

# Different treatments for different types of gastric cancer

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**Abstract.** Abnormal cell growth in the main part of the stomach is what usually leads to gastric cancer. 44% of newly diagnosed gastric cancer cases worldwide occur in China. Overall, gastric cancer is the fourth most common cancer and the second most common cause of cancer death. In recent years, some progress has been made in treating gastric cancer, and it has been found through research that hereditary gastric cancer does exist. The treatment options for gastric cancer will be analyzed and studied in this article. The various stages of gastric cancer will be introduced, along with the various treatment options based on the staging. Through research, early, middle, and late stages of gastric cancer can be distinguished. Early gastroscopy, a CT scan, positron emission tomography, local excision in the middle and late stages, chemotherapy, immunology, and medications for treatment are a few of the treatment options for gastric cancer. Different gastric cancers and patients use various diagnostic and therapeutic approaches depending on the type of cancer they have. Patients can better combat tumor cells and increase their five-year survival rate by using various diagnostic techniques for various time periods. Gastric cancer diagnostic research is anticipated to significantly lower the incidence of the disease with better early detection and chemoprevention for patients.

**Keywords:** gastric cancer, recent advance, standard techniques, early gastric cancer.

## 1. Introduction

The survival rate for gastric cancer is very low in Western nations and India because early diagnosis is not made timely enough and most patients are already in a disease that is at a mature phase [1]. The proper management of gastric cancer can aid in identifying the various stages of the condition and the best course of action to keep patients from progressing to the disease's advanced stages. According to research, acute and long-lasting inflammation of the gastric mucosa and epithelial cells caused by *Helicobacter pylori* (*H. pylori*) becoming infected has been connected to the occurrence of gastric cancer [2]. The radical cure for GC depends on the full tumor removal procedure, so early detection and precision assessment are essential to determine the diagnosis, treatment plan, and advanced stage of the disease. Endoscopy can be used to evaluate the dimensions of nearby active participation of lymph glands and distance metastases for the quantitative staging and evaluation of gastric cancer [1, 3-4]. By providing metabolic data about the tumor, PET using the tracer 18F-fluorodeoxyglucose (FDG) has been shown to diagnose and assess a variety of malignancies [5]. If metastatic cancer is not immediately apparent, the National Comprehensive Cancer Network (NCCN) advises patients to get a PET/CT scan because it can detect occult metastatic disease [5]. Overall, though, PET and PET/CT sensitivity for attempting to identify GC is not very high. Lymph node dissection can be used to establish the stage of GC. A wide gastrectomy, which may include a distal partial or total gastrectomy,

must be carried out on patients undergoing D2 lymphadenectomy for gastric cancer. Local excision that is limited to the area where GC is present and omission of dissection of lymph glands due to the poor postoperative prognosis are the best surgical approaches to prevent postoperative symptoms. It is urgently necessary to make progress in the treatment of advanced gastric cancer. Current problems include low acceptance of early gastroscopy screening, a dearth of clinical options, and a bleak future. There is an urgent need to find a solution for how to raise patients quality of life and extend advanced patients' survival times.

Gastric cancer is currently still treatable but incurable and patients' quality of life cannot be enhanced. Most patients with GC are detected far too late, and the five-year survival rate is poor. This essay examines and studies the various gastric cancer treatment options currently available. Divided into two main sections corresponding to the different stages of gastric cancer, this article begins with an introduction to the hereditary nature of gastric cancer and a classification of early and advanced treatment options. The second provides a comprehensive overview of treatment techniques and tools, identifies current knowledge gaps and makes recommendations for future research.

## **2. Treatments for gastric cancer**

Infection of the human stomach with the bacterial pathogen *H. pylori* is connected to the occurrence of GC, inflammation-related cancer. Acute and chronic inflammatory cells infiltrate the stomach mucosa in association with *H. pylori* infection. This inflammatory process gradually deteriorates the normal acid-secreting mucosa into a degenerative epithelium consisting of intestinal and pyloric degeneration (expressing spasmolytic peptides) and eventually develop into gastric cancer. Gastric cancer is caused by chronic atrophic gastritis [2].

Second-most prevalent cancer -related death globally as well as the fourth most common cancer overall is gastric cancer [6]. The complex disease of GC is influenced by genetic and environmental variables together. The multi-step process of developing gastric cancer involves the accumulation of genetic mutations that cause uncontrolled cell growth and eventual tumor formation. 10% of cases will show familial clustering. The specific term for hereditary GC is hereditary diffuse gastric cancer (HDGC), which occurs in 1-3% of cases. Gastrointestinal cancers of the digestive tract have a diffuse growth pattern, with glandular growth and a tendency to form signet ring cells. HDGC, familial gastrointestinal cancer (FIGC), and polyposis are the three subtypes of familial or hereditary gastric cancer [6-7].

Genetic variations in the DNA sequence, or genetic polymorphisms, raise a person's risk of developing stomach cancer. TP53 (a tumor suppressor gene) and CDH1 were the two genes that were most frequently mutated in gastric cancer (a gene encoding E-cadherin). Because mutations in these genes prevent cells from functioning properly, cancer cells grow and divide uncontrollably [6]. An autosomal dominant cancer susceptibility syndrome is HDGC that is primarily brought on by neutralizing CDH1 germline mutations gene and is characterized by diffuse GC (DGC) and invasive breast lobular carcinoma (LBC). About 70% of people who are born with a CDH1 pathogenic variant will develop DGC by the time they are 80 years old. About 40% more women are at risk for LBC than men [6-7].

Since there are three different stages of gastric cancer, including early gastric cancer, locally advanced gastric cancer and advanced GC, the choice of treatment of GC depends on the tumor's stage and form, and there are various treatment options available for different stages of gastric cancer [8]. Surgery is aimed at removing the tumor and nearby lymph nodes and is the main treatment for early gastric cancer [9]. The stomach may be completely or partially removed. Surgery, chemotherapy, and radiation therapy are frequently used as treatments for locally advanced stomach cancer. Surgery is usually performed to remove most of the cancerous tissue, followed by chemotherapy and radiation therapy to eradicate any remaining cancer cells. Chemotherapy, immunotherapy, targeted therapy, or any combination of these therapies may be used as a form of treatment for advanced stomach cancer. Surgery and radiation therapy may occasionally be used to reduce symptoms or enhance the quality of life [2, 9].

Cancerous areas of the stomach can be visualized and treated using endoscopy, which can treat early gastric cancer and is considered minimally invasive. Early-stage gastric cancer (EGC) is more prevalent when it is diagnosed. EGC has a favorable outlook and a rate of survival of 5 years of more than 90%. Endoscopic therapy has evolved common due to the improvements in available instruments and the experience of endoscopists. EMR, ESD, endoscopic ablation and endoscopic stenting are the four treatments [1]. The best endoscopic treatment option is chosen according to the cancer's size and location, the patient's health, and other variables. Endoscopic treatment has the benefits of a brief hospital stay, quick recovery, and few complications as a type of minimally invasive treatment [2].

### 2.1. EMRs

Using a snare or another specialized tool, the stomach's lining's cancerous tissue is removed. It is typically applied to small, early gastric tumors that have not yet spread to the stomach wall's deep layers. A snare or other specialized tool is used to remove cancerous tissue from the stomach lining after an endoscope is passed through the mouth into the stomach. EMR typically takes an hour and is done under sedation or anesthesia [1-2].

### 2.2. ESD

Similar to EMR, but can remove deeper and larger tumors. ESD is typically carried out using specialized tools to gradually cut and remove the tumor. ESD is frequently carried out under sedation or anesthesia and can take several hours to complete [1-2].

### 2.3. Endoscopic ablation therapy

To eliminate cancerous tissue, apply heat (thermal ablation) or cold (cryoablation). While cryoablation uses extremely cold temperatures to freeze and kill cancer cells, thermal ablation is typically carried out using radiofrequency energy or argon plasma coagulation. It is applied to treat cancer cells that remain after surgery or to treat small, early tumors [1-2].

### 2.4. Endoscopic stent placement

When cancer is causing a blockage in the stomach, a stent is implanted to help keep the stomach open. An endoscope is used to insert the stent, which then expands to support growths in the stomach wall. Stenting may be used to treat symptoms like vomiting or difficulty swallowing. By providing metabolic data about the tumor, PET with 18F-fluorodeoxyglucose (FDG) stinger has been used to diagnose and assess various malignancies. By combining metabolic and anatomical images, the majority of PET scanners are now a single system that is incorporated with CT, dramatically enhancing diagnostic accuracy. In order to show occult metastatic disease in cases where gastric cancer metastases are not obvious, the patient will undergo a PET/CT scan. By increasing the detection of involved nodal or metastatic disease, PET imaging can enhance staging. However, compared to the majority of other malignancies, the overall sensitivity the effectiveness of PET and PET/CT in detecting gastric cancer is comparatively low. Due to factors like Some types of gastric cancer, physical FDG uptake, involuntary activities of the posterior segment may interfere with FDG PET's capacity to detect GC [5].

Numerous variables, including size, histopathologic type, and location of the tumor, have an impact on the ability of PET/CT to detect and diagnose gastric cancer. Among the key factors affecting the detection of principal GC using FDG PET is tumor size. For the detection of gastric cancers larger than 30 mm, FDG PET has a sensitivity of 76.7%, but only 16.8% for those smaller than 30 mm. An independent variable influencing the FDG uptake of gastric lesions is the depth of tumor invasion. AGC typically produces higher sensitivity than EGC in FDG PET imaging because advanced tumors are typically larger and more deeply infiltrated [5]. The gastroesophageal junction (GEJ) together with the top half, intermediate, and lower (or distal) portions of the gastric region can all be separated. FDG PET detection of GEJ tumors is more sensitive than gastric adenocarcinomas in other parts of the

stomach because intestinal-type cancers are more common in GEJ cancers. It is more likely to find gastric cancers in the upper or proximal part of the stomach [5].

The PET detection of gastric cancer can also be impacted by physiological uptake. In the fasted state, the gastric and intestinal wall showed moderate and strenuous FDG take - up in amounts ranging from 40.0% to 60.0%. By using methods that lessen physiologic absorption in the posterior segment, including such gastric distention or pharmacodynamic silencing, PET can be used to make a diagnosis GC in the proximal stomach. These techniques can improve the sensitivity and specificity of FDG PET or PET/CT. One of the most frequently investigated FDG uptake-related genes in gastric cancer is GLUT-1. In gastric cancer, the affirmation of glioma GLUT-1 and FDG SUV correlated favorably. The uptake of FDG by gastric tumors was found to be facilitated by hypoxia-inducible factor 1 (HIF-1) in gastric cancer cells [5]. Operative lesion removal, non-contact glioma starting to lift, full-thickness resection performed endoscopically, and minimally invasive surgery collaborative surgery are all examples of local resection [1]. Additionally, there really are numerous problems with local removal surgery for esophageal cancer. These include preventing unsafe surgical margins, preventing gastric deformation and dysfunction, raising the risk of metachronous gastric cancer, and potentially causing peritoneal spread. During cancer surgery, lymph node dissection frequently provides precise staging data. A gastrectomy involving conventional lymphadenectomy up to D2 has a good outcome for stomach cancer with metastases confined to local lymph nodes [1].

Patients with gastric cancer undergoing D2 lymph node dissection need an extensive gastrectomy, which may include a total or distal partial gastrectomy. The extent of the gastrectomy can be reduced by partially reducing the lymphadenectomy at D2. Proximal gastrectomy preserves the distal stomach while omitting the proximal stomach, and pylorus-sparing gastrectomy preserves the pylorus while omitting the right gastric vascular lymph node dissection at position "5". The best surgical approach to prevent postoperative symptoms is local resection, limited to the area where gastric cancer is present and skips lymph node dissection [9]. Breast, prostate, and melanoma cancers have seen significant progress with immunotherapy. When William B. Coley administered streptococcal organisms to a cancer patient who was inoperable, the patient's malignant tumor shrank in 1891. According to this experiment, the body's defense mechanisms can be used to get rid of malignant tumors. Because the immune system is carefully regulated through numerous checkpoints and feedback to prevent host damage, progress in cancer immunotherapy has been sluggish [2].

The descendants of a single transformed cell grow and spread over time, causing cancer. One definition of "cancer immunoediting" is the capacity to foster immune responses against tumors while also defending the host. The three main stages of immunoediting are escape, equilibration, and elimination. Cancer immunotherapy increases the ability of the immune system to eliminate tumors in an effort to stop the immune editing process and treat cancer by effectively inducing an immune response against tumor cells. It is usually based on the use of gene transfer vaccines, cytotoxic immune cells or monoclonal antibodies. Monoclonal antibodies may still be useful because they can direct the cellular immune system to attack the tumor by binding to tumor-specific antigens [2-9]. The medications function by encouraging the patient's immune system to identify and target cancer cells. Immune checkpoint inhibitor pembrolizumab prevents the interaction between PD-1 (a protein on T cells) and PD-L1 (a protein on cancer cells), allowing T cells to recognize and combat cancer cells more successfully. Nivolumab, another medication, also affects the PD-1 pathway. Patients with tumors that express PD-L1 at high levels or that have specific gene mutations typically respond better to these medications. Translation of fatigue, nausea and diarrhea are typical side effects, and other potentially harmful side effects include inflammation of the liver, lungs and other organs. A reaction known as an autoimmune response can occur when the immune system targets healthy tissue [2]. Gastrectomy is particularly linked to postoperative pneumonia (POP), which can result in postoperative mortality, among abdominal surgeries. To improve surgical outcomes for patients having gastrectomy procedures, POP may need to be prevented or treated. The patients' general and genetic disorder survival after GC is negatively impacted by postoperative complications. Patients with GC who are elderly are particularly vulnerable to POP and other postoperative complications.

Consider improving preoperative nutrition as a way to prevent POP. Reducing postoperative complications can increase elderly GC patients' long-term survival [10].

### 3. Conclusion

Treatment of gastric cancer usually combines surgery, chemotherapy, radiotherapy, targeted therapy, and/or immunotherapy, depending on the stage and characteristics of the cancer and the general health status of the patient. The purpose of treatment is to eliminate or kill cancer cells and stop them from spreading to other organs while retaining as much of the patient's quality of life and digestive system as is feasible. To increase the likelihood of a successful outcome, early detection and prompt treatment are essential. The existing problems are the low penetration rate of early gastroscopy screening, limited clinical options for treatment and poor prognosis. How to increase the quality of life of patients and prolong the survival of advanced patients are problems that need to be solved. The ineffectiveness of the method for treating gastric cancer is due to the possibility of side effects in some patients or the development of drug resistance to specific treatments. Therefore, there is a need to develop more personalized, creative treatments and limited healthcare services in order to cater to the unique characteristics of each patient's cancer. In some areas, it may be difficult for patients with gastric cancer to get high-quality medical care, such as diagnostic procedures, surgeries, and cutting-edge treatments. Inadequate diagnosis of gastric cancer reduces the effectiveness of treatment and the likelihood that patients will survive. Therefore, there is a need for a more equitable and open healthcare system that gives all patients prompt and efficient care. Combination therapies, which can target multiple pathways involved in the growth and spread of cancer cells, and immunotherapies, which use the patient's immune system to fight cancer, are two types of stomach cancer treatments that are currently being developed and researched. It is hoped that future developments in genomics and molecular profiling will make it easier to find new therapeutic targets and boost the efficacy of individualized treatment for gastric cancer. Despite improvements, there are still restrictions and unmet needs as a means of treating gastric cancer. To create more individualized and effective gastric cancer treatments and enhance patient outcomes, more research and innovation are required.

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