Epidemiology of nasopharyngeal carcinoma

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Introduction

- NPC: geographic and racial distribution
- Incidence: 1 per 100,000 population per year
- Hereditary and viral risk factors: discussed in other journal
- Focus: nonviral environmental risk or protective factors
International variation

- United States: 0.5 (men) & 0.2 (women) per 100,000 person-year
- Highest rates: Cantonese in Guangdong Province in Southern China
- Decline from south to north China
- Intermediate rates in Southeast Asia: Thais, Vietnamese, Malays, & Filipinos
Incidence of different populations

<table>
<thead>
<tr>
<th>Population</th>
<th>Age-standardized (world) incidencea</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Chinese, Hong Kong</td>
<td>24.3</td>
<td>9.5</td>
</tr>
<tr>
<td>Chinese, Taipei</td>
<td>8.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Chinese, Shanghai</td>
<td>4.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Chinese, Tianjin</td>
<td>1.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Inuits, Greenland</td>
<td>12.7</td>
<td>9.2</td>
</tr>
<tr>
<td>Inuits, Athabascans, and Aleuts, Alaska</td>
<td>11.9</td>
<td>5.6</td>
</tr>
<tr>
<td>Thais, Chiang Mai</td>
<td>2.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Vietnamese, Hanoi</td>
<td>10.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Malays, Singapore</td>
<td>6.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Filipinos, Manila</td>
<td>7.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Kuwaitis, Kuwait</td>
<td>2.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Algerians, Setif</td>
<td>8.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Israeli Jews born in Morocco, Algeria or Tunisia</td>
<td>2.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

a Per 100 000 person-years.
High incidence regions in China

Figure 1. Map of China showing provinces with high incidence of NPC.
Gender and age

- Higher in men than women (about 2-3:1)
- In low-risk regions: monotonically increase with age
- In high-risk regions: peaks between 45 and 54 years, decline at older ages
- Moderate-risk regions: peak in adolescents & young adults (United states, Malaysian, Kadazans, & Indians)
Race-ethnicity

- High risk: people resident in Guangdong, Guangxi, Hunan, & Fujian
- Southern Chinese migrants: still high risk, but declining rates
- Consumption of preserved food: risk factor
Socioeconomic status

- In Southern Chinese, Southern Asia & Arab of North Africa: lower socioeconomic → higher risk of NPC
- Occupational exposure to dust & smoke: a risk factor for NPC in the United States
- NPC association that is confined to non-Hispanic white men
Socioeconomic status (II)
Urbanization

- No difference in risk of NPC was found between urban and rural Southern Chinese populations
- In United States: higher mortality rates in urban non-Hispanic white residents (men: 2.2; women: 1.7)
Table 2. Time trends in average annual age-standardized (world population) incidence rates of nasopharyngeal cancer (per 100,000 person-years) in Hong Kong and Singapore Chinese.

<table>
<thead>
<tr>
<th>Period</th>
<th>Average annual incidence</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hong Kong Chinese</td>
<td>Singapore Chinese</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>1973–1977</td>
<td>32.9</td>
<td>14.4</td>
<td>19.4</td>
</tr>
<tr>
<td>1978–1982</td>
<td>30.0</td>
<td>12.9</td>
<td>18.1</td>
</tr>
<tr>
<td>1983–1987</td>
<td>28.5</td>
<td>11.2</td>
<td>18.1</td>
</tr>
<tr>
<td>1988–1992</td>
<td>24.3</td>
<td>9.5</td>
<td>18.5</td>
</tr>
<tr>
<td>1993–1997</td>
<td>21.5</td>
<td>8.3</td>
<td>16.7</td>
</tr>
</tbody>
</table>

* Data from Cancer Incidence in Five Continents Series.*
Cantonese-style salted fish & others

- John Ho, 197: Cantonese-style salted fish (weaning food) → etiological factor
- Age at first exposure: an important determinant factor
- Experimental data: rats, dose-dependent manner
- Carcinogenic nitrosamines/precursors & EBV-activating substances
Fresh fruit & vegetables

- NPC patient: less consume citrus fruit
- Vitamine-C: inhibitor of in vivo formation of nitrosamines
- Other NPC protective foods: orange-colored vegetables (carrots & sweet potatoes), tomatoes, dark green vegetables → carotenoids
Tobacco & alcohol

- Ever smokers: 30-100% excess risk relative to life-long nonsmokers
- Passive smoker: inconsistent results
- Alcohol: substantial use, significantly related to NPC risk
Occupational exposures

- Formaldehyde: Blair et al., 1986; The International Agency for Research on Cancer, 1995
- Wood dust: chlorophenols, NPx traps medium-size particles (5-10 um)
- Smoke particles (incomplete combustion)
Conclusions

- NPC: rare malignancy in most parts of world (under 1 per 100,000 person-year)
- Highest rates: Cantonese living in Chinese (Guangdong Province)
- Other higher incidence areas: Southeast Asia natives, the Arabs of North Africa, & the Middle East
- Preserved food at early age (in all population group)
- Smoking, occupational exposure
Thank you for your attention