DCEG Studies in China

- More than 30 years collaboration
  - Currently over 25 studies
- Insights from cancer maps led to epidemiologic field studies
  - Unusual patterns of risk for lung, esophagus, and stomach cancer
- Unique opportunities to study occupational exposures
DCEG Trainees in China

- Cancer Institute and Hospital, Chinese Academy of Medical Sciences
- Peking Union Medical College
- Peking University School of Oncology
- The Army Hospital
- Research Center for Eco-Environmental Sciences, Chinese Academy of Medical Sciences
- Shanxi Cancer Hospital
- Fudan University
- Jiao Tong University
- Shanghai Institutes for Biological Sciences, Chinese Academy of Medical Sciences
- Shanghai Center for Disease Control and Prevention
- Shanghai Institutes for Biological Sciences, Chinese Academy of Medical Sciences
- Fudan University
- Jiao Tong University
- Shanghai Center for Disease Control and Prevention
- Chinese University of Hong Kong
- Sun Yat-Sen University Cancer Center
- Guangdong Poison Control Center
- Zhejiang University School of Public Health
- Hong Kong University
DCEG Studies in China: Special Exposures

- Occupational exposures
  - Shanghai, Tianjin
    - Benzene
    - Formaldehyde
    - Trichloroethylene
    - Particulates: diesel exhaust and coal combustion products
- Physical activity
  - Shanghai
DCEG Studies in China: Lung Cancer

- Lung cancer among never-smoking women
  *Shanghai, Shenyang, Xuanwei*
  - Indoor air pollution from coal used for cooking
  - Identified risks
  - Intervention by ventilating stoves
  - Lung cancer rates decreased substantially

- Residential radon from underground dwellings
  *Shenyang*

Consortium to Study Environmental and Genetic Etiology of Lung Cancer in Never-Smoking Females

- Genome-wide Association Study
  - ~13,000 cases from 19 studies
- 8 Novel Signals
  - Majority unique to non-smokers
  - No association found at 15q25.1
  - 2 gene-environment interactions with indoor use of coal for heating/cooking
- Ongoing Exome Sequencing
  - Susceptibility study
  - Tumor/Normal pairs
- Link residential histories to air pollution databases and satellite data

Combined GWAS of Esophageal Squamous Carcinoma

- Call for Data Sharing
  - Published editorial in Nature Genetics 2011
  - Based 3 parallel papers for ESCC
- Pooled, combined analysis
  - Individual data exchange
  - New loci
- Correction of 4 previously published

Corrigendum: Genome-wide association analyses of esophageal squamous cell carcinoma in Chinese identify multiple susceptibility loci and gene-environment interactions

Corrigendum: Genome-wide association study of esophageal squamous cell carcinoma in Chinese subjects identifies susceptibility loci at PLCE1 and C20orf54
Worldwide Ranks of Cancer Mortality

- Lung: 1378 (1000s)
- Stomach: 738 (1000s)
- Liver: 695 (1000s)
- Colon & rectum: 608 (1000s)
- Breast: 458 (1000s)
- Esophagus: 406 (1000s)
- Cervix: 274 (1000s)
- Pancreas: 266 (1000s)
- Prostate: 258 (1000s)
- Leukaemia: 257 (1000s)
DCEG Studies in China: Upper Gastrointestinal Cancers

- Nutrition Intervention Trials in Linxian, Henan
  - Early detection of esophageal cancer
- *H. pylori* treatment trial in Linqu, Shandong
- Genome-wide association studies
- Tooth loss & oral hygiene → microbiome
  - Yunnan Tin Miner’s Cohort with serial sputum samples
General Population NIT: Summary of Significant Trial Results

- Selenium, β-carotene, and vitamin E
  - Total mortality reduced 9%
  - Total cancer mortality reduced 13%
  - Total gastric cancer mortality reduced 21%

- 32,912 subjects being followed
  - 6,332 incident UGI cancer cases
  - Observational studies
    - >100 publications
    - Serum selenium and UGI cancer risk
    - HPV and esophageal cancer risk
Early Detection and Intervention
# Endoscopic Localization with Lugol’s

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Sensitivity of Unstained Lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>---</td>
</tr>
<tr>
<td>Esophagitis</td>
<td>---</td>
</tr>
<tr>
<td>Mild Dysplasia</td>
<td>63%</td>
</tr>
<tr>
<td>Moderate Dysplasia</td>
<td>93%</td>
</tr>
<tr>
<td>Severe Dysplasia</td>
<td>96%</td>
</tr>
</tbody>
</table>
Squamous Dysplasia is the Precursor

Follow-up time (years)

Cumulative Hazard (%)

- Severe dysplasia (RR≈30 [n=39])
- Moderate dysplasia (RR≈10 [n=30])
- Mild dysplasia (RR≈3 [n=76])
- Esophagitis (RR≈1 [n=33])
- Normal (Reference [n=492])

Taylor, et al. CEBP 2013
<table>
<thead>
<tr>
<th>Component</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID of precursor lesions</td>
<td>✓</td>
</tr>
<tr>
<td>Primary screen</td>
<td>✓</td>
</tr>
<tr>
<td>Endoscopic localization</td>
<td>✓</td>
</tr>
<tr>
<td>Staging</td>
<td>✓</td>
</tr>
<tr>
<td>Therapy</td>
<td>✓</td>
</tr>
</tbody>
</table>
Implementation of the Screening Program

Journal of Clinical Oncology

Long-Term Follow-Up of a Community Assignment, One-Time Endoscopic Screening Study of Esophageal Cancer in China

Wen-Qiang Wei, Zhi-Feng Chen, Yu-Tong He, Hao Feng, Jun Hou, Dong-Mei Lin, Xin-Qing Li, Cui-Lan Guo, Shao-Sen Li, Guo-Qing Wang, Zhi-Wei Dong, Christian C. Abnet, and You-Lin Qiao

- 34% reduction in ESCC mortality