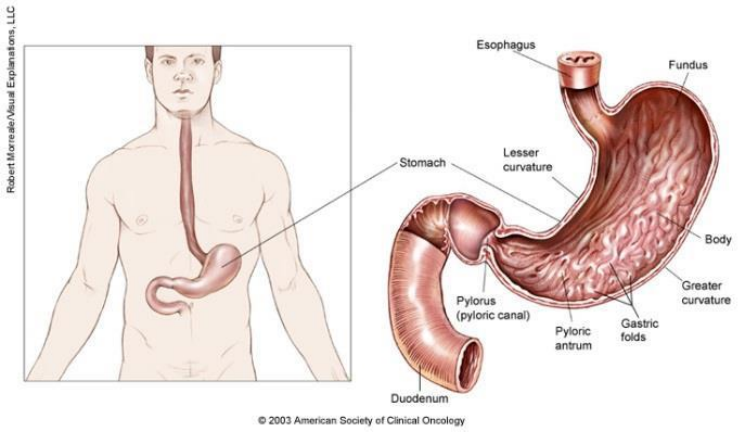
Cancer Association of South Africa (CANSA)

Fact Sheet on Stomach Cancer

Introduction

The stomach is a muscular, hollow, dilated part of the digestive system which functions as an important organ of the digestive tract of humans, in some animals, including vertebrates, echinoderms, insects (mid-gut), and molluscs. It is involved in the second phase of digestion, following mastication (chewing).



[Picture Credit: Stomach]

The stomach is located between the oesophagus and the small intestine. It secretes protein-digesting enzymes called protease and strong acids to aid in food digestion. Food reaches the stomach via oesophageal peristalsis through smooth muscular contortions. Partially digested food (chyme) is forwarded to the small intestines.

Stomach Cancer

Stomach cancer, also called *gastric cancer*, is a cancer that starts in the stomach. It occurs when cells in the stomach change and start to grow rapidly and in uncontrolled fashion. It can then form a tumour. A malignant tumour is also known as cancer.

Stomach cancer should not be confused with other cancers that can occur in the abdomen, like cancer of the colon (large intestine), liver, pancreas, or small intestine because these cancers may have different symptoms, different outlooks, and different treatments.

Stomach cancer tends to develop slowly over years. Before a true cancer develops, pre-cancerous changes often occur in the inner lining (mucosa) of the stomach. These early changes rarely cause symptoms and often go undetected. Cancers starting in different sections of the stomach may cause different symptoms and tend to have different outcomes. The cancer's location can also affect the treatment options.

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Sorokin, M., Poddubskaya, E., Baranova, M., Glusker, A., Kogoniya, L., Markarova, E., Allina, D., Suntsova, M., Tkachev, V., Garazha, A., Sekacheva, M. & Buzdin, A. 2020. RNA sequencing profiles and diagnostic signatures linked with reponse to ramucirumab in gastric cancer. *Cold Spring Harb Mol Case Stud*. 2020 Feb 14. pii: mcs.a004945. doi: 10.1101/mcs.a004945. [Epub ahead of print]
"Gastric cancer (GC) is the fifth cancer type by associated mortality. Proportion of early diagnosis is low, and most patients are diagnosed at the advanced stages. First line therapy standardly includes fluoropyrimidines and platinum compounds with trastuzumab for HER2-positive cases. For the recurrent disease there are several alternative options including ramucirumab, a monoclonal therapeutic antibody that inhibits VEGF-mediated tumor angiogenesis by binding with VEGFR2, alone or in combination with other cancer drugs. However, control over disease rate following ramucirumab or its combinations is 30-80% of the patients, suggesting that personalization of drug prescription is needed to increase efficacy of treatment. We report here original tumor RNA sequencing profiles for 15 advanced GC patients linked with data on clinical response to ramucirumab or its combinations. Three genes showed differential expression in the tumors-responders vs non-responders: CHRM3, LRFN1 and TEX15. Of them, CHRM3 was upregulated in the responders. Using bioinformatic platform Oncobox we simulated ramucirumab efficiency and compared output model results with actual tumor response data. An agreement was observed between predicted and real clinical outcomes (AUC ≥ 0.7). These results suggest that RNA sequencing may be used to personalize prescription of ramucirumab for GC and indicate on potential molecular mechanisms underlying ramucirumab resistance. The RNA sequencing profiles obtained here are fully compatible with the previously published Oncobox Atlas of Normal Tissue Expression (ANTE) data."

Incidence of Stomach Cancer in South Africa
According to the outdated National Cancer Registry (2016), known for under reporting, the following number of stomach cancer cases was histologically diagnosed in South Africa during 2016:

Group - Males 2016	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	803	1:195	2,06%
Asian males	56	1:115	5,64%
Black males	296	1:350	2,23%
Coloured males	180	1:90	3,86%
White males	271	1:126	1,29%

Group - Females 2016	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All females	461	1:492	1,09%
Asian females	48	1:162	3,86%
Black females	198	1:808	1,00%
Coloured females	89	1:239	1,92%
White females	126	1:326	0,74%

The frequency of histologically diagnosed cases of stomach cancer in South Africa for 2016 was as follows (National Cancer Registry, 2016):

Group - Males 2016	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All males	1	7	29	85	205	256	162	58
Asian males	0	0	1	5	16	18	12	4
Black males	0	5	19	37	96	84	42	10
Coloured males	0	1	2	12	33	59	48	13
White males	1	1	3	24	42	93	86	31

Group - Females 2016	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All females	0	105	23	53	108	117	93	57
Asian females	0	0	1	8	6	15	13	5
Black females	0	8	10	25	50	49	33	23
Coloured females	0	1	4	8	20	33	23	1
White females	0	1	8	12	32	21	24	28

N.B. In the event that the totals in any of the above tables do not tally, this may be the result of uncertainties as to the age, race or sex of the individual. The totals for 'all males' and 'all females', however, always reflect the correct totals.

According to **Bruni, *et al*.,** (2019), the burden of Stomach cancer for South Africa for 2018 is estimated as (based on Globocan estimates):

- Annual number of Stomach cancer cases 1 940
- Annual number of Stomach cancer deaths 1 573

Risk Factors of Stomach Cancer

The following are known risk factors for stomach cancer:

- having a family history of stomach cancer - if a family member has had stomach cancer, it can increase one's risk.
- having an infection of the stomach caused by the bacteria called *Helicobacter pylori*
- having or having had a polyp larger than 2cm in the stomach
- having inflammation and swelling of the stomach for a long time (chronic atrophic gastritis
- *Helicobacter pylori* infection - if these bacteria in the stomach are left untreated, the risk for stomach cancer increases. The risk further increases if the person smoked and has a poor diet as well
- having a history of stomach lymphoma - people who have had a certain type of lymphoma of the stomach known as *mucosa-associated lymphoid tissue (MALT) lymphoma* have an increased risk of getting adenocarcinoma of the stomach. This is probably because MALT lymphoma of the stomach is caused by infection with *H pylori* bacteria
- smoking tobacco products
- age - it is more likely to occur in people over the age of 55
- gender - it is more common in men than women
- smoking tobacco products - people who smoke are twice as likely to develop stomach cancer
- alcohol consumption - alcohol has been declared a Group 1 carcinogen (cancer causing chemical) by the International Agency for Research on Cancer (IARC) in 1988
- diet - a diet low in fresh fruit and vegetables can increase the risk of stomach cancer
- salt intake - a diet high in salt and preservatives can increase the risk of stomach cancer
- chronic gastritis/ulcers/acid reflux - if a person has a history of gastritis, stomach ulcers or acid reflux the risk may increase as well

- Barrett's oesophagus - in this condition, abnormal cells develop in the lining of the lower end of the oesophagus where it joins the stomach. A small number of people with this condition develop stomach cancer
- pernicious anaemia - if the person lacks Vitamin B_{12}, it can cause pernicious anaemia, which affects the lining of your stomach and increases the risk for stomach cancer
- hereditary conditions - these are conditions run in families. For example, if one has small benign growths in one's stomach, it can increase the risk for stomach cancer. These conditions are usually rare
- geography - worldwide, stomach cancer is more common in Japan, China, Southern and Eastern Europe, and South and Central America. This disease is less common in Northern and Western Africa, South Central Asia, and North America
- eating red meat and processed foods - an increased risk for stomach cancer is seen in people with diets that have large amounts of smoked foods, salted fish, red meat, and pickled vegetables. Nitrates and nitrites are substances commonly found in cured meats. It can be converted by certain bacteria, such as *H pylori*, into compounds that have been shown to cause stomach cancer in laboratory animals.
- being overweight or obese - being overweight or obese is a possible cause of cancers of the cardia (the upper part of the stomach nearest the oesophagus) - the link is not yet clear
- having type A blood - blood type groups refer to certain substances that are normally present on the surface of red blood cells and some other types of cells. These groups are important in matching blood for transfusions. For unknown reasons, people with type A blood have a higher risk of getting stomach cancer
- Epstein-Barr (EBV) virus infection – this virus causes infectious mononucleosis. Almost all adults have been infected with this virus at some time in their lives, usually as children or teens. EBV has been linked to some forms of lymphoma. It is also found in the cancer cells of about 5% to 10% of people with stomach cancer. These people tend to have a slower growing, less aggressive cancer with a lower tendency to spread. EBV has been found in some stomach cancer cells, but it is not yet clear if this virus actually causes stomach cancer
- certain occupations - workers in the coal, metal, nickel refining, rubber, timber and asbestos industries seem to have a higher risk of getting stomach cancer
- inherited cancer syndromes – persons with the following inherited cancer syndromes have a higher risk for stomach cancer:

    - Hereditary diffuse gastric cancer - this inherited syndrome greatly increases the risk of developing stomach cancer. This condition is rare, but the lifetime stomach cancer risk among affected people is about 70% to 80%. Women with this syndrome also have an increased risk of getting a certain type of breast cancer. This condition is caused by mutations (defects) in the *CDH1* gene. Some cancer centres can test for these gene mutations
    - Hereditary non-polyposis colorectal cancer (HNPCC) - HNPCC, also known as *Lynch syndrome*, is an inherited genetic disorder that increases the risk for colorectal cancer. People with this syndrome also have an increased risk of getting stomach cancer (as well as some other cancers). In most cases, this disorder is caused by a defect in either the *MLH1* or *MSH2* gene, but other genes can cause HNPCC, including *MLH3*, *MSH6*, *TGFBR2*, *PMS1* and *PMS2*
    - Familial adenomatous polyposis (FAP) - in FAP syndrome, people get many polyps in the colon and sometimes in the stomach and intestines as well. People with this syndrome are at greatly increased risk for getting colorectal cancer and have a slightly increased risk of getting stomach cancer. It is caused by mutations in the *APC* gene

    - BRCA1 and BRCA2 - people who carry mutations of the inherited breast cancer genes *BRCA1* or *BRCA2* may also have a higher rate of stomach cancer
    - Li-Fraumeni syndrome - people with this syndrome have an increased risk of several types of cancer, including developing stomach cancer at a relatively young age. Li-Fraumeni syndrome is caused by a mutation in the *TP53* gene
    - Peutz-Jeghers syndrome (PJS) - people with this condition develop polyps in the stomach and intestines, as well as in other areas including the nose, the airways of the lungs, and the bladder. The polyps in the stomach and intestines are a special type called *hamartomas*. They can cause problems like bleeding or blockage of the intestines. PJS can also cause dark freckle-like spots on the lips, inner cheeks and other areas. People with PJS have an increased risk of cancers of the breast, colon, pancreas, stomach, and several other organs. This syndrome is caused by mutations in the gene *STK1*
- Human epidermal growth factor receptor 2 (HER2) overexpression is increasingly recognized as a frequent molecular abnormality in gastric and gastroesophageal cancer. With the recent introduction of HER2 molecular targeted therapy for patients with advanced gastric cancer, determination of HER2 status is crucial in order to select patients who may benefit from treatment with Herceptin.

Pooralajal, J., Moradi, L., Mohammadi, Y., Cheraghi, Z. & Gohari-Ensaf, F. 2020.
OBJECTIVES: This report provides information on 14 behavioral and nutritional factors, needed for stomach cancer prevention programs.
METHODS: PubMed, Web of Science, and Scopus databases were searched until December 2018. The reference lists were screened too. Observational studies addressing the association between stomach cancer and behavioral factors were enrolled. The heterogeneity between studies was investigated using Chi2, Tau2, and I2 statistic. The likelihood of publication bias was explored using Begg's and Egger's tests and Trim & Fill analysis. The effect szie were expressed as the odds ratio (OR) with 95% confidence intervals (CI) using a random-effects model.
RESULTS: Of 52,916 identified studies, 232 were eligible involving 33,831,063 participants. The OR (95% CI) of factors associated with stomach cancer was as follows: H. pylori infection 2.56 (2.18, 3.00); currently smoking 1.61 (1.49, 1.75); formerly smoked 1.43 (1.29, 1.59); currently drinking 1.19 (1.10, 1.29); formerly drank 1.73 (1.17, 2.56); overweight/obesity 0.89 (0.74, 1.08); sufficient physical activity 0.83 (0.68, 1.02); intake of fruits ≥3 times/week 0.48 (0.37, 0.63); intake of vegetables ≥3 times/week 0.62 (0.49, 0.79); using pickled vegetables 1.28 (1.09, 1.51); black tea 1.00 (0.84, 1.20); green tea 0.88 (0.80, 0.97); coffee 0.99 (0.88, 1.11); using fish ≥1 time/week 0.79 (0.61, 1.03); using red meat ≥4 times/week 1.31 (0.87, 1.96), and high salt intake.
CONCLUSION: This meta-analysis provided a clear picture of behavioral and nutritional factors playing pivotal roles in developing stomach cancer. These results may be utilized for ranking and prioritizing preventable risk factors to implement effective prevention programs.

Signs and Symptoms of Stomach Cancer
Signs and symptoms of stomach cancer may include:

- Fatigue
- Bloated feeling after eating
- Feeling full after eating little
- Heartburn

- Indigestion and stomach discomfort
- Nausea which may be mild
- Loss of appetite
- Sensation of food getting stuck in the throat with eating
- Stomach pain
- Vomiting, particularly vomiting up of solid food shortly after eating
- Weight loss
- Diarrhoea or constipation

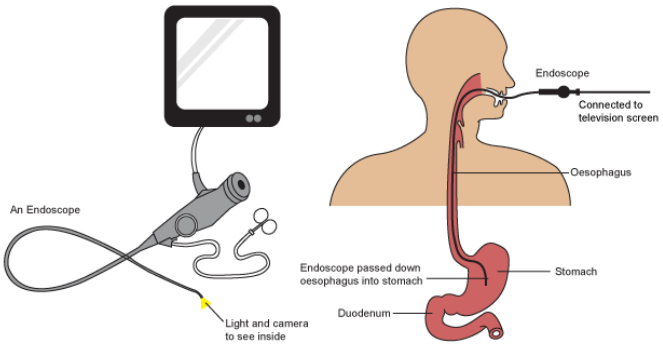
In cases of more advanced cancer, a patient may present with:

- Discomfort in the upper or middle part of the abdomen
- Blood in the stool (which appears as black, tarry stools)
- Vomiting or vomiting blood
- Presence of blood in the stools
- Black, tarry stools (due to presence of digested blood)
- Unexplained weight loss
- Pain or bloating in the stomach after eating
- Weakness or fatigue associated with mild anaemia (a deficiency in red blood cells)

Diagnosis of Stomach Cancer

Scientists are not sure exactly what causes stomach cancer. There is a strong correlation between a diet high in smoked, salted and pickled foods and stomach cancer. As the use of refrigeration for preserving foods has increased around the world, the rates of stomach cancer have declined.

In general, cancer begins when an error (mutation) occurs in the DNA of a cell. The mutation causes the cell to grow and divide at a rapid rate and to continue living when normal cells would die. The accumulating cancerous cells form a tumour that can invade nearby structures. And cancer cells can break off from the tumour to spread throughout the body.



[Picture Credit: Endoscopy]

In addition to a physical examination, the following tests may be used to diagnose stomach cancer:

- Biopsy - a biopsy is the removal of a small amount of tissue for examination under a microscope. Other tests can suggest that cancer is present, but only a biopsy can make a definite diagnosis. The sample removed from the biopsy is analysed by a pathologist (a doctor who specialises in interpreting laboratory tests and evaluating cells, tissues, and organs to diagnose disease)

- Endoscopy - this test allows the doctor to see the inside of the body. The patient may be sedated, and the doctor inserts a thin, lighted, flexible tube called a gastroscope or endoscope through the mouth, down the oesophagus, and into the stomach and small bowel. The doctor can remove a sample of tissue during an endoscopy and check it for evidence of cancer

- Endoscopic ultrasound - this test is similar to an endoscopy, but the gastroscope has a small ultrasound probe on the end that produces a detailed image of the stomach wall. An ultrasound uses sound waves to create a picture of the internal organs. The ultrasound image helps doctors determine how far the cancer has spread into the stomach and nearby lymph nodes, tissue, and organs, such as the liver

- X-ray - an x-ray is a way to create a picture of the structures inside of the body using a small amount of radiation

- Barium swallow - in a barium swallow, a person swallows a liquid containing barium and a series of x-rays are taken. Barium coats the lining of the oesophagus, stomach, and intestines so tumours or other abnormalities are easier to see on the x-ray

- Computed tomography (CT or CAT) scan - a CT scan creates a three-dimensional picture of the inside of the body with an x-ray machine. A computer then combines these images into a detailed, cross-sectional view that shows any abnormalities or tumours. Sometimes, a contrast medium (a special dye) is injected into a patient's vein to provide better detail

- Magnetic resonance imaging (MRI) - an MRI uses magnetic fields, not x-rays, to produce detailed images of the body. A contrast medium may be injected into the patient's vein to create a clearer picture

- Positron emission tomography (PET) scan - a PET scan is a way to create pictures of organs and tissues inside the body. A small amount of a radioactive substance is injected into the patient's body. This substance is absorbed mainly by organs and tissues that use the most energy. Because cancer tends to use energy actively, it absorbs more of the radioactive substance. A scanner then detects this substance to produce images of the inside of the body

- Laparoscopy - a laparoscopy is a minimally invasive surgery in which the surgeon inserts a scope into the abdominal cavity to evaluate spread of the stomach cancer to the lining of the abdominal cavity or liver. This pattern of cancer spread is not detected by CT or PET scan

Marta, Z.N., Agnieszka, W., Jacek, P., Jelen, A., Adrian, K., Diagmara, S.K., Salagacka-Kublak, A. & Balcerczak, E. 2020.
"Gastric cancer is one of the most common worldwide types of cancer. It is a multifactorial disease and both environmental and genetic factors play an important role in its etiology. Evaluation of the relative expression level of NFKB2 gene in two groups of patients: peptic ulcer and gastric cancer and its role in the pathomechanism of these diseases was the aim of this study. RNA was isolated from: 79 samples of peptic ulcer, 22 gastric cancer and 11 control tissue. The real-time PCR technique was used to study the expression of NFKB2 gene. The relative expression level of NFKB2 gene was a variable in all three studied groups. The relative NFKB2 gene expression depends on the type of a disease. Peptic ulcer cases showed the increased relative NFKB2 gene expression to control group

(p = 0.0000). Cancer cases presented decreased relative NFKB2 gene expression to normal stomach tissue (p = 0.0183). There are statistically important differences in the investigated gene expression between peptic ulcer, where the expression level is higher comparing to gastric cancer and control tissue which confirmed that such an activation is connected with an inflammatory process. The relative expression level of NFKB2 is decreased in cancer cases as opposed to control tissue and peptic ulcer cases which could suggest that during carcinogenesis of gastric cancer inhibition of NF-kB pathway takes place which could be a promising factor for patients."

Wu, J., Yang, Y., Cheng, L., Wu, J., Xi, L., Ma, Y., Zhang, P., Xu, X., Zhang, D. & Li, S. 2020.
"Gastric cancer (GC) continues to be one of the major causes of cancer deaths worldwide. Meanwhile, liquid biopsies have received extensive attention in the screening and detection of cancer along with better understanding and clinical practice of biomarkers. In this work, 58 routine blood biochemical indices were tentatively used as integrated markers, which further expanded the scope of liquid biopsies and a discrimination system for GC consisting of 17 top-ranked indices, elaborated by random forest method was constructed to assist in preliminary assessment prior to histological and gastroscopic diagnosis based on the test data of a total of 2951 samples. The selected indices are composed of eight routine blood indices (MO%, IG#, IG%, EO%, P-LCR, RDW-SD, HCT and RDW-CV) and nine blood biochemical indices (TP, AMY, GLO, CK, CHO, CK-MB, TG, ALB and γ-GGT). The system presented a robust classification performance, which can quickly distinguish GC from other stomach diseases, different cancers and healthy people with sensitivity, specificity, total accuracy and area under the curve of 0.9067, 0.9216, 0.9138 and 0.9720 for the cross-validation set, respectively. Besides, this system can not only provide an innovative strategy to facilitate rapid and real-time GC identification, but also reveal the remote correlation between GC and these routine blood biochemical parameters, which helped to unravel the hidden association of these parameters with GC and serve as the basis for subsequent studies of the clinical value in prevention program and surveillance management for GC. The identification system, called GC discrimination, is now available online at http://lishuyan.lzu.edu.cn/GC/."

Zaręba, K.P., Zińczuk, J., Dawidziuk, T., Pryczynicz, A., Guzińska-Ustymowicz, K. & Kędra, B. 2019.
INTRODUCTION: According to statistics, gastric cancer remains one of the most common causes of death due to neoplastic disease in the world's population. It is a common conception that this type of cancer mostly affects people in their fifth or sixth decade of life. So, when it comes to young people, for example in their twenties or early thirties, who present to a doctor with symptoms suggesting a cancer of the gastrointestinal tract, these are quite often ignored because of their young age.
AIM: In this study we at The Second Department of General and Gastroenterological Surgery of the Medical University of Białystok, Poland decided to enlighten the problem of stomach cancer in people under 40 years old as a cause of death and complications most likely because of an incorrect diagnosis at the beginning of therapy.
MATERIAL AND METHODS: Major analysis involved 350 cases of gastrointestinal tumours treated surgically, of which 14 cases (7 men and 7 women) were patients aged 18-39 years diagnosed with different stages of gastric cancer.
RESULTS: Statistical analysis has shown that gastric cancer in women occurred much earlier than in men, and the average survival time was 16 months after the surgery.
CONCLUSIONS: Because of the false suggestion that gastric cancer affects mostly older people, there is a risk of ignoring the symptoms in young people and finding advanced neoplastic lesions at the time of diagnosis, which has a negative effect on long-term treatment results.

Types of Stomach Cancer

The cells that form the tumour determine the type of stomach cancer. The type of cancer cells in the stomach helps determine the treatment options. Types of stomach cancer include:

- Cancer that begins in the glandular cells (adenocarcinoma). The glandular cells that line the inside of the stomach secrete a protective layer of mucus to shield the lining of the stomach from the acidic digestive juices. Adenocarcinoma accounts for the great majority of all stomach cancers

- Cancer that begins in immune system cells (lymphoma). The walls of the stomach contain a small number of immune system cells that can develop cancer. Lymphoma in the stomach is rare.

- Cancer that begins in hormone-producing cells (carcinoid cancer). Hormone-producing cells can develop carcinoid cancer. Carcinoid cancer in the stomach is rare

- Cancer that begins in nervous system tissues. A gastrointestinal stromal tumour (GIST) begins in specific nervous system cells found in your stomach. GIST is a rare form of stomach cancer

Because the other types of stomach cancer are rare, when people use the term 'stomach cancer' they generally are referring to adenocarcinoma.

Reducing the Risk for Stomach Cancer

Screening programmes are successful in detecting disease in the early stages in parts of the world where the risk of gastric cancer is high. The value of screening in countries with low rates of gastric cancer is not clear.

The following may help reduce the risk of gastric cancer:

- Do not smoke
- Eat healthy foods rich in fruits and vegetables. Eat at least five (5) portions of vegetables and fresh fruit (in season) every day
- Take medicines to treat reflux disease (heartburn), if it is present
- Take antibiotics if are diagnosed with *H. pylori* infection
- Limit salt intake
- Limit the intake of meat and processed foods
- Limit alcohol intake

Staging of Stomach Cancer

One tool that doctors use to describe the stage is the TNM system developed by the American Joint Committee on Cancer (AJCC). This system judges three factors: the tumour itself, the lymph nodes around the tumour, and if the tumour has spread to the rest of the body. The results are combined to determine the stage of cancer for each person. There are five stages: stage 0 (zero) and stages I through IV (one through four). The stage provides a common way of describing the cancer, so doctors can work together to plan the best treatments.

Resectable vs Unresectable Stomach Cancer
The AJCC staging system provides a detailed summary of how far a stomach cancer has spread. For treatment purposes, however, doctors are often more concerned about whether the tumour can be removed (resected) with surgery or not.

- Resectable cancers are those the doctor believes can be completely removed during surgery.

- Unresectable cancers cannot be removed completely. This might be because the tumour has grown too far into nearby organs or lymph nodes, it has grown too close to major blood vessels, it has spread to distant parts of the body, or the patient is not healthy enough for surgery.

There is no distinct dividing line between resectable and unresectable in terms of the TNM stage of the cancer but earlier stage cancers are more likely to be resectable.

Prognosis (Outlook)
The prognosis of patients with gastric cancer is related to the extent of the tumour and includes both involvement of lymph nodes and direct extension of the tumour beyond the gastric wall. Tumour grade may also provide some prognostic information.

In localised distal gastric cancer, more than 50% of patients can be cured. The overall survival rate in most patients at 5 years ranges from almost no survival for patients with disseminated disease to almost 50% survival for patients with localised distal gastric cancers confined to resectable regional disease. Even with apparent localised disease, the 5-year survival rate of patients with proximal gastric cancer is only 10% to 15%. Although the treatment of patients with disseminated gastric cancer may result in palliation of symptoms and some prolongation of survival, long remissions are uncommon .

Outlook varies based on how much the cancer has spread by the time of diagnosis. Tumours in the lower stomach are cured more often than those in the higher stomach. Chances of a cure also depend on how far the tumour has invaded the stomach wall and whether lymph nodes are involved.

When the tumour has spread outside the stomach, a cure is often not possible. In this case, the goal of treatment is to improve symptoms.

Prescribed Minimum Benefits (PMBs) for Individuals with Medical Scheme Insurance
Cancer of the stomach is a prescribed minimum benefit (PMB) condition under the Diagnosis and Treatment Pair (DTP) code 950C. The treatment component specified for this DTP according to the PMB Regulations is Medical and Surgical management, which includes chemotherapy and radiation therapy. The diagnosis, treatment and care of PMBs should be funded by medical schemes irrespective of one's plan option.

<u>Diagnostic Tests and the PMBs</u>
- Full Blood Count (FBC), Liver and Kidney function tests are routinely done.

- Gastroscopy remains the golden standard investigation to detect and diagnose gastric cancer. A specimen from the stomach is usually taken during the procedure for analysis at the laboratory.
- Endoscopic ultrasonography (EUS) and computed tomography (CT) can be used to determine the invasion of cancer and the spread outside the stomach
- Diagnostic laparoscopy is strongly recommended as an additional tool for cancer staging.
- Chest X-ray may be used to detect lung metastases. A CT scan of the chest, abdomen and pelvis is useful in identifying the tumour, assessing the spread of the cancer as wll as lymh node involvement.

The above-mentioned tests constitute PMB level of care for cancer diagnosis. Positron Emission Tomography (PET) scan is not recommended as PMB level ofcare. The value of PET scan in diagnosis and evaluation remains controversial.

Treatment Options and the PMBs

- Surgical interventions of early stage gastric cancer that are PMB level of care
  - Endoscopic resection – it is a minimallyh invasive procedure that allows for the removal of the tumour while preserving the stomach.

  - Total gastrectomy with lymph node resection – this procedure involves total removal of the stomach. The procedure can be done by laparoscopy or by opening the abdomen.

  - Oesophagogastrectomy with lymph node resection – this surgery involves the removal of the lower portion of the oesophagus and the proximal or upper portion of the stomach.

  - Subtotal gastrectomy with lymph node resection – this procedure is associated with better nutritional outcomes and better quality of life when compared with total gastrectomy.

- Chemotherapy
  The following chemotherapy agents are used only for the treatment of stomach cancer and constitute PMB level of care:
  - Epirubicin
  - 5FU
  - Cisplatin
  - Capecitabine

- Radiation therapy
  Radiation therapy in early gastric cancer is considered PMB level of care.

Treatment of Stomach Cancer

Once a patient has been diagnosed with cancer and staged, there is a lot to think about before patient and doctors can choose a treatment plan.

The main treatments for stomach cancer are:

- Surgery
- Chemotherapy

- Targeted therapy
- Radiation therapy

Often the best approach uses 2 or more of the above treatment methods.

It is good to have a team of doctors with different specialties involved in the treatment consisting of:
- A gastroenterologist: a doctor who specialises in treatment of diseases of the digestive system
- A surgical oncologist: a doctor who treats cancer with surgery.
- A medical oncologist: a doctor who treats cancer with medicines such as chemotherapy
- A radiation oncologist: a doctor who treats cancer with radiation therapy

Surgery - Surgery to remove the stomach (gastrectomy) is the only treatment that can cure the gastric adenocarcinoma. Radiation therapy and chemotherapy may help. Chemotherapy and radiation therapy after surgery may improve the chance of a cure.

For patients who cannot have surgery, chemotherapy or radiation can improve symptoms and may prolong survival, but will likely not cure the cancer. For some patients, a surgical bypass procedure may relieve symptoms. The goal of surgery is to remove all of the stomach cancer and a margin of healthy tissue, when possible.

Options include:
- Removing early-stage tumours from the stomach lining. Very small cancers limited to the inside lining of the stomach may be removed using endoscopy in a procedure called endoscopic mucosal resection. The endoscope is a lighted tube with a camera that's passed down the throat into the stomach. The doctor uses special tools to remove the cancer and a margin of healthy tissue from the stomach lining.

- Removing a portion of the stomach (subtotal gastrectomy). During subtotal gastrectomy, the surgeon removes only the portion of the stomach affected by the cancer.

- Removing the entire stomach (total gastrectomy). Total gastrectomy involves removing the entire stomach and some surrounding tissue. The oesophagus is then connected directly to the small intestine to allow food to move through your digestive system.

- Surgery to relieve signs and symptoms. Removing part of the stomach may relieve signs and symptoms of a growing tumour in people with advanced stomach cancer. In this case, surgery cannot cure stomach cancer but it can make the person more comfortable.

Surgery carries a risk of bleeding and infection. If all or part of your stomach is removed, you may experience digestive problems.

Chemotherapy - Chemotherapy uses anti-cancer (cytotoxic) drugs to destroy cancer cells. It works by disrupting the growth of cancer cells. The drugs circulate in the bloodstream throughout the body.

For stomach cancer, one may have chemotherapy:

- Before and after surgery
- To reduce or control symptoms in advanced cancer
- To slow an advanced cancer down

One may be given chemotherapy for stomach cancer

- As an injection
- Through a drip into the arm
- Through a pump as a slow continuous infusion
- As tablets

How a patient receives his/her chemotherapy will depend on the particular drug or combination of drugs that are given. The patient may have a combination of drip, injections and tablets.

Chemotherapy before and after surgery - If the patient has stomach cancer that can be removed, he/she is most likely to have chemotherapy both before and after surgery. This is called peri-operative chemotherapy. Chemotherapy helps to reduce the size of the cancer making it easier to remove. It also reduces the chances of the cancer coming back. Chemotherapy does have side effects, and not everyone is fit enough to have it.

Radiation Therapy - Radiation therapy uses high-energy rays or particles to kill cancer cells in a specific area of the body. External beam radiation therapy is the type of radiation therapy often used to treat stomach cancer. This treatment focuses the radiation on the cancer from a machine outside the body. Having this type of radiation therapy is like having an X-ray, except each treatment lasts longer, and the patient usually receives five treatments per week over a period of weeks or months. Following surgery, radiation therapy can be used to kill very small remnants of the cancer that cannot be seen and removed during surgery.

Radiation therapy - especially when combined with certain chemotherapy drugs may delay or prevent cancer from coming back after surgery and may help patients live longer. Radiation therapy can also be used to ease the symptoms of advanced stomach cancer such as pain, bleeding and eating problems.

Side effects from radiation therapy for stomach cancer can include:

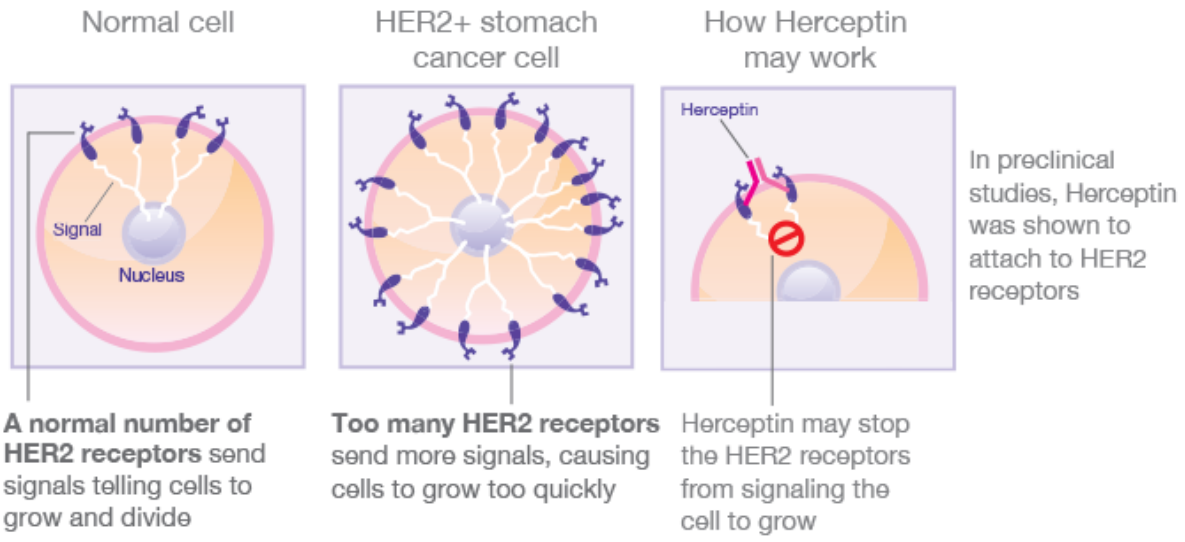
- Mild skin problems at the site where the radiation was aimed
- Nausea and vomiting
- Diarrhoea
- Fatigue
- Low blood cell counts

Side effects usually go away within several weeks after treatment is finished. When radiation is given with chemotherapy, side effects are often worse.

Targeted Therapy - Targeted therapy uses drugs that attack specific abnormalities within cancer cells. Targeted drugs are used to treat a rare form of stomach cancer called gastrointestinal stromal tumor. Targeted drugs used to treat this cancer include imatinib (Gleevec) and sunitinib (Sutent).

Herceptin is a monoclonal antibody - a type of targeted therapy - shown in preclinical studies to target cells with too many HER2 receptors.

Herceptin is the first and only targeted therapy approved for the treatment of first-line HER2+ metastatic stomach or GEJ cancer. Traditional therapies, such as chemotherapy and radiation therapy, are also used to treat HER2+ metastatic stomach or GEJ cancer.



[Picture Credit: Herceptin]

Gene therapy - Gene therapy is a personalised medicine approach that allows scientists to attack the specific causes of each stomach cancer individually.

Changing of Lifestyle after Stomach Cancer Diagnosis

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past.

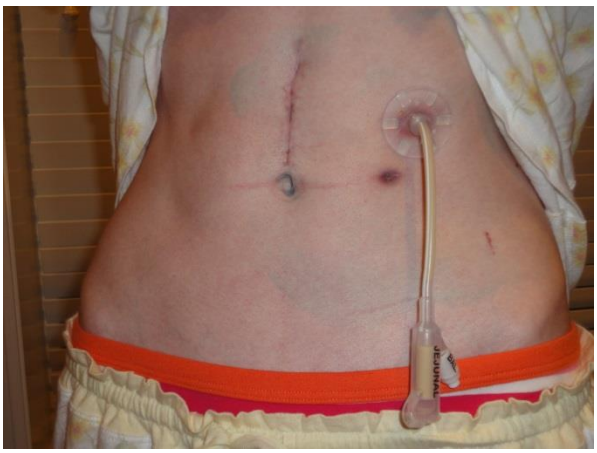
Eating right can be hard for anyone, but it can get even tougher during and after cancer treatment. This is especially true for cancers that affect the digestive tract, such as stomach cancer. The cancer or its treatment can affect how one eats and absorbs foodstuffs. Nausea can be a problem from some treatments. The patient may also lose his/her appetite for a while and lose weight when they do not want to.

During treatment: If losing weight or having trouble eating during treatment, eat what appeals at the time. Patients are advised to eat what they can, when they can. It helps to eat small portions every 2 to 3 hours. Patients are usually referred to a dietician, an expert in nutrition, to assist on how to fight some of the side effects of the treatment.

After treatment: If part or all of the stomach has been removed, the patient might need to eat smaller amounts of food more often. The doctor or nutritionist may also recommend that the patient stays upright for some time after eating. The health care team will help adjust the diet if a particular patient is having problems eating.

Some patients have problems with nausea, diarrhoea, sweating, and flushing after eating. This is called *dumping syndrome*. When part or all of the stomach is removed, the food that is swallowed quickly passes into the intestine, leading to these symptoms after eating. These symptoms often get better over time.

Some people may need nutritional supplements to help make sure they get the nutrition they need. Some people may even need a feeding tube, usually called a *jejunostomy tube (*or *J-tube)*, put into the small intestine. This is done through a small hole in the skin over the abdomen during a minor operation. A J-tube allows liquid nutrition to be put directly into the small intestine to help prevent weight loss and to improve nutrition. Less often, the tube may be placed into the lower part of the stomach instead. This is known as a *gastrostomy tube* or *G-tube*.



[Picture Credit: Jejunostomy]

Other important lifestyle changes include:

- If smoking, quit and get assistance – join the CANSA e-KickButt Programme
- Avoid drinking alcohol
- Limit salt intake
- Prevent being overweight or obese
- Eat a diet rich in vegetables and fresh fruit (in season)
- Avoid a diet rich in smoked, salted and pickled foods

Replace salt in food with the following:

- Garlic powder NOT garlic salt. Garlic powder enhances most cooking and livens it up, from meat to fish to poultry to soups, pastas, stir fry and more

- Fresh ground black pepper is a great salt alternative. There is a huge difference between shaking black pepper and using fresh ground black pepper. Fresh ground black pepper is a more intense and aromatic flavour

- Onion powder NOT onion salt. Be sure to go easy when you first start using it because it is a fairly concentrated taste

- Fresh squeezed lemon juice is a wonderful salt alternative. Fresh squeezed lemon juice is so much better than lemon concentrate

- Lime juice is another salt alternative. Try adding it to water instead of drinking soda or pop. It will give the drink a kick. Lime is also great for making homemade salsa's

- For a crunchier salt alternative, try using unsalted ground sunflower seeds or sesame seeds. It makes great toppings to salads, stir fry and other roasted foods

- For cold deli style salads, try using mustard for notching up the salty taste but reducing the salt and sodium level way down.

- Do not forget about the 'sweet'. Sweet can add 'zing' to foods and cooking also. Try cooking chicken in orange juice and reduced sugar marmalade for wonderful orange chicken! Try using sweetened dried cranberries (such as craisins) to perk up a carrot salad, or other meal. Sweet and sour and tart tastes often satisfy the taste buds and provide a great salt alternative

- Try some of the following herbs and spices: Oregano - a clear winner. In addition to oregano, a number of other herbs are also excellent salt replacements and, in addition, pack a significant antioxidant punch. Among the more familiar, ranked in order, are dill, garden thyme, rosemary and peppermint. Less familiar herbs with comparable antioxidant-power include rose geranium, sweet bay, purple amaranth, winter savoury and Vietnamese coriander

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The South African National Clinical Trials Register provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

Medical Disclaimer

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