

Gastric Cancer in Mongolia is Associated with the Highest Mortality Rate in the World

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Worldwide, gastric cancer is the fifth most common cancer and the fourth most common cause of cancer-related deaths [1]. The incidence of this disease varies across the globe, and the highest rates were observed in South Korea, followed by Mongolia and Japan [1]. However, the mortality rate was the highest in Mongolia due to diagnosis of the disease at later stages. Cancer mortality is reduced when the disease is detected and treated early. Results of the South Korean screening program for gastric cancer revealed a decrease in mortality from gastric cancer [2]. Several case-controlled studies in Japan have also reported decreased mortality due to gastric cancer in patients who underwent endoscopic screening [3, 4]. Therefore, endoscopic screening plays an essential role in controlling the disease and the first pilot upper gastrointestinal endoscopic screening program started in Mongolia in May 2022. Preliminary data show an improved detection rate of gastric cancer.

The oncogenesis of gastric cancer is a complex, multistep process including various genetic and epigenetic alterations of tumor suppressor genes, oncogenes, cell cycle regulators, signaling molecules and DNA repair genes [5]. The etiology of gastric cancer varies among races and is associated with dietary and non-dietary factors. In the Asian population, it is mostly associated with *Helicobacter pylori* infection which causes transformation of normal gastric mucosa through stages of chronic gastritis, gastric atrophy, intestinal metaplasia, dysplasia, and eventually gastric cancer [5 - 7]. Pathogenic protein CagA and vacuolating toxin VacA of *Helicobacter pylori* are reported to be strongly associated with the development of gastric malignancies [8 - 10]. The East-Asian-type CagA is known as a more carcinogenic marker compared to the Western-type Cag A. Gastric cancer characteristics of the Mongolian group were inconsistent with the Asian population and the ratio of diffuse type to intestinal type gastric cancer was higher than some East Asian and Western countries [11, 12]. However, the Japanese cohort suggests that diet and environmental factors play the major role in determining the relative cancer risk in an *H. pylori* infected population compared with the CagA subtype [13]. Thus, environmental and dietary factors such as high salt intake, hot beverages, smoking and low fruit and vegetable intake might be associated with the high incidence of gastric cancer in Mongolia.

Recently, gastric microbiome carcinogenic effects have received increased attention and *Enterococcus*, *Carnobacterium*, *Glutamicibacter*, *Paeniglutamicibacter* were found in gastric mucosa of Mongolian people where the incidence of gastric cancer is high [14].

Gastric cancer is asymptomatic in the early stage, and in advanced stages patients have dysphagia, indigestion, weight loss, early satiety, and anemia. Early gastric cancer (EGC) was defined as a malignancy limited to the mucosa or submucosa regardless of the presence of lymph node metastases [11]. In Japan, advances in early endoscopic diagnosis and treatment of gastric cancer have improved the 5-year survival rates from 36.7% up to 95% in last 50 years [15]. Endoscopy has been proven to be the standard method for the detection and diagnosis of EGC [16]. In recent decades, endoscopic imaging technology has improved markedly. Optical IEE technologies such as narrow band imaging (Olympus Medical System, Tokyo, Japan), and blue light or laser imaging (Fujifilm, Tokyo, Japan) combined with magnification had a significant impact on the evaluation and detailed endoscopic diagnosis of EGC, enabling minimally invasive treatments. Endoscopic resection is the primary treatment modality for EGC. Endoscopic treatment success and individualized protocols for follow-up are determined based on complete primary tumor resection and the likelihood of lymph node metastases.

Finally, the start of nationwide endoscopic screening will increase the rates of early diagnosis and treatment of gastric cancer, promising a gastric cancer mortality rate decrease in the near future.

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