

Gastric cancer



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- Globally, stomach cancer is the fifth leading cause of cancer and the third leading cause of death from cancer, making up 7% of cases and 9% of deaths.
- Outcomes are often poor with a less than 10% five-year survival rate globally. This is largely because most people with the condition present with advanced disease. In the United States, five-year survival is 28%, while in South Korea it is over 65%, partly due to screening efforts.
- In 2012, it newly occurred in 950,000 people and caused 723,000 deaths. Before the 1930s, in much of the world, including most Western developed countries, it was the most common cause of death from cancer. Rates of death have been decreasing in many areas of the world since then.

Signs and Symptoms

- May be symptomatic or cause nonspecific symptoms) in early stages.
- Heartburn.
- upper abdominal pain
- nausea and loss of appetite.
- weight loss
- jaundice



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- vomiting
- difficulty swallowing
- blood in the stool.
- Metastases in liver, lungs, bones, lining of the abdomen and lymph nodes.
- Peritoneal metastatic spread may be evident as a palpable ovary on pelvic examination (Krukenberg tumor) or metastasis to the pouch of Douglas on rectal examination (Blumer's shelf sign).

Aetiology

- *Helicobacter pylori* infection is a risk factor in 60 - 85% of gastric cancer , but only 2 % of people with H pylori infection develop cancer
- Smoking increases the risk of developing gastric cancer significantly, from 40% increased risk for current smokers to 82% increase for heavy smokers. Gastric cancers due to smoking mostly occur in the upper part of the stomach near the esophagus.
- Alcohol consumption.
- Diet; consumption of smoked foods , processed meats ,salted foods and pickled vegetables. Nitrates and nitrites in cured/ baked meats can be converted by certain bacteria, including *H. pylori*, into nitrosamines which are carcinogenic Fresh fruits and vegetables protective due to high levels of antioxidants
- Obesity associated with GERD
- About 10% of cases run in families, and between 1% - 3% of cases are due to inherited genetic syndromes such as hereditary diffuse gastric cancer, associated with defect in CDH1 GENE that codes for E-Cadherin.

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- Diabetes.
- Pernicious anemia.
- Chronic atrophic gastritis.
- Menetrier's disease (hyperplastic, hypersecretory gastropathy).
- Intestinal metaplasia.

- Laboratory work up; FBC- Anaemia-iron deficiency/macrocytic anemia. UE/C- electrolyte imbalances.
- Endoscopy and Biopsy.
- Barium meal.
- CT Scan Abdomen- T,N,M Staging
- Endoscopic Ultrasonography- T,N,M Staging.
- Diagnostic/staging laparoscopy

Diagnosis

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- **Magnetic Resonance Imaging (MRI) has been known to be almost comparable to CT scan for staging of AGC and useful to confirm a liver metastasis in equivocal cases .**
- **However, currently, MRI is limitedly used when the patients have an allergy to iodine contrast or renal failure due to motion induced artifacts, longer scanning times and a higher cost than CT scan.**

Pathology

- *Gastric adenocarcinoma* accounts for 90% of gastric tumours. These are epithelial tumours, originating from glandular epithelium of the gastric mucosa. Adenocarcinomas tend to invade the gastric wall, infiltrating the muscularis mucosae, the submucosa and then the muscularis propria.
- Histologically, two major types of gastric adenocarcinoma (Lauren classification): intestinal type or diffuse type.
- Intestinal type adenocarcinoma tumour cells form irregular tubular structures, with stratification, multiple lumens, reduced stroma. Often, associated with intestinal metaplasia in neighbouring mucosa.

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- Intestinal type adenocarcinoma usually arises in the older population with an increased incidence in men and is frequently associated with chronic atrophic gastritis, intestinal metaplasia and Helicobacter pylori infection in neighboring mucosa.
- They constitute approximately 60% of gastric carcinoma in high-risk population and occur frequently in the antrum as exophytic bulky lesions.



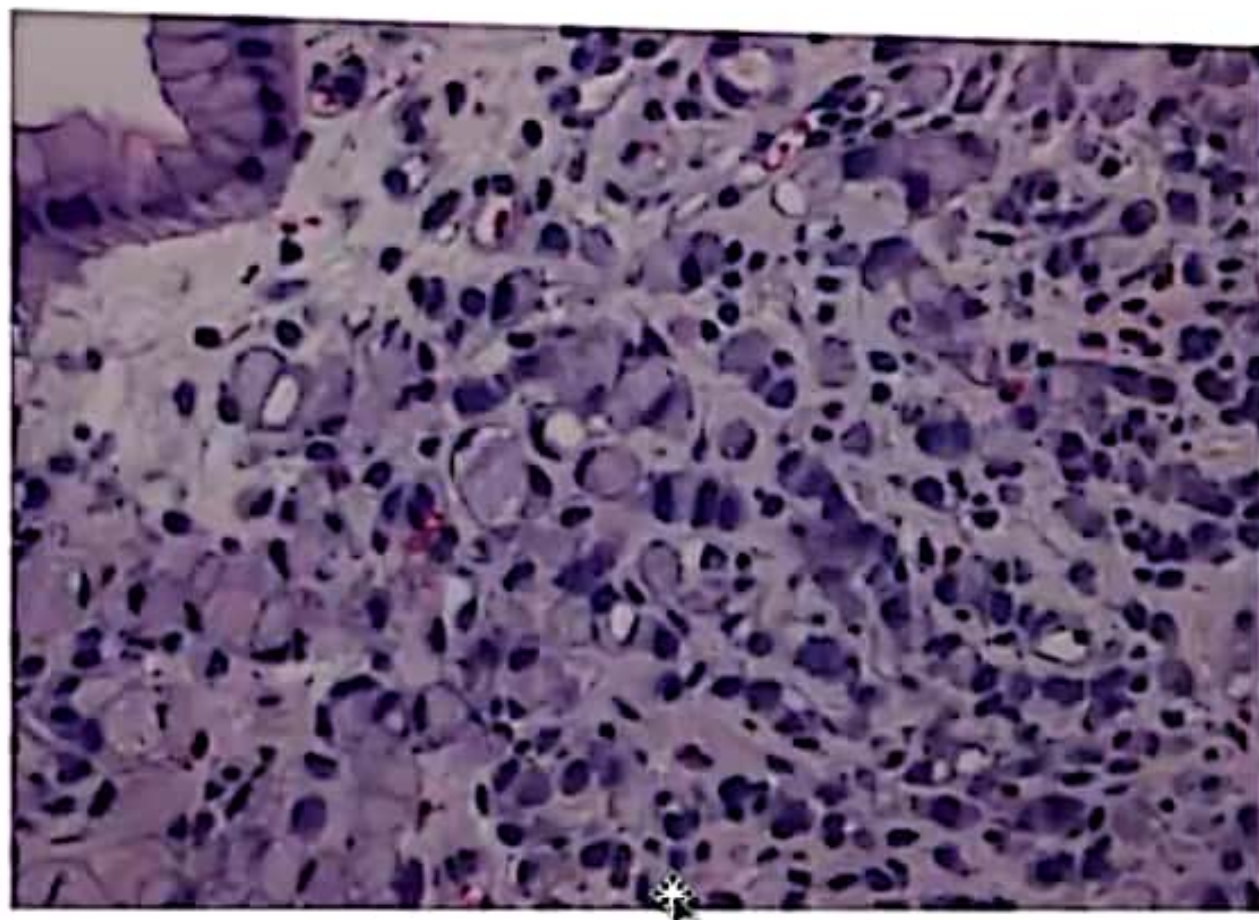
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- The sequence of changes in the stomach has been proposed that *Helicobacter pylori* infection or autoimmune gastritis → atrophic gastritis with intestinal metaplasia, -→ dysplasia (adenoma) -
→ adenocarcinoma.
- Diffuse type adenocarcinoma frequently occurs in younger patients, men = women.
- Diffuse type adenocarcinoma (mucinous, colloid, linitis plastica or leather-bottle stomach) formed of discohesive and mucus secreting cells, described as *signet-ring cell*.
- Other tumours include; Lymphomas 5% , Carcinoid and Gastrointestinal stromal tumors.



Intestinal adenocarcinoma	Diffuse adenocarcinoma		
Age	Old age	Young age	
Sex	M > F	M = F	
Risk factors	Helicobacter pylori infection, high salt diet, and smoking	CDH1 gene mutation	
Precursors	Adenoma or dysplasia	Tubule-neck dysplasia or signet ring cell carcinoma in situ	
Surrounding gastric mucosa	Atrophic gastritis with intestinal metaplasia	Non-atrophic gastritis or nonmetaplastic mucosa	
Common location	Antrum and angulus	Corpus and whole stomach	
Gross feature	Exophytic lesion	Ulcerative lesion and linitis plastica	

Signet cell gastric cancer



Staging-TNM(AJCC)

- Once histological diagnosis of gastric cancer is made the next step staging to establish extent of the disease.
- Staging tests include; CT scan, a PET scan,^l endoscopic ultrasound and Laparoscopy.
- Tumor marker; levels of carcinoembryonic antigen (CEA) and carbohydrate antigen (CA) correlate to extent of metastasis, especially to the liver, and may assist in monitoring treatment response.



Primary tumor (T)

- TX - Primary tumor cannot be assessed
- T0 - No evidence of primary tumor
- Tis - Carcinoma in situ: intraepithelial tumor without invasion of the lamina propria
- T1 - Tumor invades lamina propria, muscularis mucosae, or submucosa
- T1a - Tumor invades lamina propria or muscularis mucosae
- T1b - Tumor invades submucosa



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- T2 - Tumor invades muscularis propria
- T3 - Tumor penetrates subserosal connective tissue without invasion of visceral peritoneum or adjacent structures
- T4 - Tumor invades serosa (visceral peritoneum) or adjacent structures
- T4a - Tumor invades serosa (visceral peritoneum)
- T4b - Tumor invades adjacent structures



Regional lymph nodes (N)

- NX - Regional lymph node(s) cannot be assessed
- N0 - No regional lymph node metastasis
- N1 - Metastasis in 1-2 regional lymph nodes
- N2 - Metastasis in 3-6 regional lymph nodes
- N3 - Metastasis in seven or more regional lymph nodes
- N3a - Metastasis in 7-15 regional lymph nodes
- N3b - Metastasis in 16 or more regional lymph nodes



Distant metastasis (M)

- M0 - No distant metastasis
- M1 - Distant metastasis



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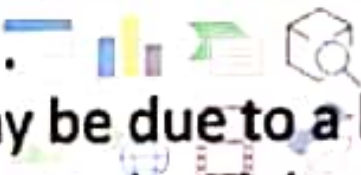
Stage	T	N	M
0	Tis	N0	M0
IA	T1	N0	M0
IB	T1	N1	M0
	T2	N0	M0
II A	T1	N2	M0
	T2	N1	M0
	T3	N0	M0
	T1	N3	M0
II B	T2	N2	M0
	T3	N1	M0
	T4a	N0	M0

Table 1 Numbering of lymph nodes (LNs) according to the old classification of Japanese Research Society for Gastric Cancer (1)

Station nr	Lymph nodes
1	Right cardiac nodes
2	Left cardiac nodes
3	Nodes along the lesser curvature
4	Nodes along the greater curvature
5	Suprapyloric nodes
6	Infrapyloric nodes
7	Nodes along the left gastric artery
8	Nodes along the common hepatic artery
9	Nodes around the coeliac axis
10	Nodes at the splenic hilus
11	Nodes along the splenic artery
12	Nodes in the hepatoduodenal ligament
13	Nodes at the posterior aspect of the pancreas head
14	Nodes at the root of the mesenterium
15	Nodes in the mesocolon of the transverse colon
16	Para-aortic lymph nodes

Adapted from Degiuli M *et al.* World J Gastroenterol 2016 March 14; 22(10): 2875-2893; with permission.

Early gastric carcinoma

- Early gastric carcinoma (EGC) is defined as an invasive adenocarcinoma that involves only the mucosa or submucosa but not the muscularis propria, independent of lymph node status.
- EGC represents approximately 20% of all newly diagnosed gastric cancers in Western countries, whereas in Northeast Asia (Japan and Korea), it accounts for over 50% of cases . 
- The difference in incidence may be due to a higher prevalence of gastric cancer with mass screening test, and widely adapted use of magnifying upper endoscopy with high-resolution images and chromoendoscopy in Northeast Asia.



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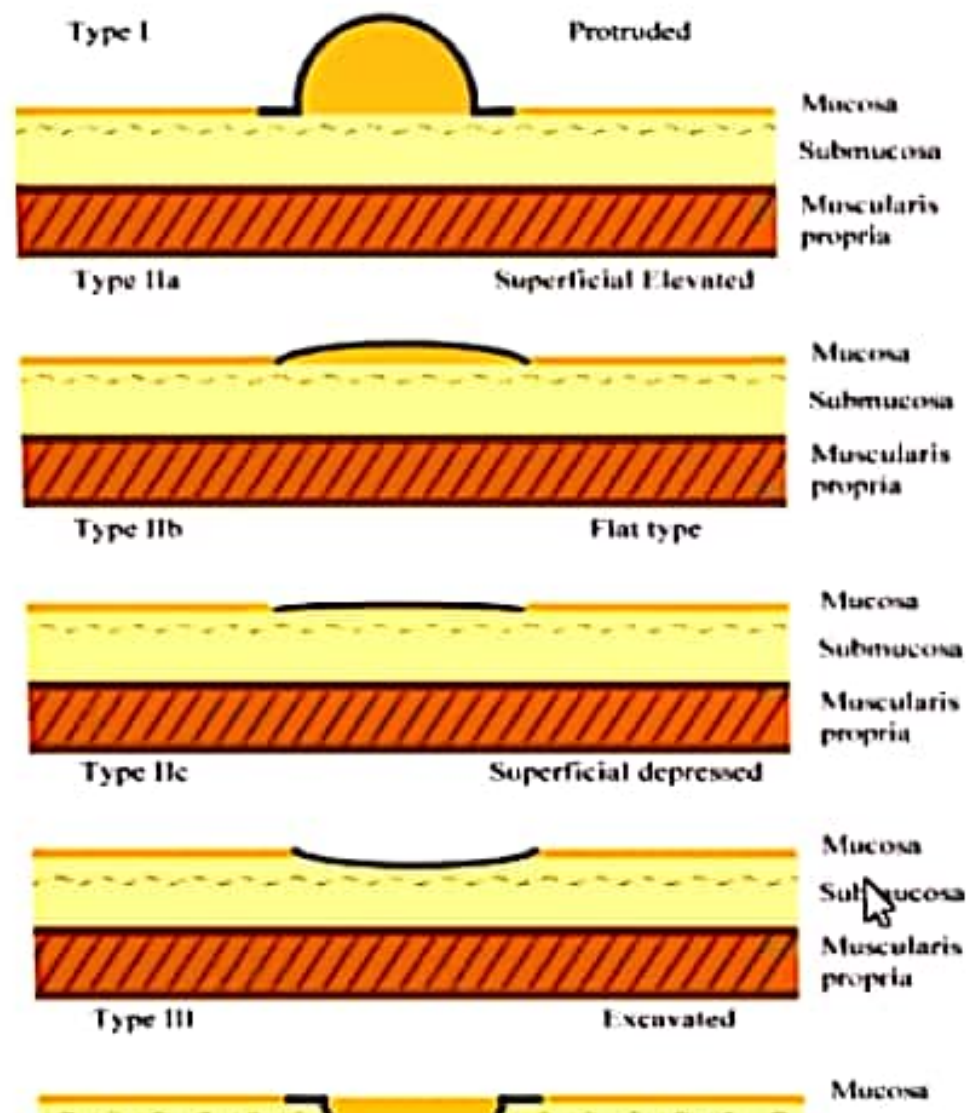
- The majority of patients with EGC are asymptomatic.
- Some may present with non-specific upper abdominal symptoms such as heartburn or epigastric pain, so-called dyspeptic symptoms.
- Weight loss, anorexia, anemia, and hypoalbuminemia frequently found in patients with advanced gastric cancer are not commonly seen.
- Dyspeptic symptoms may occur in up to 40% of the patients with EGC
- Dyspeptic symptoms may bemasked by the use of anti-acid drugs and proton pump inhibitors

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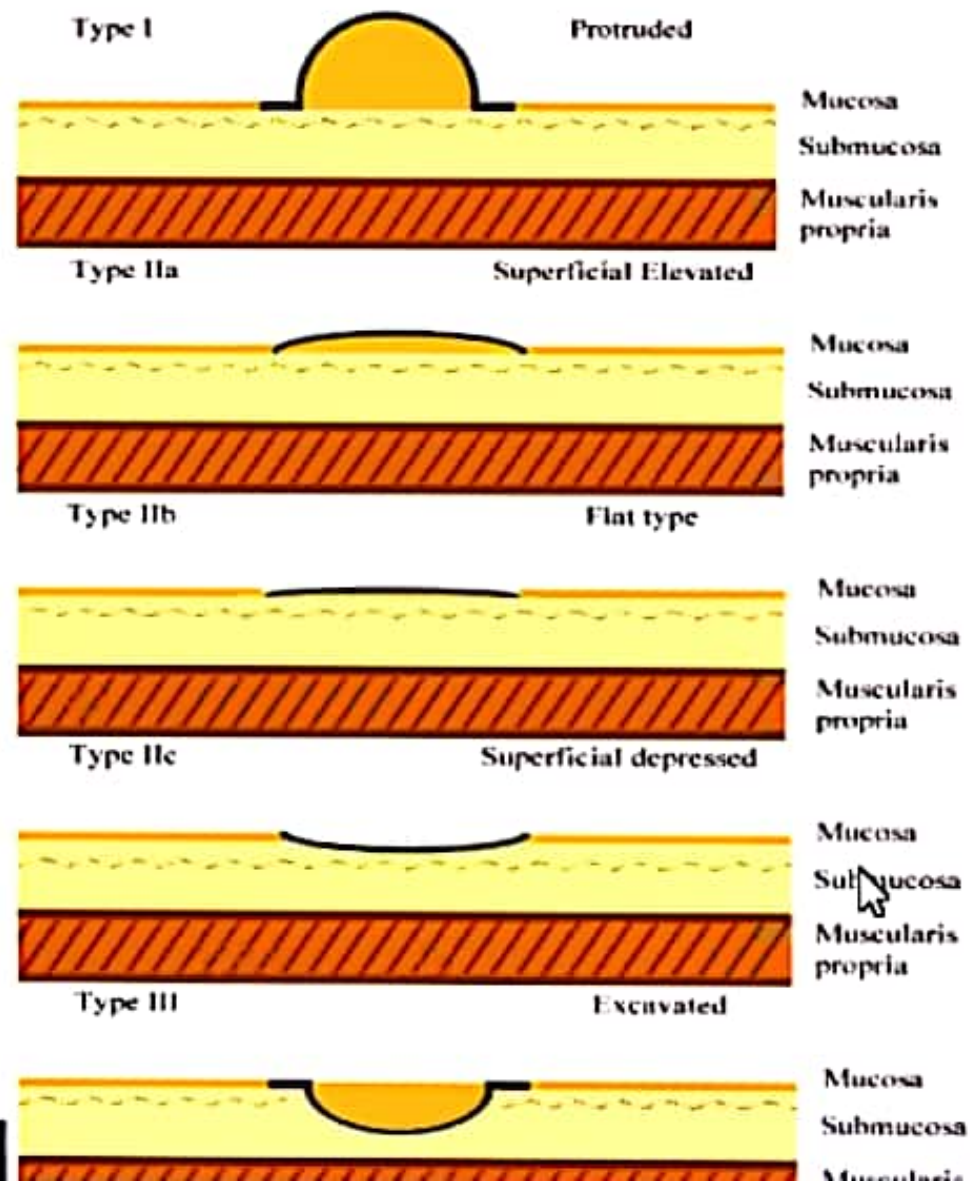
- Most of Japanese series have reported more than 90% of 5 and 10 year survival rates for the patients with EGC.
- In the Western, 5-year survival rates range from 68% to 92%.Diagnosis by ENDOSCOPY/ENDOSCOPIC US



Bormann's classification of gastric cancer

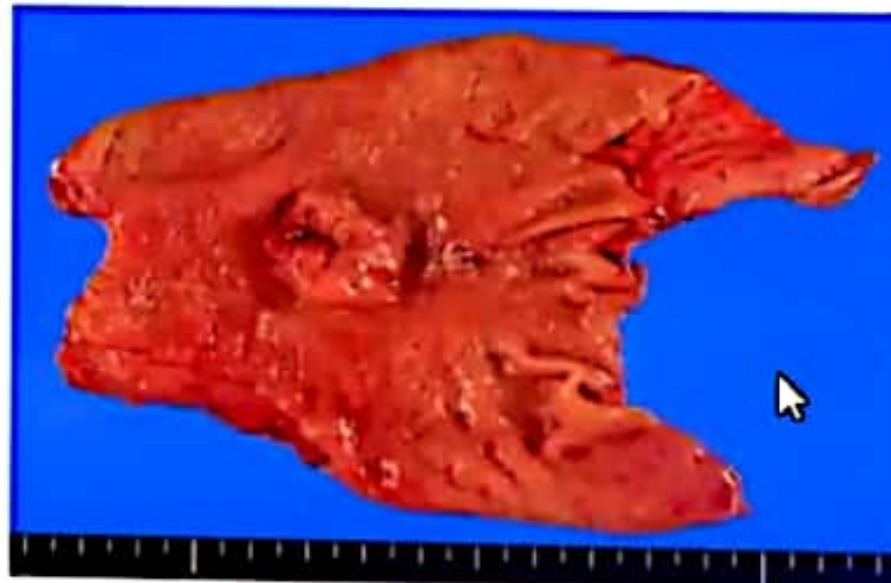


Bormann's classification of gastric cancer



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Type 1 Polypoid: Well circumscribed polypoid tumors.



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Type 2 Fungating: Fungating tumors with marked central infiltration .



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Type 3 Ulcerated: Ulcerated tumors with infiltrative margins

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Type 4 Infiltrating: Diffusely infiltrated tumors.



Management

- Gastrectomy and lymphadenectomy
 - Endoscopic mucosal resection(EMR).
 - Indications for EMR ;
 - 1.The lesions must be confined to the mucosa.
 2. Smaller than or equal to 2 cm for superficially elevated type lesions;
 3. Smaller than or equal to 1 cm for the flat and depressed type lesions;
 4. No ulcer or ulcer scar;
 5. No venous or lymphatic involvement
- 

Advanced gastric carcinoma

- Men are more frequently affected than women (male: female ratio; 2:1)
- The median age at diagnosis is 70 years of age.
- The overall prognosis of AGCs is poor, with 5-year survival rate of 20%.
- Median survival for metastatic or unresectable disease is approximately 8 to 10 months .

