Epidemiology of gastric cancer in Japan

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Despite its decreasing trend in Japan, gastric cancer remains an important public health problem. Although the age standardised rates of gastric cancer have been declining for decades, the absolute numbers are increasing because of the rapid aging of the population. A large proportion of Japanese gastric cancers are detected at an early stage, with a better overall survival rate. As with Western developed countries, a change in the social environment such as reduced salt use and increased fresh vegetable and fruit intake as well as improvement of food storage may play an important part in the decline. Differences in \textit{Helicobacter pylori} infection rates between generations presumably have contributed to the generation related variation in the declining trends. It is expected that most gastric cancers in Japan may be preventable by lifestyle modification such as salt reduction and increased fruit and vegetable intake, together with avoidance of smoking and countermeasures against \textit{H pylori} infection so that the level now evident in Western developed countries can be reached.

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with the degree of reduction dependent on the degree of Westernisation and the actual incidence rate in the respective host countries. In a comparison between Japanese migrants to the USA and Brazil, two major target countries for Japanese migration, Japanese migrants to the USA show a significantly lower incidence rate than Japanese living in Japan, while Japanese migrants to Brazil show a similar rate to the latter group. This suggests that the traditional Japanese dietary practice, retained among Japanese migrants to Brazil than those to the USA, contributes as a risk factor for this cancer.

**CLINICOEPIDEMIOLOGICAL FEATURES**

Japanese gastric cancers as a group show characteristic features. Firstly, the distal stomach is more frequent as the site of occurrence than the proximal portion. With clinico-pathological finding of surgical cases, around 80% of cases are located in the middle or lower thirds of the stomach. The proportion of the distal cancers increases when restricted to early gastric cancers detected at an early stage and to cases in the elderly population. Similar features are also corroborated by population based data, although such data are limited by a high proportion of cancers with an unknown location. About 15% of cancers seen in the Japanese registries are located in the upper portion of the stomach.

Secondly, although the prognosis for gastric cancer is generally poor, better survival rates are seen in Japanese patients. An international comparison, based on population based cancer registries in developing countries and Western developed countries, shows a five year relative survival rate of about 20%, while it is 40%–60% in Japan. The comparatively good overall survival in Japan is considered to be attributable to the large proportion of gastric cancer diagnosed at an early stage in Japanese patients. In 1995–2000, 53% of Japanese gastric cancers were localised when diagnosed, which is comparatively high as compared with the 27% reported by the US SEER programme. A similar low rate of localisation is speculated to exist in other Western countries. In addition, a report from a population based registry has indicated that the overall five year survival rates for gastric cancer improved from 28% for cases diagnosed in 1975–77 to 50% for those in 1990–92. On the basis of the clinical extent, the survival rate for localised cases improved from 65% for those diagnosed in 1975–77 to 86% for those after 1981–83, while the respective figures for non-localised cases were 23% to 32%. No improvement was seen for cases with distant metastases. Thus, the increase in the proportion of cases detected at an early stage may have made a strong contribution to the improvement in overall survival. It has also been found that the survival rate increases in tandem with the increase in the proportion of gastroscopic examinees, but not with the increase in cases detected by screening. A recent report pointed out that in Japan, the group of localised cancer included intramucosal tumours, while such cases would not be included as gastric cancers in Western countries. This bias may influence the proportion of localised cancer and with survival. However, a Japanese follow up study of early gastric cancer including intramucosal cases has reported the progression of these cancers to an
advanced stage with time and that they led to death if left untreated.26

RISK FACTORS AND PREVENTION

A dramatic reduction in gastric cancer has occurred in Western developed countries over the past century. In these countries, no active primary and secondary prevention measures were introduced, instead, changes in the social environment, such as reduced salt use and increased fruit and fresh vegetable consumption associated with improved food storage with freezers and refrigerators are generally considered to have had important parts in the reduction of gastric cancer cases. These factors may also be applicable in Japan.27 According to the report of a joint WHO/FAO Expert Consultation in 2003, although insufficient evidence existed to grade dietary factors as either a “convincing” risk or protective factors, a high intake of salt preserved foods and salt and reduced fruit and vegetable intake were evaluated as a “probable” risk factor of gastric cancer.28 The association between smoking and gastric cancer is well established, and an evaluation from the International Agency for Research on Cancer concludes that smoking is one of the convincing risk factors for gastric cancer.29 Positive association with chronic atrophic gastritis, drinking habits, barbecued or grilled cooking and an inverse association with green tea are considered also to be possible modifying factors.30

In addition, Helicobacter pylori infection is considered as an important risk factor of gastric cancer. In Japanese asymptomatic populations, the prevalence of H pylori varies with age; with infection seen in less than 50% of subjects under the age of 30 as compared with an infection rate of as high as 70%–80% in those aged 50 and over.31–34 It has also been found that the H pylori positive rate increased at 1% per year for those born after 1950 but was high and comparatively constant for people with birth dates before 1950.31 The infection status in adults is considered to be influenced by the socioeconomic status in childhood. Given the massive improvement in hygiene and the economic environment in Japan in the postwar decades, differences in the infection rates between generations presumably have contributed to the variation in the declining trends in incidence and death rates of gastric cancer among Japanese when the cases are grouped according to their year of birth. On the other hand, considering the high prevalence even in the low gastric cancer rate areas of south east Asia,35 and that a small proportion of subjects with H pylori infection develop gastric cancer during their lifetime, to contribute to the risk of gastric cancer, infection with H pylori presumably must interact with other factors, including dietary habits, host factors, and virulence of the H pylori infection.

A mass screening programme with photofluorography for gastric cancer has been conducted in Japan since 1960. Over six million Japanese attend the screening annually, the participation rate being 10%–20% of the target population. Previous reports showed an acceptable accuracy of early detection with the screening programme and better prognosis for screen detected cancer cases.36 On the other hand, descriptive data show that the age standardised death rates declined almost in parallel with the incidence rate in the 1960s, while the gap between them became wider after the 1970s. As the rate of both incidence and death have been declining, it seems that the reduction in the rates is attributable mainly to changes in these environmental factors and the discrepancy between the incidence and death rates can be explained in part by efforts made to achieve early detection.37

FUTURE PROJECTION AND PERSPECTIVE

According to future projections, both age standardised incidence and death rates will consistently decrease, with a
Other Europe countries and USA

Eastern Europe

Central/Southern America

Eastern Asia

Japan

Korea, Seoul (1993–1997)

China, Taiwan (1997)

China, Shanghai (1993–1997)

Colombia, Cali (1992–1996)

Ecuador, Quito (1993–1997)


Belarus (1993–1997)

Russia, St Petersburg (1994–1997)

Italy, Romagna (1993–1997)

Germany, Saarland (1993–1997)

The Netherlands (1993–1997)

USA, SEER (1993–1997)

Sweden (1993–1997)


Figure 3 International comparison of subsite distribution of gastric cancer (both sexes). Source Parkin et al.2


Japan, Miyagi (1993–1997)

Korea, Seoul (1993–1997)

China, Taiwan (1997)

China, Shanghai (1993–1997)

Colombia, Cali (1992–1996)

Ecuador, Quito (1993–1997)


Belarus (1993–1997)

Russia, St Petersburg (1994–1997)

Italy, Romagna (1993–1997)

Germany, Saarland (1993–1997)

The Netherlands (1993–1997)

USA, SEER (1993–1997)

Sweden (1993–1997)


Figure 4 International comparison of five year relative survival rates (%) of gastric cancer. Source: Ries et al.,18 Sankaranarayanan et al.,19 Sant et al.,20 Ajili et al.,21 and Oshima et al.22
larger degree of decline seen in the mortality rate than the incidence rate if the same trends continue. It is estimated that in 2020, compared with rates in 2000, death rates will decrease by 40%–50%, while incidence rates will decrease by 25%–30% (fig 2). On the other hand, because of the rapid aging of the population, the absolute numbers of gastric cancer deaths remain at a plateau, and those of gastric cancer incidence will show a gradual increase, especially prominent in the very old, before signs of levelling off are seen. Thus, the shift towards a downward trend will take some time to appear.22

However, a preventable fraction by modification of risk factors can be presumed for Japanese gastric cancers. It is expected that most gastric cancers in Japan may be preventable by lifestyle modification such as salt reduction and increase in fruit and vegetable intake, together with avoidance of smoking and countermeasures against H pylori infection, so that the level now evident in Western developed countries is reached.

SELF ASSESSMENT QUESTIONS (TRUE (T)/FALSE (F); ANSWERS AT END OF REFERENCES)
1. Gastric cancer is increasing worldwide.
2. More than half of gastric cancer cases occur in Eastern Asia.
3. Changes in the social environment, such as reduced salt use and increased fruit and fresh vegetable consumption through improved food storage with freezers and refrigerators is considered to have played a minor part in the reduction of gastric cancer cases in Western developed countries.
4. The prevalence of H pylori infection and the incidence rate of gastric cancer are in direct proportion.
5. Mass screening is generally considered to have had an important part in the reduction of gastric cancer cases in Western developed countries.

REFERENCES

Key references

Learning points
- For stomach cancer, more than half of the new cases are from Eastern Asia, with 41% from China and 11% from Japan.
- In most countries, gastric cancer shows a constant declining trend.
- Rather than active primary and secondary prevention measures, the important parts in the reduction of gastric cancer cases in Western developed countries are generally considered to have been played by changes in the social environment, such as reduced salt use and increased fruit and fresh vegetable consumption associated with improved food storage.
- H pylori infection is considered as an important risk factor for gastric cancer, but H pylori infection contributes to the risk of gastric cancer presumably by interacting with other factors, including dietary habits, host factors, and the virulence of the infection.