

The Role of Genetics and Environmental Factors in Gastric Cancer

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Description

Gastric cancer, also known as stomach cancer, originates in the stomach lining and is a significant global health concern. Representing one of the leading causes of cancer-related deaths worldwide, particularly in East Asia, gastric cancer poses challenges in diagnosis, treatment, and survival rates due to often-late detection and its aggressive nature. Gastric cancer incidence varies globally. Higher rates are observed in East Asia, Latin America, and Eastern Europe, with comparatively lower incidence rates in North America and parts of Western Europe. Risk factors include genetic predisposition, environmental influences, *Helicobacter pylori* infection, and dietary habits such as high salt and smoked food consumption. Gastric cancer develops from abnormal cell growth in the stomach's mucosal layer and may progress to other layers. The primary histological types include adenocarcinomas (the most common type) and less common forms like lymphomas and gastrointestinal stromal tumors. Cellular mutations often involve genes such as p53, E-cadherin, and HER2, playing critical roles in tumor progression. Family history and genetic mutations in the CDH1 gene are associated with Hereditary Diffuse Gastric Cancer (HDGC). Smoking, high alcohol consumption, and a diet rich in nitrates and smoked foods elevate gastric cancer risk. *Helicobacter pylori* is a significant risk factor due to its association with chronic inflammation and ulceration, leading to a precancerous condition called atrophic gastritis. Sedentary lifestyles, obesity, and poor diet increase risks. Gastric cancer is typically asymptomatic in its early stages, making early detection challenging. Since symptoms often resemble other gastrointestinal issues, gastric cancer is frequently diagnosed at an advanced stage, leading to a poor prognosis. A primary method where a camera-tipped tube inspects the stomach lining. Biopsies taken during this procedure confirm cancer presence. CT, PET, and MRI scans help determine cancer spread (staging) and assess lymph nodes and nearby organs. While no specific markers confirm gastric

cancer, blood tests can indicate anaemia or other abnormalities. New biomarkers are being researched, such as microRNA (miRNA), to help improve early diagnosis. Stages range from I (localized) to IV (metastatic), with higher stages indicating more advanced disease and worse prognosis. For localized cancer, gastrectomy (partial or total) may be curative. Lymph node dissection is performed to reduce metastasis risks. Often used preoperatively (neoadjuvant) or postoperatively (adjuvant) to shrink tumours or eradicate remaining cancer cells. Combined with chemotherapy for certain advanced cancers, although not frequently used alone. For HER2-positive gastric cancer, drugs like trastuzumab target the HER2 protein, slowing tumour growth. The FDA has approved drugs such as pembrolizumab for specific types of advanced gastric cancers that express PD-L1, a protein allowing cancer to evade immune detection. Survival rates highlight the importance of early detection. Tumour location, depth, and lymph node involvement also significantly affect prognosis. Reducing smoked, salted, and nitrate-rich foods can lower risk. A diet rich in fruits, vegetables, and fibre is beneficial. Treating infections with antibiotics and regular screening can prevent gastric cancer development in high-risk populations. Avoiding smoking, reducing alcohol intake, and maintaining a healthy weight are critical. Individuals with a family history of gastric cancer, particularly those with identified genetic mutations, may benefit from regular screenings and genetic counselling. Research on genetic and epigenetic changes in gastric cancer could lead to better-targeted therapies.

Acknowledgement

None.

Conflict of Interest

The authors declare that they have no competing interests.

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