

• *Chronic Injury:*
  – Chronic inflammation (lymphocytes and plasma cells)
  – Lymphoid aggregates and follicles
  – Atrophy of *specialized* glands
  – Metaplasia (intestinal, pyloric, and pancreatic)

• *Repair Reactions:*
  – Regenerative activity
  – Foveolar hyperplasia
  – Granulation tissue
Working Classification of Gastritis

- Acute (erosive, hemorrhagic)
- Chronic:
  - *H. pylori* gastritis
  - Atrophic gastritis
    - Type A *or* autoimmune *or* diffuse body
    - Type B *or* multi-focal *or* environmental
  - Eosinophilic gastritis (*gastroenteritis*)
  - Lymphocytic gastritis
  - Granulomatous gastritis
- Infections
- Chemical “gastropathies”
  - Bile reflux
  - NSAIDS
  - Alcohol
Gastritis- etiologic classification

- Acute (erosive) gastritis
  - trauma, chemical injury, ischemia
- Helicobacter-associated gastritis
- Non-Helicobacter infectious gastritis
- Immune-mediated- autoimmune, GVHD
- Lymphocytic gastritis
- Allergic (eosinophilic) gastritis
- Crohn’s disease
- Other- chemical, collagenous
**Helicobacter Pylori Gastritis**

- Typical histopathology is characterized by:
  - Chronic active antral gastritis, with or without
  - Chronic active **superficial** gastritis in the corpus
    - Lymphoplasmacytic inflammation in the lamina propria
    - Neutrophils in the lamina propria and gastric pits
    - Lymphoid aggregates and follicles
  - Characteristic bacilli, primarily in the foveolar mucus

- Histology may also include:
  - Increased intraepithelial lymphocytes in the antrum
  - Eosinophilic infiltrate
**H pylori- Natural history**

- **High level of acid production**
  - H. pylori
  - Normal gastric mucosa
  - Chronic H. pylori infection
  - Acute H. pylori infection
  - Antral-predominant gastritis
  - Nonatrophic pangastritis
  - Corpus-predominant atrophic gastritis
  - Gastric ulcer
  - Intestinal metaplasia
  - Dysplasia
  - Gastric cancer
  - MALT lymphoma
  - Asymptomatic H. pylori infection

- **Low level of acid production**
  - CHILDHOOD
  - ADVANCED AGE

Image by MIT OCW.
Distributions of gastritis

- Antral (Type B)
- Fundic Gland (Type A)
- Pangastroitis (Type AB)
Autoimmune/Type A/Diffuse Atrophic Gastritis

- An autoimmune autosomal dominant disease with anti-parietal cell or anti-intrinsic factor autoantibodies
- Histopathology is characterized by:
  - Chronic inflammation
  - Gland atrophy
  - Loss of parietal cells
  - Pyloric and intestinal metaplasia
- Specific targeting of the parietal cells leads to:
  - Disease limited to the corpus and the fundus
  - Achlorhydria due to the loss of parietal cells
  - Pernicious anemia due to the loss of intrinsic factor
  - Hypergastrinemia due to the loss of gastric acid production
  - Endocrine cell hyperplasia and neoplasia due to hypergastrinemia

1999 K. Badizadegan
Environmental/Type B/Multifocal Atrophic Gastritis

• Heterogeneous disease due to chronic *H. pylori* gastritis, dietary factors, etc.
• Disease most commonly involves the antrum and/or antrum-corpus junction, but may be seen anywhere in the stomach
• Histopathology is characterized by:
  – Chronic inflammation
  – Gland atrophy
  – Intestinal metaplasia
  – Pylori metaplasia (with involvement of the corpus)
  – Patchy and/or focal involvement
• Identified as the precancerous lesion in 95% of early gastric adenocarcinomas in Japan
“Chemical” Gastropathy

- The final common pathway of mucosal damage due to chemicals, drugs, or bile reflux, characterized by any combination of:
  - Mucosal edema, congestion, and hemorrhage
  - Foveolar hyperplasia
  - Foveolar mucin depletion
  - Regenerative changes
  - Microscopic mucosal erosions
  - Increased smooth muscle fibers in the lamina propria
  - Relative paucity of inflammation

- Alcohol, NSAIDS, and other drugs produce a similar pattern of injury
Infections
**Eosinophilic Gastritis**

- Eosinophilic gastritis is typically part of eosinophilic gastroenteritis, which may take one of three forms:
  - *Mucosal* (bleeding, protein loss, malabsorption)
  - *Mural* (mass lesion)
  - *Serosal* (ascites)

- The **mucosal** form of allergic gastroenteritis accounts for the majority of cases, is typically “allergic” in nature, and commonly involves the gastric antrum.

- To establish a diagnosis of eosinophils/allergic gastroenteritis, eosinophils must be the predominant cell type, and other possible conditions must be excluded:
  - IBD
  - Reflux (esophagitis)
  - Parasitic infections
  - Vasculitis
  - Drug reaction
  - Chronic granulomatous disease
  - ...
Lymphocytic Gastritis

- **Histopathology:**
  - Increased foveolar intraepithelial T lymphocytes (>3 per 10)
  - Variable degree of lymphoplasmacytic inflammation in the lamina propria
  - Involvement of the corpus with or without antral involvement

- Approximately 80% of cases diagnosed endoscopically as *chronic erosive (varioliform) gastritis* meet the histological diagnostic criteria for lymphocytic gastritis
- Approximately 20% of cases diagnosed histologically as lymphocytic gastritis have gross thickening of the mucosa
- ? Association with *H. pylori*
- ? Association with protein losing gastropathy
- Approximately 60% of patients with active celiac disease have increased intraepithelial lymphocytes in the *antrum*
Granulomatous Gastritis

- Crohn’s disease
- Sarcoidosis
- Infections:
  - Mycobacteria
  - Histoplasma
- Foreign materials
- Isolated granulomatous gastritis
- And possibly:
  - Lymphoma
  - Malakoplakia
  - Whipple’s disease
  - Chronic granulomatous disease
Acute Gastritis

- Acute infectious gastritis
- Acute hemorrhagic gastritis
  - Stress, medications, alcohol, ischemia, ...
- Acute Stress Ulcer Disease
  - Cushing’s ulcer (CNS damage)
  - Curling’s ulcer (burn trauma)
  - Develops 1-2 weeks post-insult
  - Multifocal ulcers, typically in the body (contrast with PUD)
Developmental and Structural Abnormalities

- Gastric atresia (membranes >> complete segmental defects)
- Microgastria (arrested foregut development)
- Gastric diverticula:
  - 75% are *juxtacardial* (on the posterior wall of the cardia)
- Gastric duplication “cysts”
- Gastric outlet obstruction:
  - Infantile hypertrophic pyloric stenosis
- Heterotopias:
  - Gastric corpus mucosa (inlet patch, duodenal, Meckel’s, rectal)
  - Pancreatic tissue (gastric and duodenal *wall and submucosa*)
  - Brunner glands
Vascular Disorders

- Congestive gastropathy and varices
- Gastric antral vascular ectasis (GAVE)
- Hereditary Hemorrhagic Telangiectasia (Osler-Weber-Rendu disease)
- Sporadic telangiectasias
- Caliber-persistent artery (Dieulafoy ulcer)
- Arterio-venous malformations
- Vasculitis
- Atheroembolic disease
- Amyloid vasculopathy
Gastric Mucosal Hypertrophy

- Congenital hypertrophy of the rugae
- Mucosal hypertrophy due to parietal cell hyperplasia
  - Zollinger-Ellison Syndrome
- Mucosal hypertrophy due to foveolar hyperplasia
  - Menetrier’s Disease
- Mucosal thickening (not hypertrophy) secondary to an infiltrative process
Menetrier’s Disease

- Hyperplasia of the surface foveolar zone
- Overproduction of mucus results in protein-losing enteropathy
- Chronic disease in adults with a possible increase in the risk of gastric cancer
- Self-limited disease in children typically following to a viral infection
Zollinger-Ellison Syndrome

• Hyperplasia of the parietal cells due to increased gastrin production

• Source of gastrin may be:
  – A pancreatic islet cell tumor (90%)
  – A proximal duodenal tumor (7%)
  – Antral G-cell hyperplasia (3%)

• Maximal stimulation of parietal cells leads to excessive acid production, resulting in multiple peptic ulcers of the stomach and the duodenum
Gastric polyps

- Non-neoplastic
  - Hyperplastic polyp
  - Fundic gland polyp
  - Others (hamartomatous, etc.)
- Neoplastic
  - Adenoma
  - Carcinoma