Ethnic Distribution of Atrophic Autoimmune Gastritis in the United States

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Background

1 - Autoimmune Atrophic Gastritis (AIG) has classically been associated with “elderly women of Northern European ancestry.” (Friedlander, Am. J. Med. Sci, 1934)

2 - Several epidemiologic studies have shown equal prevalence in various ethnic groups in the US. (Carmel et al, N. Engl. J. Med. 1978; Arch. Intern. Med. 1987; Arch. Intern. Med. 1996)

3 - A series from Johns Hopkins suggested a similar prevalence in US Caucasians, African-Americans, and Asians, and a two-fold prevalence in Hispanic patients (Park et al., Am J Surg Pathol, 2010)
Major limiting factors in epidemiology of AIG

1 - Impossible to diagnose without a proper set of gastric biopsies or additional serologic data

2 - *H. pylori* infection was unrecognized until 1985 - 1990, and most studies on AIG have been carried out before then.
Why AIG cannot be diagnosed with limited biopsy sampling
Hypothesis

1 - A nationwide database of ~ 1 million patients with upper gastrointestinal biopsy specimens would contain enough cases with proper gastric mucosal biopsy sampling to carry out a robust study of AIG.

2 - A set of sophisticated linguistic algorithms would allow to determine with high accuracy the ethnic ancestry of patients seen in United States gastroenterology practices.
Our database

- > 1 million EGD records

- Biopsy specimens contributed by ~1,500 gastroenterologists in 46 states

- Pathologic diagnoses made by a group of GI pathologists who use uniform criteria and searchable coded diagnostic keys

- Demographic, clinical, and endoscopic information available for each patient
Methods

1 - Extract from the database patients who had a set of gastric biopsy specimens that included separate samples from the gastric antrum and corpus.

2 - Assign each patient to one of the ethnic ancestries for which linguistic algorithms were developed.

3 - Review and evaluate all histopathologic diagnoses that included mucosal atrophy in the stomach and assign to the AIG those that meet appropriate criteria.
Criteria for AIG

Antrum:
- Normal or reactive gastropathy
- No IM or atrophy
- No significant chronic or any degree of active inflammation

Corpus:
- Atrophy of the oxyntic mucosa, with or without IM
- Chronic inflammation
- Mild or no active inflammation
- ECL-cell hyperplasia (linear or micronodular)
- Neuroendocrine tumor
- Atrophy and reliable history of AIG

No *H. pylori* infection
Histopathologic criteria for AIG
Determining Ethnicity: A Validated Method

1 - Queries using comprehensive list of last and first names, assign subjects to a provisional category.

2 - An anthropologist consultant with specific expertise in each group identifies characteristics peculiar to that group (e.g., preferred English names, propensity to marry outside group, U.S. immigration history).

3 - Queries are refined to include above information.

4 - An educated native informant reviews lists and excludes uncertain subjects. Queries may be further adjusted.

5 - Final categorization is generated.

Validation

1 - Practices are called to enquire about ethnicity of a sample of their patients

2 - Queries are applied to lists of people from ancestral countries. If specificity is <100% or sensitivity <90%, queries are further adjusted.
Categories used for this study

**East Asian**: Chinese, Korean, Vietnamese, Japanese

**Hispanic**: Spanish-speaking subjects from Latin America and Spain

**Northern European**: Scandinavian, Finnish, and Estonian

**Indian**: Indian subcontinent (including Pakistan and Bangladesh)

**Excluded**: Patients who could not be classified with reasonable certainty

**Other American**: All others
Results

672,989 unique patients (504,605 female, 75.0%) with gastric biopsies (Jan 2008 - Dec 2012)

All biopsy specimens stained for Helicobacter (85% IHC, 15% special stains)

55,038 patients (35,106 female, 63.8%) had separately labeled gastric biopsies from gastric corpus and antrum

5,606 patients had atrophy and/or metaplasia in the diagnosis and their reports were individually reviewed
## Results

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Total</th>
<th>AIG Cases</th>
<th>% AIG</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other American</td>
<td>46,122</td>
<td>1,317</td>
<td>2.9%</td>
<td>1</td>
</tr>
<tr>
<td>N. European</td>
<td>208</td>
<td>8</td>
<td>3.8%</td>
<td>1.24 (0.61 - 2.51)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3,383</td>
<td>220</td>
<td>6.5%</td>
<td>2.36 (2.04 - 2.74)</td>
</tr>
<tr>
<td>East Asian</td>
<td>4,910</td>
<td>68</td>
<td>1.4%</td>
<td>0.48 (0.37 - 0.61)</td>
</tr>
<tr>
<td>Indian</td>
<td>166</td>
<td>4</td>
<td>2.4%</td>
<td>0.82 (0.30 - 2.21)</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Median Age Controls</th>
<th>Median Age AIG Patients</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other American</td>
<td>59</td>
<td>68</td>
<td>9</td>
</tr>
<tr>
<td>N. European</td>
<td>61</td>
<td>73</td>
<td>12</td>
</tr>
<tr>
<td>Hispanic</td>
<td>55</td>
<td>68</td>
<td>13</td>
</tr>
<tr>
<td>East Asian</td>
<td>57</td>
<td>66</td>
<td>9</td>
</tr>
<tr>
<td>Indian</td>
<td>51</td>
<td>67</td>
<td>16</td>
</tr>
</tbody>
</table>
Age Distribution of AIG

Other Americans
Median age = 68
12.7% ≤ age 50
30.1% ≤ age 60

Hispanic patients
Median age = 68
17.0% ≤ age 50
34.5% ≤ age 60
### Clinical suspicion of AIG conveyed to pathologist

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Total cases</th>
<th>Clinically suspected</th>
<th>% suspected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other American</td>
<td>1,317</td>
<td>151</td>
<td>11.3%</td>
</tr>
<tr>
<td>N. European</td>
<td>8</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>220</td>
<td>16</td>
<td>7.2%</td>
</tr>
<tr>
<td>East Asian</td>
<td>68</td>
<td>3</td>
<td>4.4%</td>
</tr>
</tbody>
</table>
Is AIG related to the prevalence of *H. pylori*?

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Prevalence AIG</th>
<th>Prevalence <em>H. pylori</em> in reference population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Americans</td>
<td>2.9%</td>
<td>12.7%</td>
</tr>
<tr>
<td>N. European</td>
<td>3.8%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>6.5%</td>
<td>26.2%</td>
</tr>
<tr>
<td>East Asian</td>
<td>1.4%</td>
<td>25.4%</td>
</tr>
<tr>
<td>Indian</td>
<td>2.4%</td>
<td>25.9%</td>
</tr>
</tbody>
</table>
Summary

AIG was more than twice as common in subjects of Hispanic ancestry than in non-Hispanic, non-Asian Americans.

Patients of East Asian ancestry had the lowest prevalence of AIG.

The prevalence of *Helicobacter* infection was similar in Asian and Hispanic patients (~26%), suggesting that the role of *Helicobacter* in the pathogenesis of AIG may be limited.

Patients of Northern European descent had essentially the same prevalence of AIG as other Americans.
Conclusions

AIG is rarely suspected clinically, inadequately diagnosed histopathologically, and infrequently confirmed serologically.

Hispanic patients with gastric atrophy are generally assumed to have *Helicobacter*-related atrophic gastritis, and the possibility of AIG is rarely considered.

In current US clinical practice, the classic stereotype of the “elderly woman of Northern European descent” as the patient most likely to have AIG is clearly obsolete.

Differences between Americans of African and European ancestry - not evaluated in our study - deserve to be investigated.
Acknowledgements

Drs. T.K. Choi, T. Pham, Q.H. Yang, T. Hattori, R. Malhotra and Mrs. Soo Park, C. Park, and D. Juarez for invaluable assistance in the creation of the ethnicity algorithms.

Dr. K. Turner for instrumental help with the validation of the algorithms.

Miraca Life Sciences technical personnel for slide preparation and retrieval.