Stomach Cancer Incidence in Asia, Central and South America: Implications for the United States

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South Florida GI Cancer Symposium

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Patient Presentation #1

- 30 year old woman from Colombia with dyspepsia including mild epigastric discomfort and iron deficiency anemia.

- *Should she undergo an upper endoscopy?*

Patient Presentation #2

- 50 year East Asian man who emigrated from Korea to Miami as a teenager.

- *He is asymptomatic and in overall good health but is asking you if he should have a Screening EGD.*
- *He asks if he should take Vitamin C to prevent Gastric Cancer.*

Overview, Gastric Cancer

Global Burden

US

- Epidemiology
  - Demographics
  - Histology and Anatomic Location
- Risk Factors and Prevention

- Screening and Early Detection
  - Carcinogenesis Pathway: *Precursors an Opportunity for Early Detection and Intervention*
  - AGA Guidelines and Practice Summary
  - Future Screening Methods

Global Gastric Cancer Epidemiology

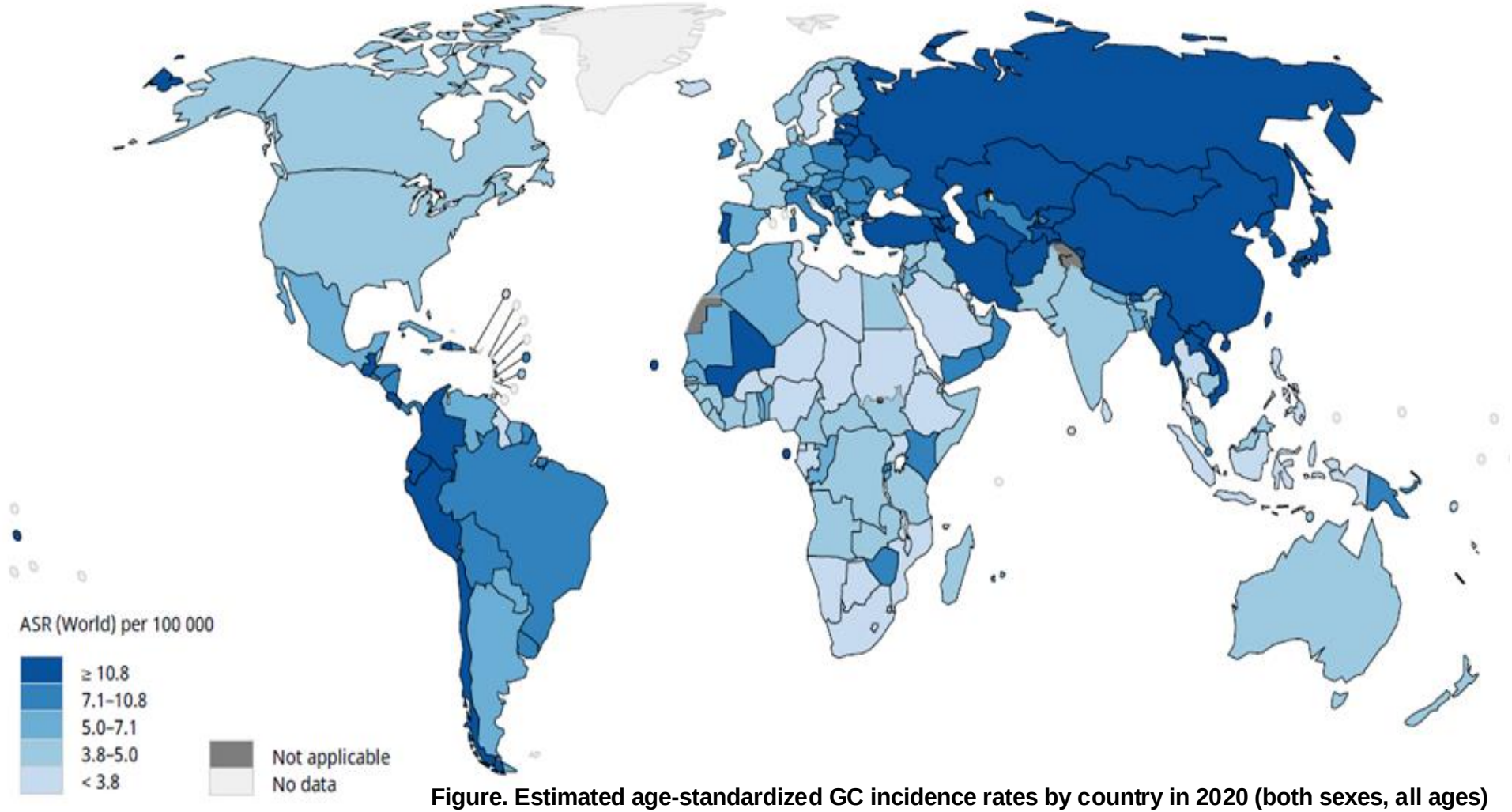


Figure. Estimated age-standardized GC incidence rates by country in 2020 (both sexes, all ages)

Global Gastric Cancer Epidemiology

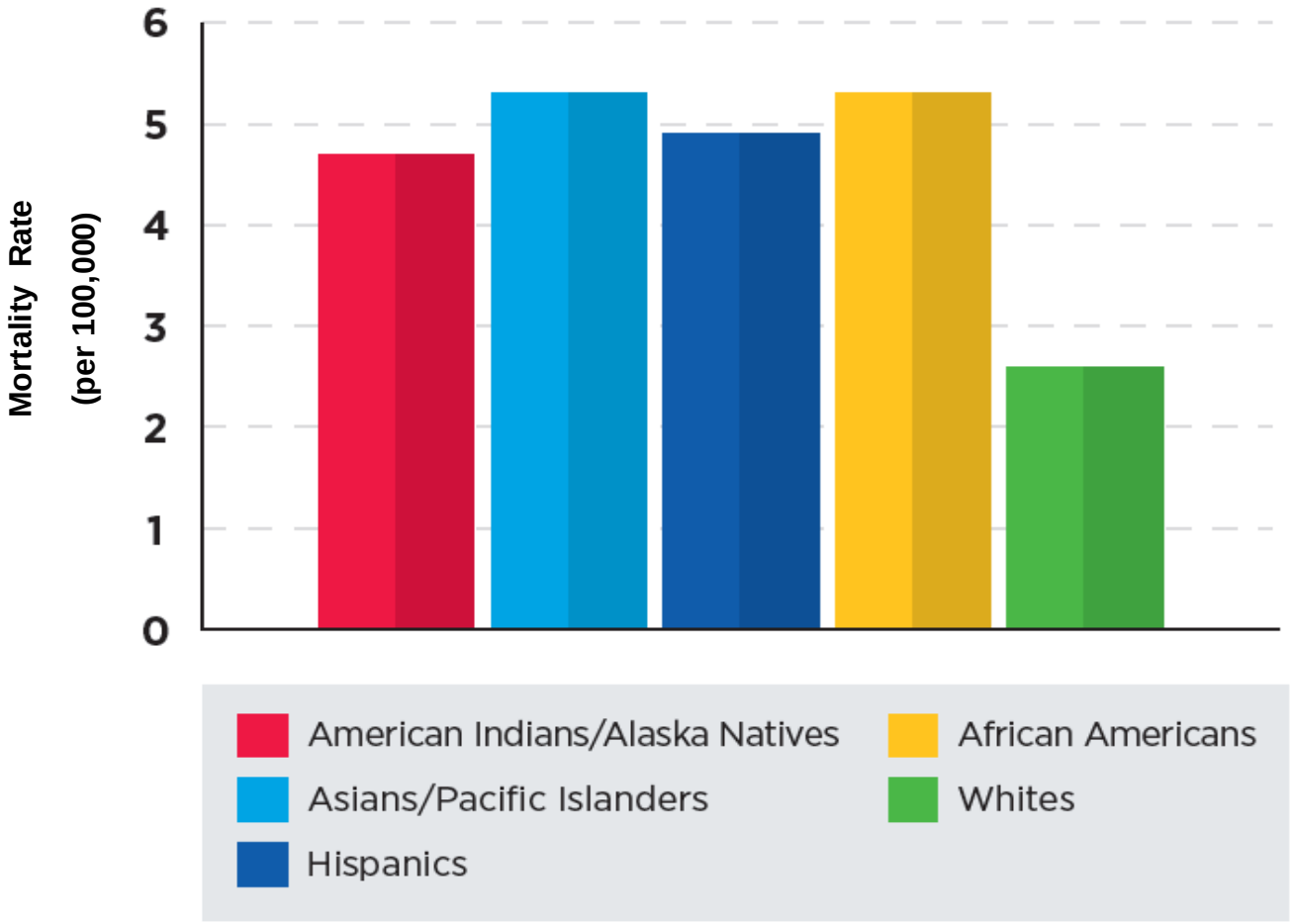
- 5th incidence, 3rd mortality
- > 1 million cases/year
- 770,000 deaths/year

- Globally <30% 5-year survival rate
- Japan/Korea detect Stage I in >50% with upper endoscopic screening

- Hp Infection ~89% of Non-Cardia Gastric Cancer
- World Health Organization designated "***Neglected Cancer***"

Gastric Cancer is a Major Source of Cancer **Disparities** among Racial/Ethnic Groups in US

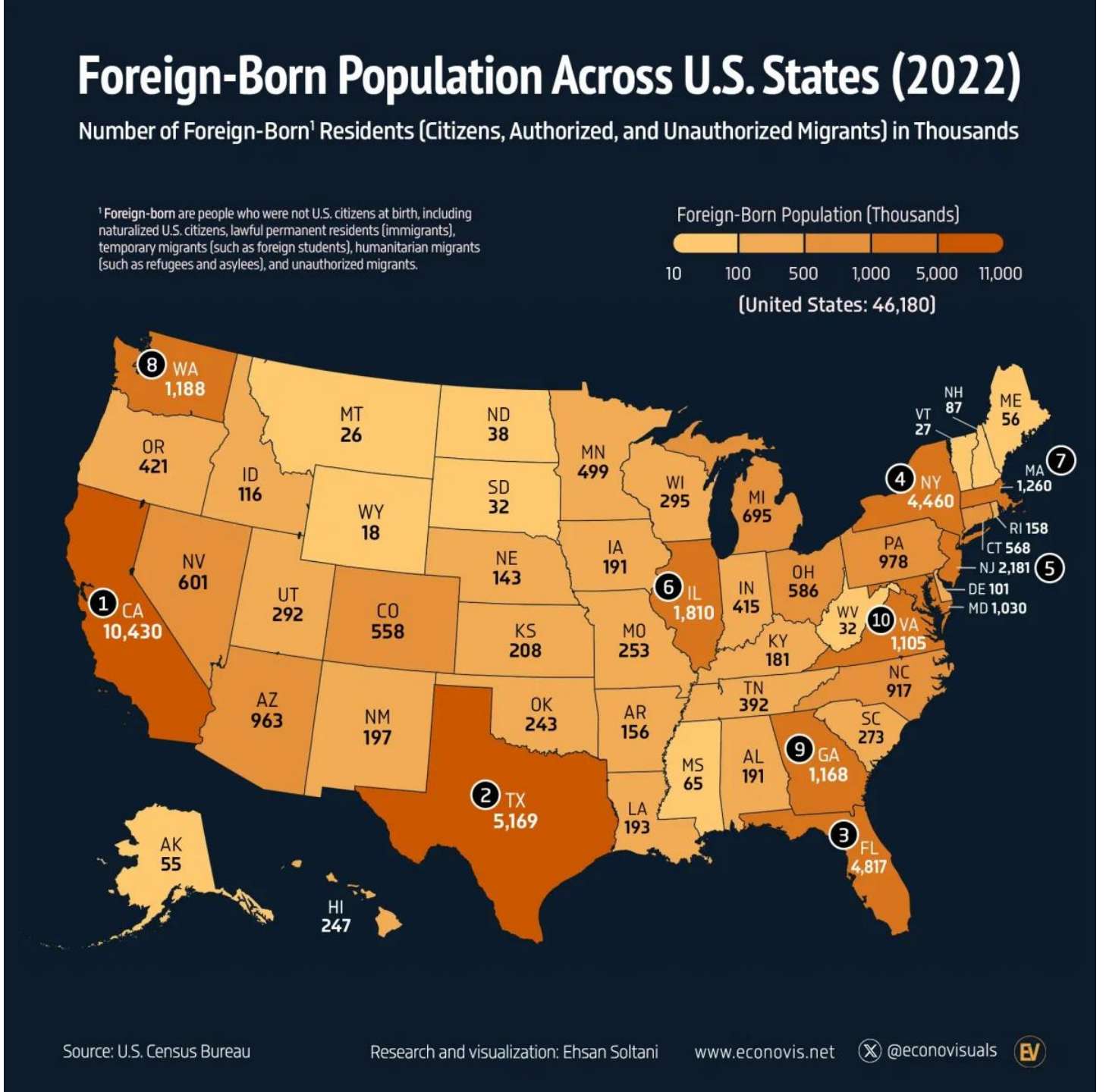
Figure. GC mortality rates by race/ethnicity



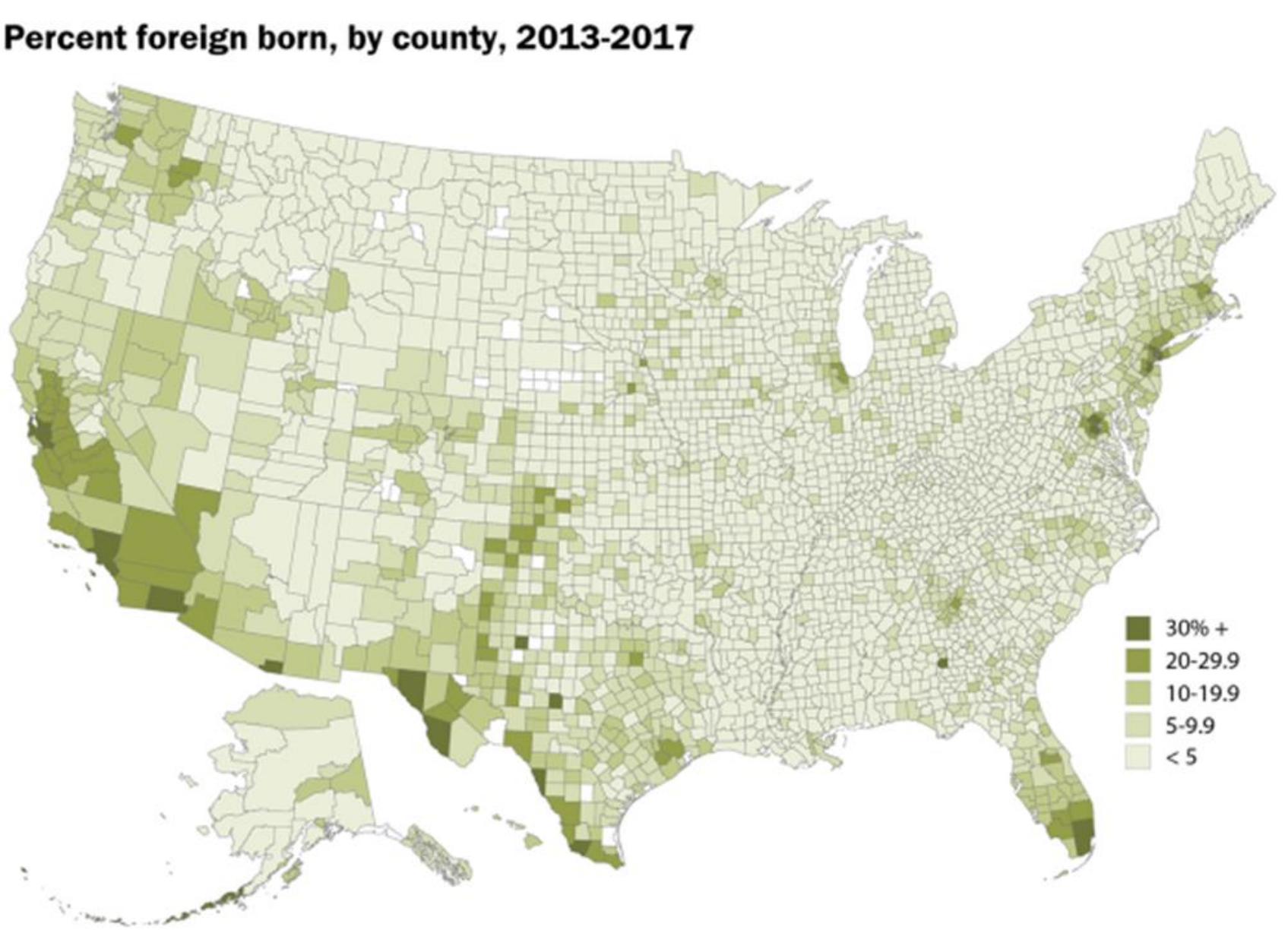
US

- 27,500 cases and 11,000 deaths
- Rise in Early Onset GC (age 25-50)
- GC Top Ranking Cancer in terms of mortality disparities
- GC is the least funded cancer in the US

US Foreign Born Map: *Absolute Numbers*



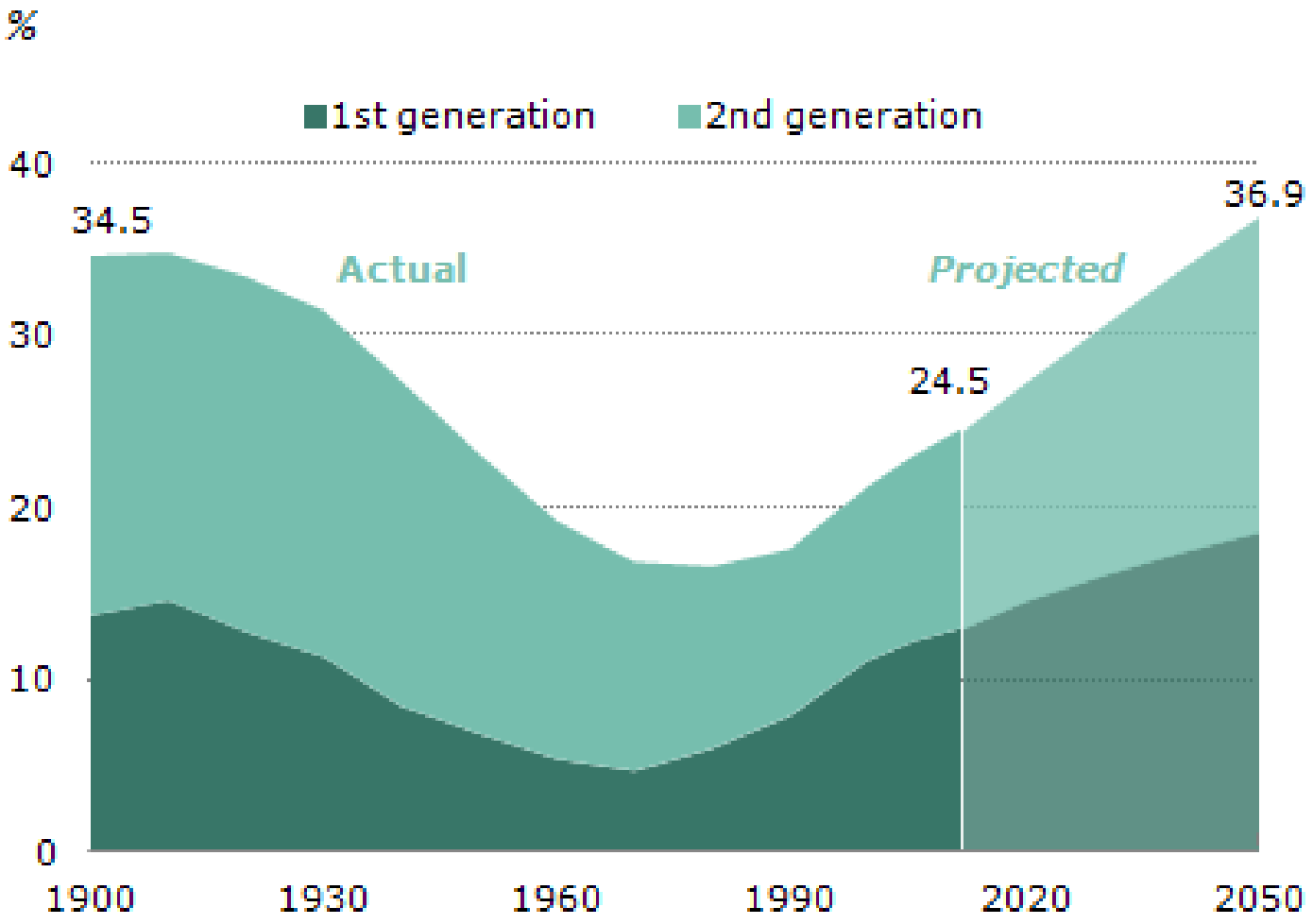
US Foreign Born:
Percentage Heat Map



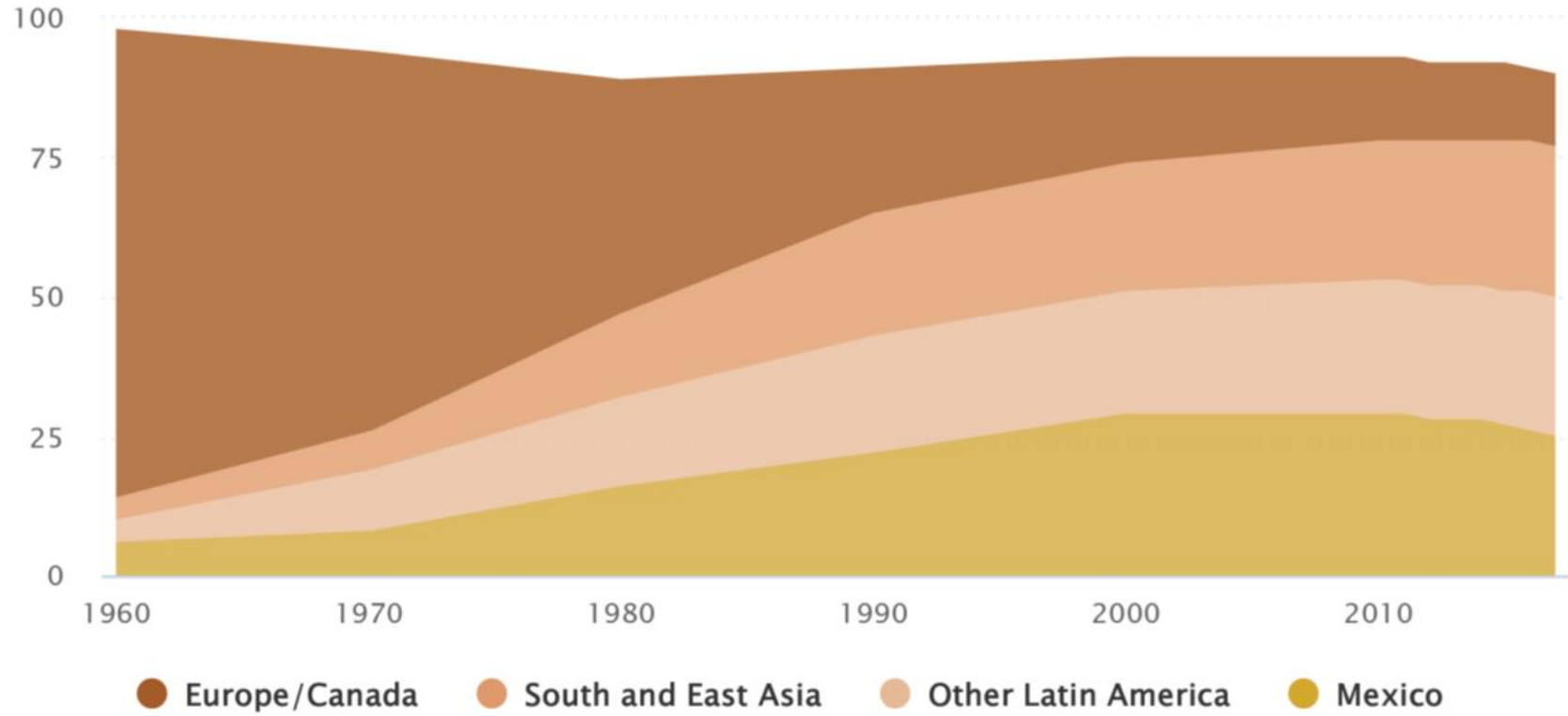
Immigrants in US Population

First Generation	44 million (**13%**)
Second Generation	37 million (**11%**)
Combined	81 million (**24%**)

First- and Second-Generation Share of the Population, Actual and Projected, 1900-2050



% of foreign-born population residing in the U.S. who were born in ...

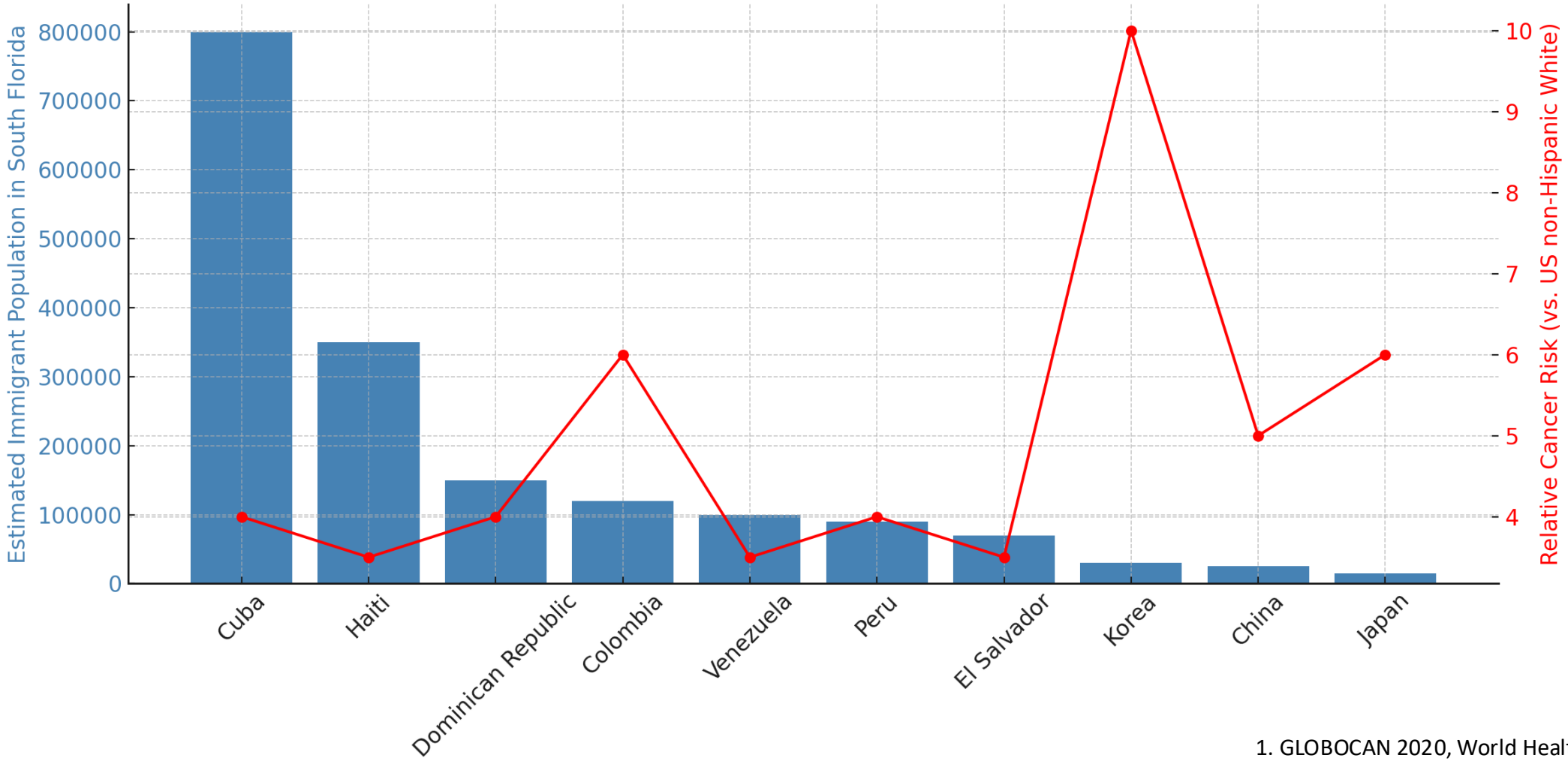


Note: "Other Latin America" includes Central America, South America and the Caribbean.

Source: Pew Research Center tabulations of 1960-2000 decennial censuses and 2010, 2013-2017 American Community Surveys (IPUMS).

PEW RESEARCH CENTER

High-Risk Immigrant Populations in South Florida for Gastric Cancer

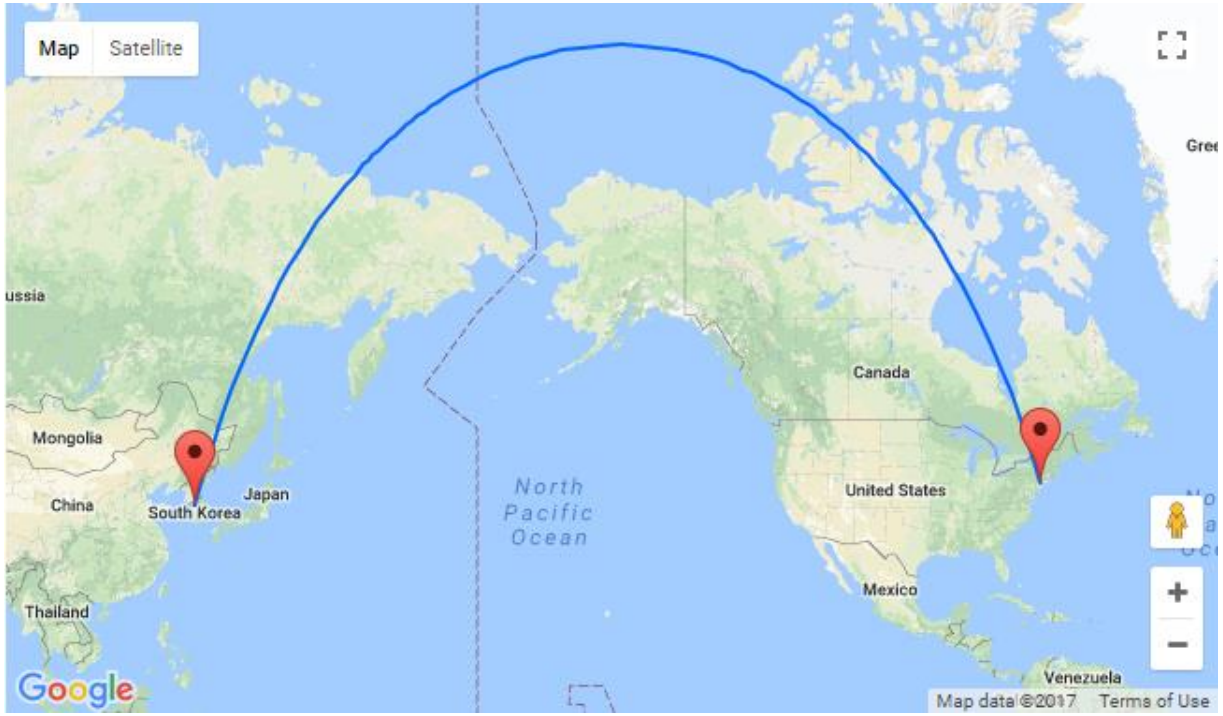


References:

1. GLOBOCAN 2020, World Health Organization
2. SEER Cancer Statistics, National Cancer Institute
3. AGA Guidelines on Gastric Cancer Screening
4. CDC US Cancer Disparities by Race and Ethnicity
5. Florida Health Charts - Foreign-Born Population Data

Life Journey
"Fresh Off the Boat"

- Personal Journey: Korea to US
  - *The transition from Korean → Korean-American*



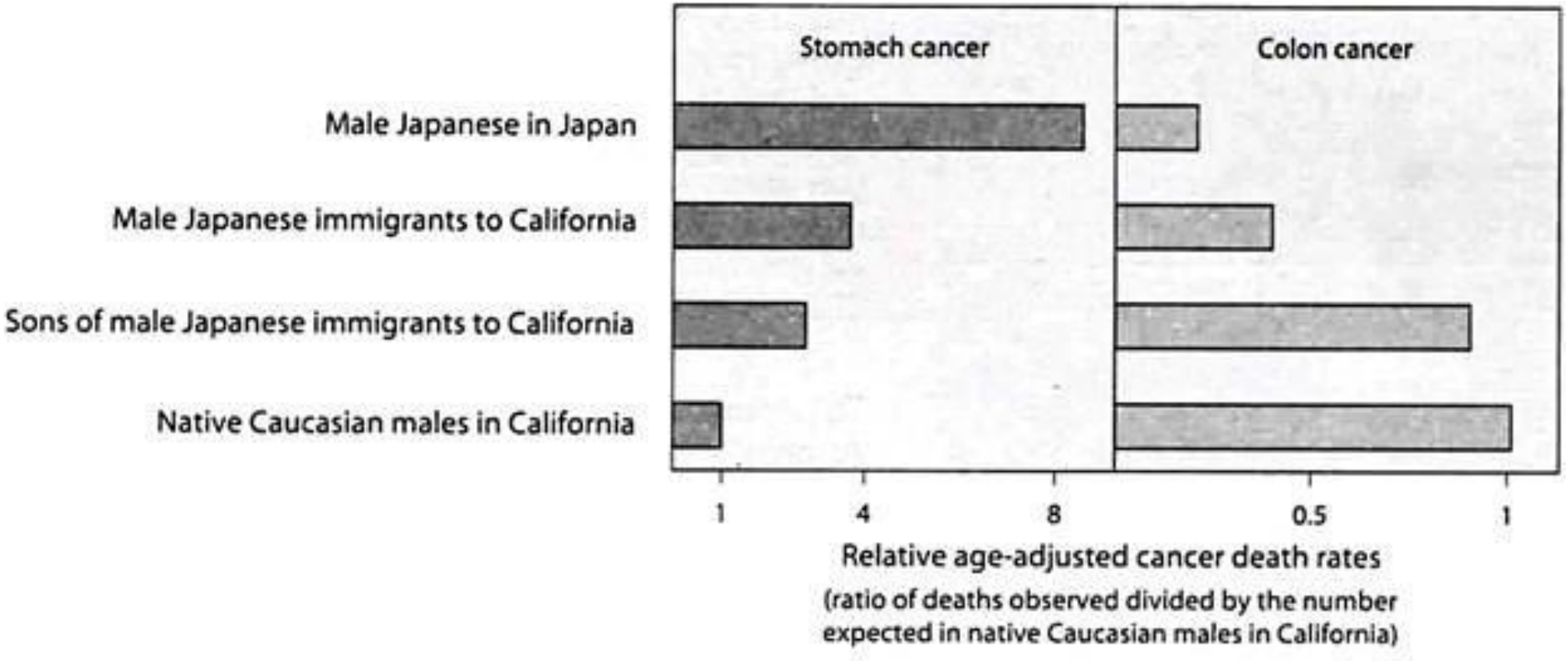
Personal Food Journey of a Korean Immigrant

Transition from Korean → American Diet

Stomach Cancer Risk in Foreign Born

CANCER RESEARCH 35, 3240-3245, November 1975

Cancer Epidemiology in Populations of the United States—with Emphasis on Hawaii and California—and Japan[1]



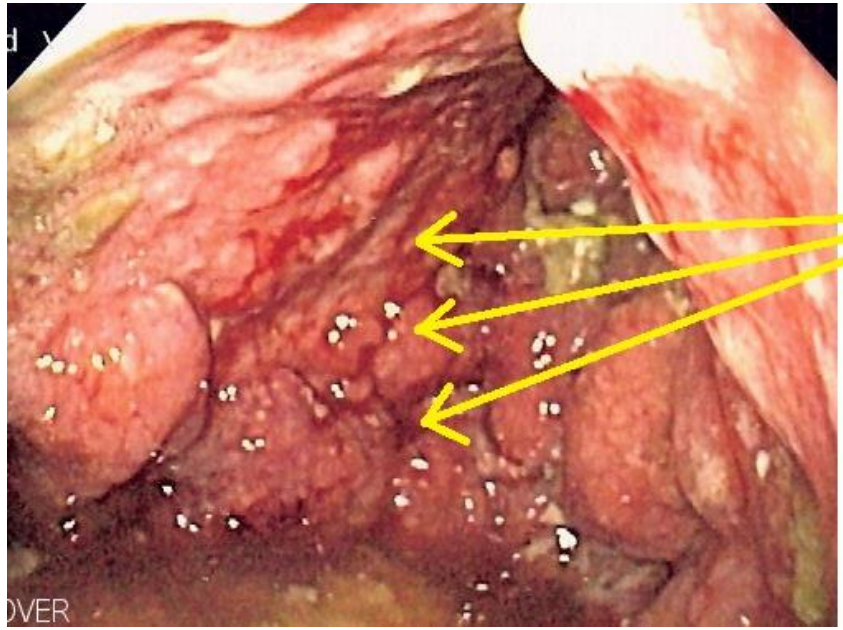
Histology and Anatomic Location

Histology

- 90–95% of GC are Adenocarcinomas
- Lauren: 2/3 Intestinal vs 1/3 Diffuse

Anatomic Location

- Distal cancers still predominate (2/3)
  - Immigrant and high-risk populations
- Proximal/cardia cancers (1/3)
  - Similar to EAC: Increasing, white obese males



Diffusely infiltrating cancer within the stomach wall giving a "leather bottle" appearance.

Lauren Classification of Gastric Cancer: Intestinal vs. Diffuse Type

Feature	Intestinal Type	Diffuse Type
Frequency	~55–60%	~30–35%
Associated with	Chronic atrophic gastritis, H. pylori, high-salt diet	CDH1 mutation, younger age, family history
Morphology	Glandular, cohesive	Poorly cohesive, signet-ring cells
Progression	Correa cascade (IM → dysplasia → cancer)	No clear precursor lesion
Screening Detection	Easier to detect; visible lesions	Harder to detect; infiltrative growth
Geographic Trend	East Asia, Latin America	More common in Western, younger patients
Genetic Association	Low; sporadic	High; especially CDH1 mutation

The Cancer Genome Atlas:
4 Molecular Subtypes of GC, Ranked Best to Worst Prognosis

Subtype	Key Features	Prevalence
EBV+	High PD-L1, PIK3CA mutations, DNA hypermethylation	~10%
MSI-High	High mutation rate, better prognosis, responds to immunotherapy	~20%
Genomically Stable	Often diffuse type, CDH1 mutations, RHOA alterations	~20%
Chromosomal Instability (CIN)	Intestinal type, TP53 mutations, HER2+, RTK amplifications	~50%

Gastric Cancer Molecular Subtypes: U.S.-Born vs. Foreign-Born

Subtype	U.S.-Born Patients	Foreign-Born Patients
EBV+	Moderate (~10–15%)	Lower (~5–10%)
MSI-High	Higher (~20–25%)	Lower (~10–15%)
Genomically Stable (CDH1, diffuse type)	Lower, mostly in younger pts	More frequent, esp. East Asia, Latin America
Chromosomal Instability (CIN, intestinal type)	Common (~50%)	Very Common (~60%)
Anatomical Location	**Proximal (Cardia)**	**Distal (Antrum/Body)**

Risk Factors for Gastric Cancer

- Age: older
- Sex: M>W
- Race/Ethnicity: Non-White
- Foreign Born, Country of Origin
- Family History
- Genetic Mutation: CDH1
- Pernicious Anemia
- H. pylori
- Smoking
- Diet

What can we do to lower our risk of gastric cancer?

Modifiable Gastric Cancer Risk Factors

- Hp Infection
- Smoking
- Obesity
- **Diet**
    - High Salt
    - Smoked, Processed Meat
    - Low Fruit and Vegetable

What can we do to lower our risk of gastric cancer?

Chemoprevention and Supplements

- Aspirin
- Vitamin C
- Antioxidants: A, E
- Green Tea
- Curcumin

Carcinogenesis Pathway: *Opportunity for Early Detection and Prevention*

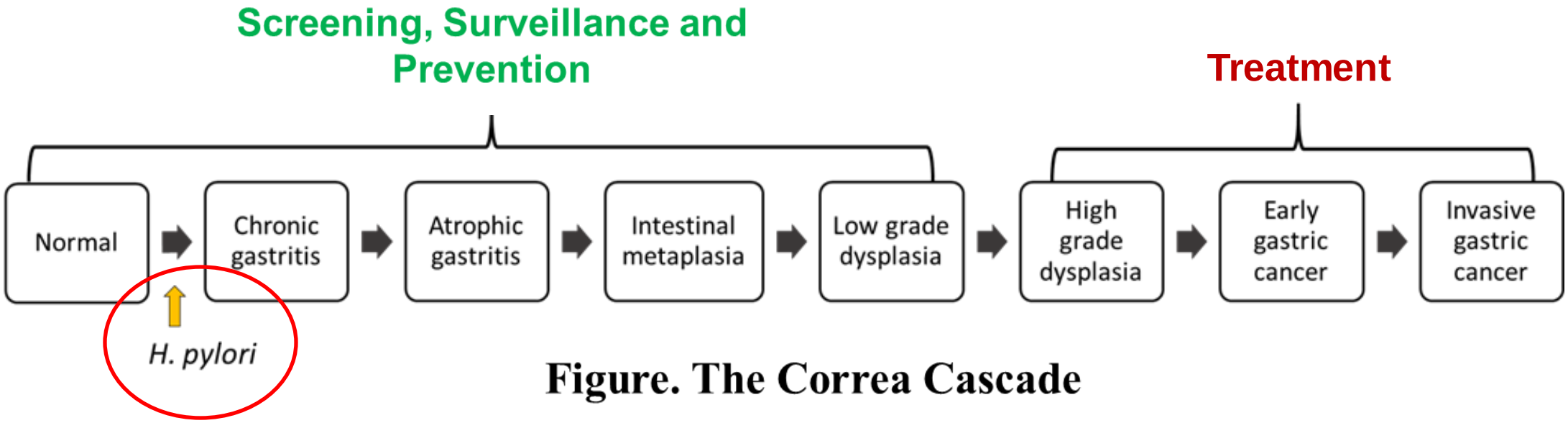
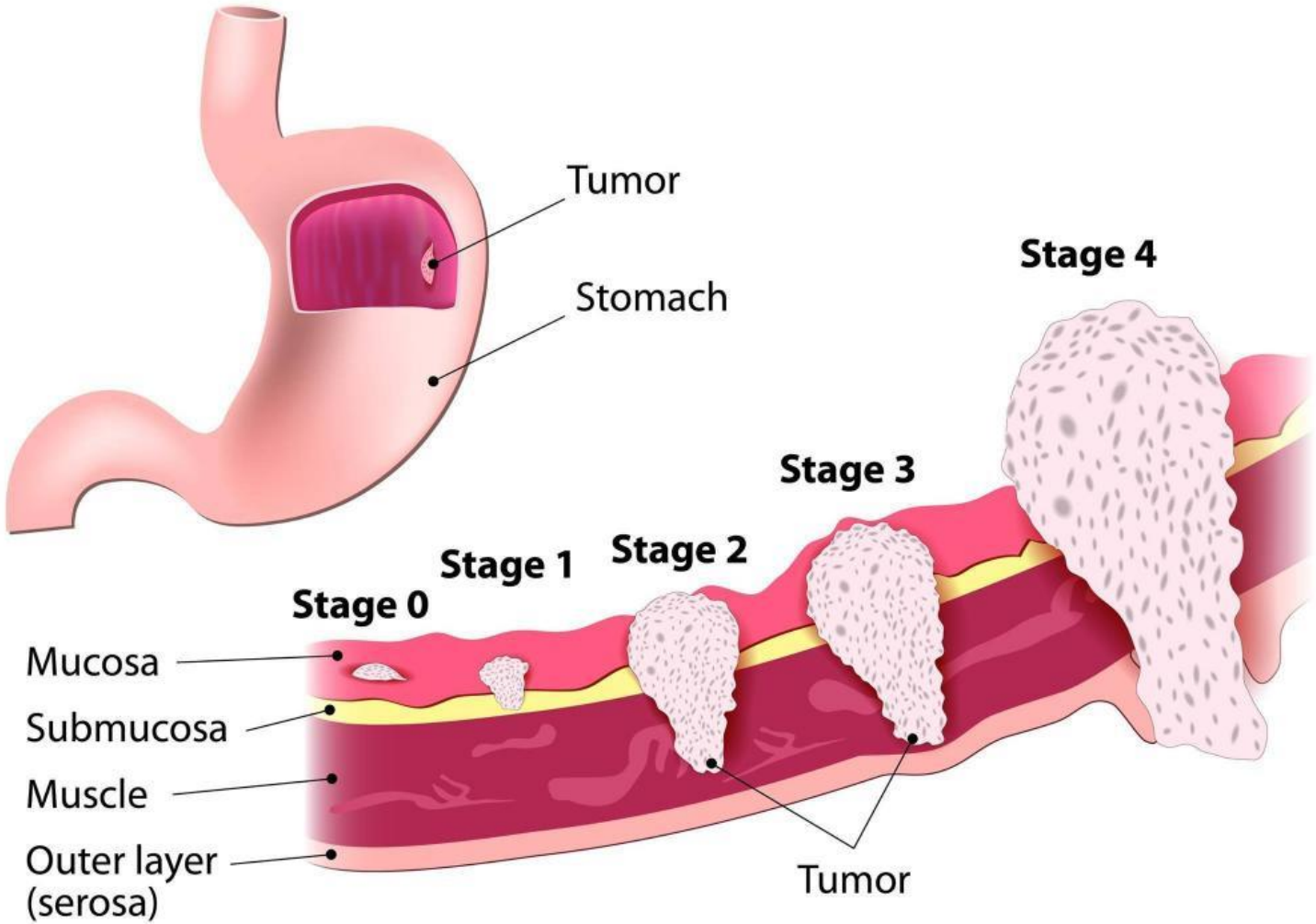


Figure. The Correa Cascade

STAGES OF STOMACH CANCER



Endoscopic Submucosal Resection (ESD)

Kim, Journal of Gastric Cancer 2011

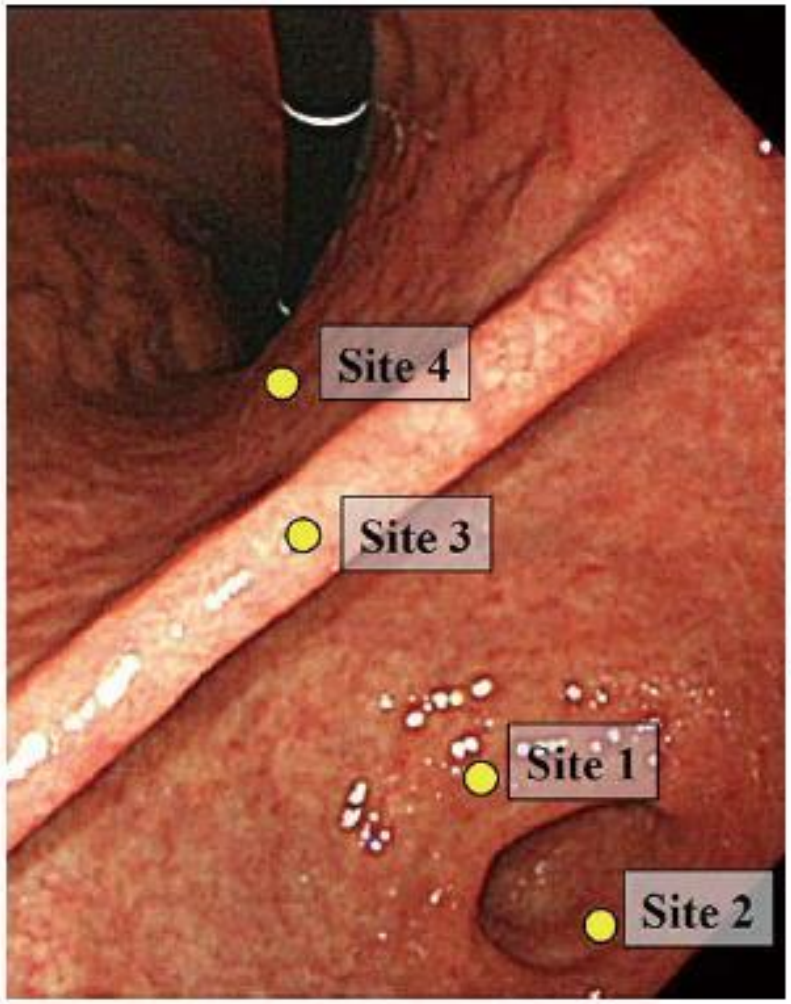
Gastric Cancer Screening and Early Detection

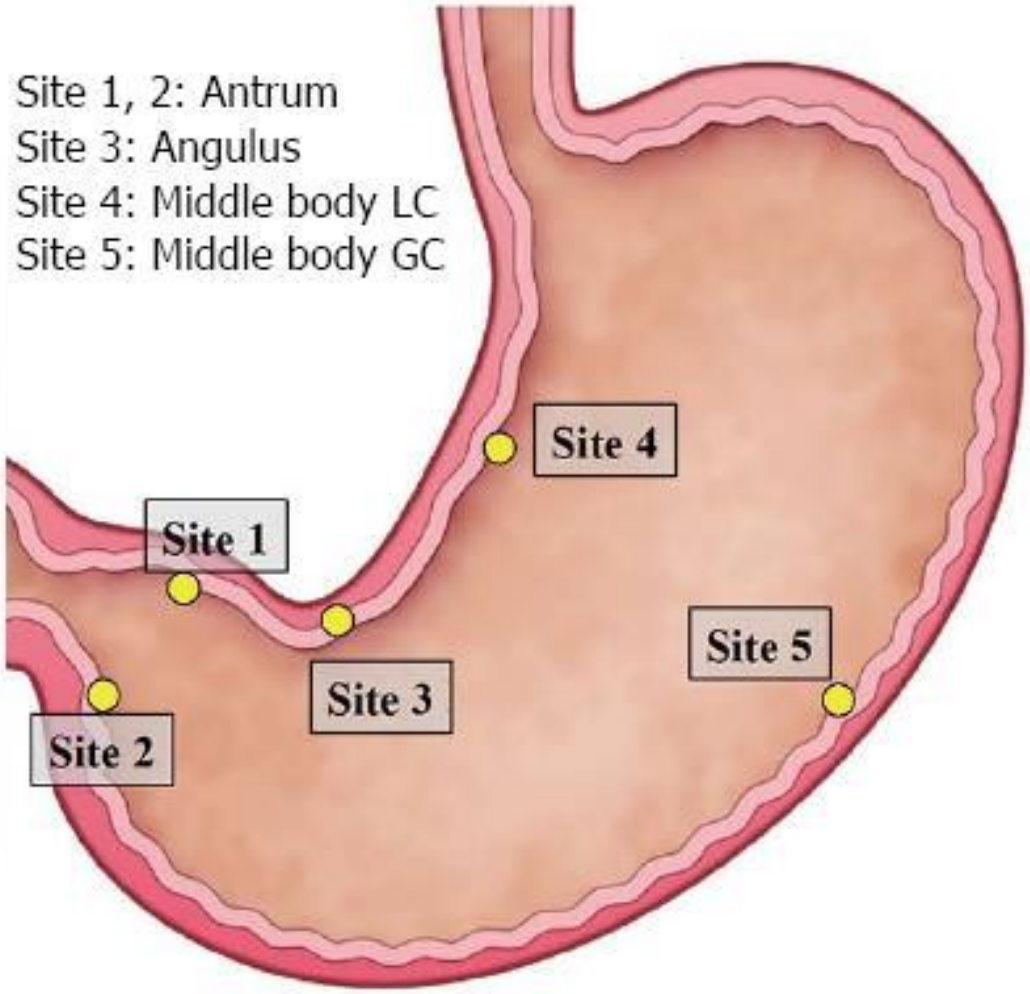
AGA Guidelines

Who Should Be Screened (or Considered for Screening EGD)?

- **No universal recommendation** for GC screening in the general U.S. population.
- **Consider screening in high-risk individuals**, especially if:
  - From High GC Incidence Regions (e.g., East Asia, Central/South America, Eastern Europe)
  - First-degree relative with GC
  - *Helicobacter pylori* infection
  - Pernicious anemia
  - Hereditary cancer syndromes (e.g., CDH1 mutations)

Endoscopic Surveillance:
Sydney Biopsy Protocol

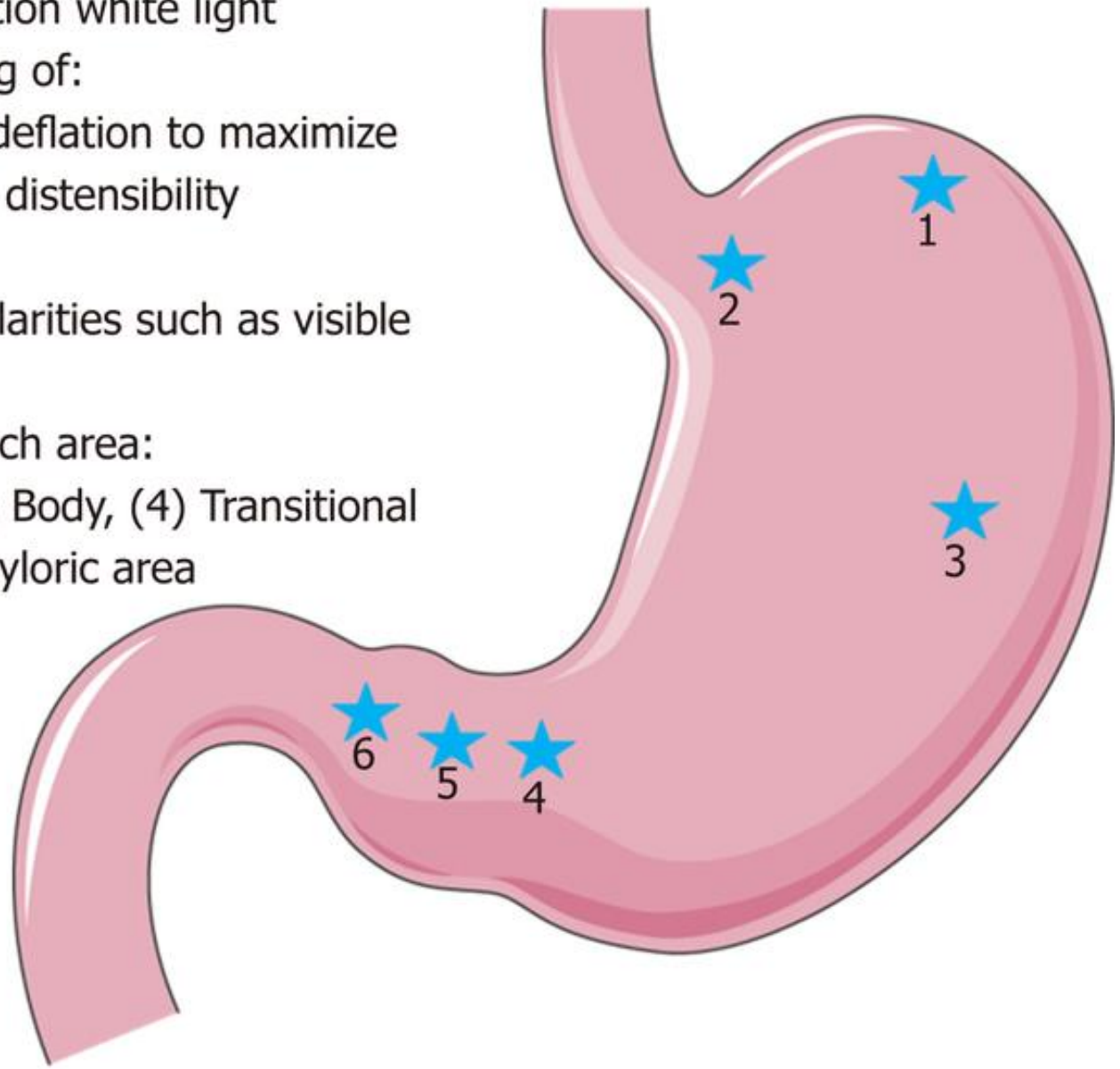




Kono World J Gastro 2015

Cambridge Protocol: HDGC, CDH1

30-min, careful high definition white light endoscopic exam consisting of:
Repeated insufflation and deflation to maximize visualization and check for distensibility
Extensive washing
Targeted biopsies of irregularities such as visible lesions or pale areas
5 random biopsies from each area:
(1) Fundus, (2) Cardia, (3) Body, (4) Transitional zone, (5) Antrum, (6) Prepyloric area



Screening Summary

GC Screening

- High Risk Individuals: Pernicious Anemia, Genetic Syndromes, Family History
- Sub-Populations: Race/Ethnicity, Foreign Born, Diet, Smoking, Obesity

- *Opportunist Upper Endoscopy, Same Time as Screening Colonoscopy?*

Liquid Biopsy for GC Screening and Early Detection

- SCED and MCED Blood Tests

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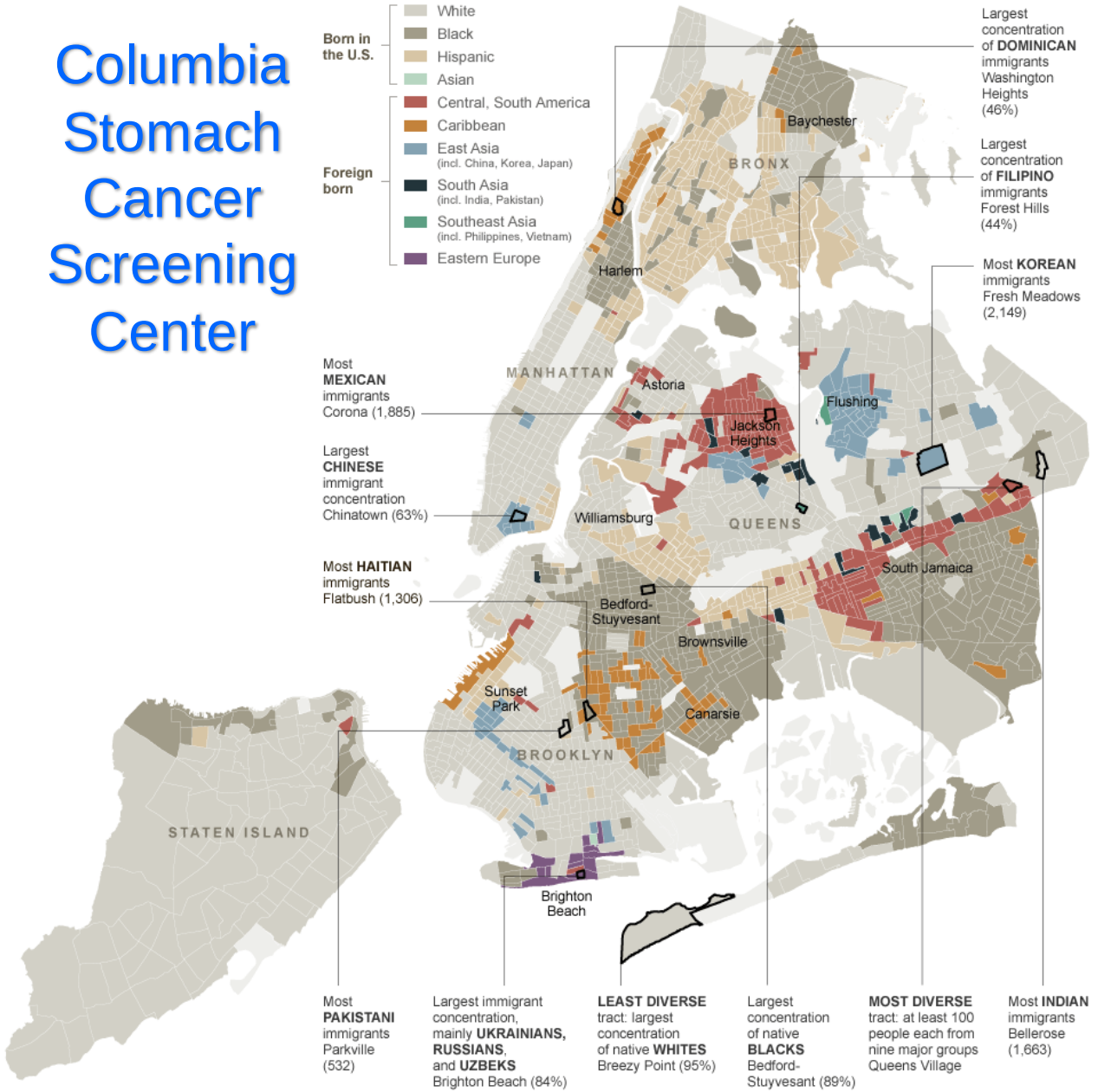
STOMACH CANCER

NOVEMBER

Columbia Stomach Cancer Screening Center



Columbia Cancer Center Velocity Fund Raiser

Team Gastric Cancer

GC Molecular Subtypes by Population

Population	More Common Subtypes	Clinical Implications
East Asia (Korea, Japan)	CIN, Genomically Stable	HER2-targeted therapy, high endoscopic yield
Latin America (Peru, Chile)	CIN	Often intestinal-type, high *H. pylori* load
U.S.-born (White)	CIN, MSI-H, EBV+	Proximal location, Immunotherapy opportunities
U.S. minorities (Black, Hispanic)	CIN, Genomically Stable	Higher mortality, more late-stage diagnoses

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