

# Cancer Association of South Africa (CANSA)

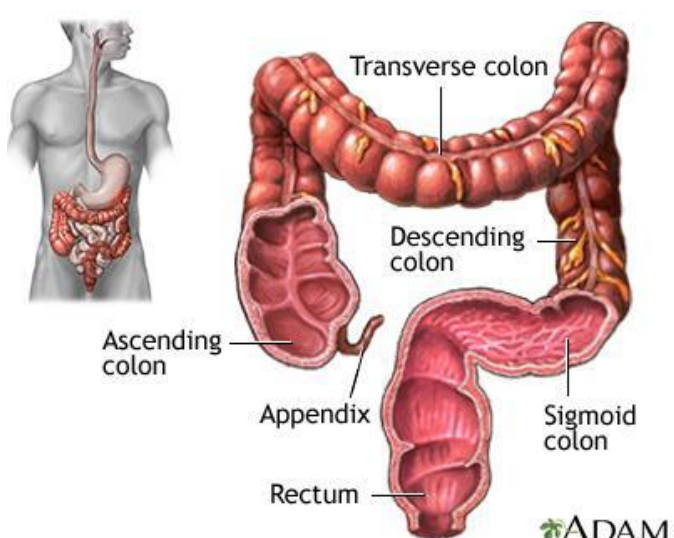


## CANSA Fact Sheet on Colorectal Cancer

### Introduction

Colorectal cancer is cancer that occurs in the colon and rectum. Sometimes it is called colon cancer, for short. The colon is also known as the large intestine or large bowel. The rectum is the passageway that connects the colon to the anus.

[Picture Credit: Anatomy Colon]



### Colorectal Cancer

Cancers of the colon and rectum (colorectal cancer) start when the process of the normal replacement of lining cells goes awry. Mistakes in mucosal cell division occur frequently. For reasons that are poorly understood, sometimes mistakes occur that escape our editing systems. When this occurs, these cells begin to divide independently of the normal checks and balances that control growth. As these abnormal cells grow and divide, they can lead to growths within the colon called polyps. Polyps vary in type, but many are precancerous tumours that grow slowly over the course of years and do not spread. As polyps grow, additional genetic mutations further destabilize the cells and can make the cells more bizarre. When these precancerous tumours change direction (growing through the tube rather than into the middle of it) and invade other layers of the large intestine (such as the submucosa or muscular layer), the precancerous polyp has become cancerous. In most cases this process is slow, taking at least 8 to 10 years to develop from those early aberrant cells to a frank cancer.

**Janney, A., Powrie, F. & Mann, E.H. 2020.**

“Colorectal cancer (CRC) is a heterogeneous disease of the intestinal epithelium that is characterized by the accumulation of mutations and a dysregulated immune response. Up to 90% of disease risk is thought to be due to environmental factors such as diet, which is consistent with a growing body of literature that describes an 'oncogenic' CRC-associated microbiota. Whether this dysbiosis contributes to disease or merely represents a bystander effect remains unclear. To prove causation, it will be necessary to decipher which specific taxa or metabolites drive CRC biology and to fully

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 1

characterize the underlying mechanisms. Here we discuss the host-microbiota interactions in CRC that have been reported so far, with particular focus on mechanisms that are linked to intestinal barrier disruption, genotoxicity and deleterious inflammation. We further comment on unknowns and on the outstanding challenges in the field, and how cutting-edge technological advances might help to overcome these. More detailed mechanistic insights into the complex CRC-associated microbiota would potentially reveal avenues that can be exploited for clinical benefit.”

**Sun, M., Wang, Y., Sundquist, J. Sundquist, K. & Ji, J. 2020.**

**PURPOSE:** The incidence of colorectal cancer (CRC) varies by age, sex, and anatomical subsite. Few studies have examined the temporal trends of age-specific sex disparity in incidence and survival by age at diagnosis and anatomical site.

**PATIENTS AND METHODS:** The study was performed on all incident cases of CRC, using data derived from the nationwide Swedish Cancer Register between 1960 and 2014, including right-sided colon cancer (RCC), left-sided colon cancer (LCC), and rectal cancer. Male-to-female age-standardized incidence rate ratio (IRR) and male-to-female five-year survival rate ratio (SRR) were calculated as the main indicators. Furthermore, we performed joinpoint regression analyses to estimate average annual percentage change.

**RESULTS:** The overall male-to-female IRR was 1.05 for RCC, 1.31 for LCC, and 1.66 for rectal cancer. Male-to-female IRR increased steadily for RCC by an average of 0.4% per year until the mid-1990s and then decreased gradually by an average of 1.0% per year. LCC patients showed an increase of 0.6% per year since the mid-1970s. For rectal cancer, a non-significant random fluctuation was noted during the study period. The temporal trends of male-to-female IRR varied by age at diagnosis. The male-to-female SRR was 0.87 for RCC, 0.88 for LCC, and 0.86 for rectal cancer, which remained relatively stable during the study period.

**CONCLUSION:** Sex disparity of CRC is age-, period-, and anatomical subsite-dependent. Further studies are needed to investigate the underlying contributing factors.

### Incidence of Colorectal Cancer in South Africa

According to the outdated National Cancer Registry, known for under reporting, the following cases of colorectal cancer were histologically diagnosed during 2019:

Group - Males 2019	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	2 342	1:77	5,63%
Asian males	146	1:51	13,94%
Black males	752	1:164	5,05%
Coloured males	326	1:59	6,59%
White males	1 118	1:34	5,20%

Group - Females 2019	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All females	1 954	1:132	4,46%
Asian females	146	1:51	13,94%
Black females	684	1:273	3,38%
Coloured females	291	1:89	5,86%
White females	871	1:49	4,90%

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

The frequency of histologically diagnosed cases of colorectal cancer in South Africa for 2019 was as follows (National Cancer Registry, 2019):

Group - Males 2019	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	26	121	253	513	689	529	208
Asian males	0	0	8	17	36	45	29	11
Black males	0	21	77	107	208	223	84	32
Coloured males	1	3	15	39	80	94	68	26
White males	0	4	21	90	189	327	348	139

Group – Females 2019	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	3	26	110	242	417	562	394	200
Asian females	0	0	2	15	24	43	20	4
Black females	2	15	71	115	193	185	80	23
Coloured females	1	5	11	40	70	84	50	29
White females	0	6	26	71	130	250	244	144

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.

### Signs and Symptoms of Colorectal Cancer

Sign and Symptoms of colorectal cancer may include:

- A change in bowel habits, including diarrhoea or constipation or a change in the consistency of stools
- Rectal bleeding or blood in stools
- Persistent abdominal discomfort, such as cramps, gas or pain
- A feeling that the bowel does not empty completely
- Weakness or fatigue
- Unexplained weight loss

Many people with colorectal cancer experience no symptoms in the early stages of the disease. When appearing, symptoms will likely vary, depending on the cancer's size and location in the large intestine.

### Risk Factors for Colorectal Cancer

Risk factors for colorectal cancer may include:

- Previous radiation therapy for cervical cancer
- Advancing age - national and international data indicate that the risk of developing colorectal cancer increases with advancing age. Most cases of colorectal cancer occur in people aged 50 or older.
- Family or personal history
  - A family history of inherited colorectal cancer syndromes, such as familial adenomatous polyposis (FAP) or hereditary non-polyposis colorectal cancer (HNPCC or Lynch syndrome)

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 3

- A strong family history of colorectal cancer or polyps. This usually means first-degree relatives (parent, sibling, or child) who developed these conditions younger than age 60
- A personal history of colorectal cancer or polyps
- A personal history of chronic inflammatory bowel disease (for example, ulcerative colitis or Crohn's disease)

### **Lifestyle Factors that May Contribute to the Increased Risk for Colorectal Cancer:**

Lifestyle factors that may contribute to the increased risk of colorectal cancer include:

- Lack of regular physical activity
- Being overweight including obesity
- Low fruit and vegetable intake
- A low-fibre and high-fat and high sugar diet
- Red meat consumption
- Consuming processed meats
- Alcohol consumption
- Tobacco use

### **Lifestyle Factors that Play an Important Role in Reducing the Risk for Colorectal Cancer**

The following are of importance:

- Fibre – research suggests that fibre (found mostly in fruit, vegetables and whole grain products and cereals) is likely to reduce the risk for bowel cancer
- Fruit and vegetables – the large European Prospective Investigation into Cancer and Nutrition (EPIC) study has shown that people who eat a lot of fruit and vegetables have a lower risk for colorectal cancer
- Meat – eating a lot of red meat, particularly processed meat, increases one's risk for colorectal cancer
- Fish – eating more fish high in Omega-3 lowers one's risk for colorectal cancer
- Calcium – calcium rich diets may lower the risk of colorectal cancer
- Alcohol – alcohol has been classified as a Group 1 carcinogen by the International Agency for Research on Cancer (IARC) and should be avoided to reduce the risk of colorectal cancer
- Tobacco - people who use tobacco products have an increased risk of colorectal cancer and cancer in general. Smoking is a well-known cause of lung cancer, but some of the cancer-causing substances in smoke dissolve into saliva and if swallowed, can cause digestive system cancers like colorectal cancer
- Processed meats (like sausages, luncheon meats inclusive of ham and even biltong) can increase the risk for colorectal cancer based on the use of nitrate and nitrites
- Cooking meats at very high temperatures (frying, broiling, or grilling) creates chemicals that increase cancer risk, namely Heterocyclic Amines (HCAs)
- Body weight – being overweight increases the risk of developing and dying from colorectal cancer. Obesity raises the risk of colorectal cancer in both men and women, but the link seems to be stronger in men

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 4

- Physical inactivity - increases the risk of developing colorectal cancer - increasing activity may help reduce the risk
- Radiation therapy for cancer - radiation therapy directed at the abdomen to treat previous cancers may increase the risk of colorectal cancer

**Hull, M.A. 2020.**

“The preventability estimate for colorectal cancer (CRC) is approximately 50%, highlighting the huge potential for altering modifiable lifestyle factors (including diet and body fatness) in order to reduce risk of this common malignancy. There is strong evidence that dietary factors (including intake of wholegrains, fibre, red and processed meat and alcohol) affect CRC risk. The lack of positive intervention trials and limited mechanistic understanding likely explain limited public health impact of epidemiological observations, to date. An alternative strategy for nutritional prevention of CRC is use of supplements that provide higher individual nutrient exposure than obtained through the diet (chemoprevention). There are positive data for calcium and/or vitamin D and the n-3 fatty acid EPA from polyp prevention trials using colorectal adenoma as a CRC risk biomarker. Although CRC is an obesity-related malignancy, there remains a paucity of observational data supporting intentional weight loss for CRC risk reduction. Some types of obesity surgeries (Roux-en-Y gastric bypass) might actually increase subsequent CRC risk due to alteration of local intestinal factors. There is intense interest in nutritional therapy of patients after diagnosis of CRC, in order to impact on recurrence and overall survival (now often termed cancer interception). In conclusion, nutritional prevention of CRC continues to hold much promise. Increased mechanistic understanding of the role of individual nutrients (linked to intestinal microbiota), as well as a precision medicine approach to CRC chemoprevention and interception based on both tumour and host factors, should enable translation of nutritional interventions into effective CRC risk reduction measures.”

### **Screening for Higher Risk Individuals**

People with familial risk factors for colorectal cancer may need earlier (before age 50) or more frequent testing. Genetic testing in suspected familial cases may identify candidates for secondary prevention. Screening for high risk individuals is more likely to be done using colonoscopy.

### Testing for occult blood in the stool (faeces)

When a health care provider tests stool with a faecal occult blood test they are often looking for the presence of microscopic occult blood in the faeces, which may be a sign of a growth, inflammation or bleeding in the digestive system.

### Causes of Blood in Stool

Blood may appear in the stool in one or more of the following conditions:

- Benign (non-cancerous) or malignant (cancerous) growths or polyps of the colon
- Haemorrhoids (swollen blood vessels near the anus and lower rectum that can rupture, causing bleeding)
- Anal fissures (splits or cracks in the lining of the anal opening)
- Intestinal infections that cause inflammation
- Ulcers
- Ulcerative colitis
- Crohn's disease

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 5

- Diverticular disease, caused by outpouchings of the wall of the large intestine
- Abnormalities of the blood vessels in the large intestine

Gastrointestinal bleeding may be microscopic (invisible to the eye) or may be easily seen as red blood or black tar-like bowel movements, called melaena stools indicating digested blood.

A Faecal Occult Blood Test - The faecal occult blood test requires the collection of 3 small stool samples. Usually the samples are a bit of stool collected on the end of an applicator. The stool samples should be taken one day apart, because colorectal cancers may bleed from time to time, rather than consistently.

Preparation before a Faecal Occult Blood Test - The faecal occult blood test results are largely affected by how one prepares for the test, so it is important to follow the instructions carefully.

Stool samples should NOT be collected from individuals:

- with haemorrhoids
- during or within 3 days either side of a menstrual period

As certain foods can alter the test results, a special diet is often recommended for 48 to 72 hours before the test. The following foods should be avoided during that time:

- Beets
- Broccoli
- Spanspek (also cantaloupe, canteloupe, cantaloup, mushmelon, muskmelon, rockmelon, sweet melon, Persian melon)
- Carrots
- Cauliflower
- Cucumbers
- Fish
- Grapefruit
- Horseradish
- Mushrooms
- Poultry
- Radishes
- Red meat (especially 'rare' prepared)
- Turnips
- Vitamin C-enriched foods or beverages

**Von Wagner, C., Versetraete, W., Hirst, Y., Nicholson, B.D., Stoffel, S.T. & Laszlo, H. 2020.**

**BACKGROUND:** There has been interest in using the non-invasive, home-based quantitative faecal immunochemical test (FIT) to rule out colorectal cancer (CRC) in high-risk symptomatic patients.

**AIM:** To elicit public preferences for FIT versus colonoscopy (CC) and its delivery in primary care.

**DESIGN & SETTING:** A cross-sectional online survey in England.

**METHOD:** A total of 1057 adults (without CRC symptoms and diagnosis) aged 40-59 years were invited from an English online survey panel. Responders were asked to imagine they had been experiencing CRC symptoms that would qualify them for a diagnostic test. Participants were

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiology and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 6

presented with choices between CC and FIT in ascending order of number of CRCs missed by FIT (from 1-10%). It was measured at what number of missed CRCs responders preferred CC over FIT.

**RESULTS:** While 150 participants did not want either of the tests when both missed 1% CRCs, the majority ( $n = 741$ , 70.0%) preferred FIT to CC at that level of accuracy. However, this preference reduced to 427 (40.4%) when FIT missed one additional cancer. Women were more likely to tolerate missing CRC when using FIT. Having lower numeracy and perceiving a higher level of risk meant participants were less likely to tolerate a false negative test. Most of those who chose FIT preferred to return it by mail (62.2%), to be informed about normal test results by letter (42.1%), and about abnormal test results face to face (32.5%).

**CONCLUSION:** While the majority of participants preferred FIT over CC when both tests had the same sensitivity, tolerance for missed CRCs was low.

**Siegel, R.L., Jakubowski, C.D., Fedewa, S.A., Davis, A. & Azad, N.S. 2020.**

“Colorectal cancer (CRC) incidence rates in the United States overall have declined since the mid-1980s because of changing patterns in risk factors (e.g., decreased smoking) and increases in screening. However, this progress is increasingly confined to older adults. CRC occurrence has been on the rise in patients younger than age 50, often referred to as early-onset disease, since the mid-1990s. Young patients are more often diagnosed at an advanced stage and with rectal disease than their older counterparts, and they have numerous other unique challenges across the cancer management continuum. For example, young patients are less likely than older patients to have a usual source of health care; often need a more complex treatment protocol to preserve fertility and sexual function; are at higher risk of long-term and late effects, including subsequent primary malignancies; and more often suffer medical financial hardship. Diagnosis is often delayed because of provider- and patient-related factors, and clinicians must have a high index of suspicion if young patients present with rectal bleeding or changes in bowel habits. Educating primary care providers and the larger population on the increasing incidence and characteristic symptoms is paramount. Morbidity can further be averted by increasing awareness of the criteria for early screening, which include a family history of CRC or polyps and a genetic predisposition.”

There are faecal occult blood tests available on the market that are not affected by dietary restrictions prior to collecting stool samples for screening. Enquire from the Cancer Association regarding availability of these occult blood tests.

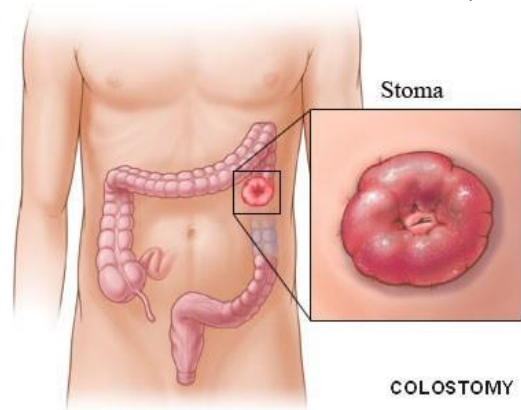
### **Colostomy Care**

Being diagnosed with cancer and having treatment takes time to come to terms with. It can also be difficult to cope with the physical effects of treatment. If a patient had a colostomy or ileostomy operation as part of treatment, the end of the bowel is brought out into an opening on the abdomen. The opening is referred to as a stoma. Some people have a temporary colostomy (an artificial opening into the colon) made during their treatment for bowel cancer. The colostomy may be closed a few months later when the bowel has fully healed.



[Picture Credit: Colostomy]

Some people have a permanent colostomy or ileostomy (artificial opening into the ilium or small bowel). It can take a while to get used to dealing with a stoma. There is a lot of advice and support available in the form of a specially trained nurse referred to as a stoma nurse.



#### *Emptying and Changing a Stoma Bag*

It is good to establish a routine for changing a stoma bag. Keep this routine as simple as possible. As the stoma is more active at certain times of the day, like shortly after meals, bags should be changed at time when it is relatively inactive, like first thing in the morning.

Stoma bag needs to be changed regularly – usually between one and three times a day depending on the amount of faeces. If using a drainable bag, it is recommended to empty the bag before removing it. Then seal the bag inside a disposal bag and place in the dustbin. Do not flush it down the toilet, as it will cause a blockage.

#### *Taking Care of the Skin Around the Stoma is very important*

Adhesive plate - The adhesive plate must fit snugly around the stoma. If the hole in the adhesive plate is larger than the stoma, the skin will become exposed to the harmful effects of the faeces and become irritated. Also, if the adhesive plate is cut too small, it may cause damage to the stoma. Check regularly to ensure the adhesive plate has a snug fit around the stoma.

Watch out for irritants - Leakage on to the skin, excessive removal of the adhesive plate and harsh skin cleansers can all cause irritation of the skin.

Bleeding - It is common to experience a small amount of bleeding around the stoma when cleaning it – no cause of alarm. If bleeding comes from inside the stoma, a doctor is to be contacted immediately.

[Picture Credit: Colostomy Bag]



#### **Diagnosis of Colorectal Cancer**

Diagnosis of Colorectal Cancer may include:

- Obtaining a history from the patient
- A Physical examination
- A digital rectal examination
- The patient may then be referred for further

examination - if the diagnosis uncertain or if symptoms suggest colorectal cancer.



**Ogunwobi, O.O., Mahmood, F. & Akingboye, A. 2020.**

“Colorectal cancer (CRC) is a leading cause of death worldwide, despite progress made in detection and management through surgery, chemotherapy, radiotherapy, and immunotherapy. Novel therapeutic agents have improved survival in both the adjuvant and advanced disease settings, albeit with an increased risk of toxicity and cost. However, metastatic disease continues to have a poor long-term prognosis and significant challenges remain due to late stage diagnosis and treatment failure. Biomarkers are a key tool in early detection, prognostication, survival, and predicting treatment response. The past three decades have seen advances in genomics and molecular pathology of cancer biomarkers, allowing for greater individualization of therapy with a positive impact on survival outcomes. Clinically useful predictive biomarkers aid clinical decision making, such as the presence of *KRAS* gene mutations predicting benefit from epidermal growth factor receptor (EGFR) inhibiting antibodies. However, few biomarkers have been translated into clinical practice highlighting the need for further investigation. We review a range of protein, DNA and RNA-based biomarkers under investigation for diagnostic, predictive, and prognostic properties for CRC. In particular, long non-coding RNAs (lncRNA), have been investigated as biomarkers in a range of cancers including colorectal cancer. Specifically, we evaluate the potential role of lncRNA plasmacytoma variant translocation 1 (*PVT1*), an oncogene, as a diagnostic, prognostic, and therapeutic biomarker in colorectal cancer.”

#### *Possible further examination*

Two tests may also be used to confirm a diagnosis of bowel cancer:

*Sigmoidoscopy* - a device called a sigmoidoscope is used, which is a thin, flexible tube attached to a small camera and light.

known as a biopsy

A sigmoidoscopy is not usually painful, but can feel uncomfortable; most people go home after the examination has been completed



[Picture Credit: Sigmoidoscope]



*Colonoscopy* – it is similar to a sigmoidoscopy except a longer tube, called a colonoscope, is used to examine the entire large bowel

[Picture Credit: Colonoscope]

#### **Staging of Colorectal Cancer**

Cancer staging is the process of determining the extent to which a cancer has developed by spreading. It also

assists in planning of treatment.

## Where Colorectal Cancer May Spread To

Should colorectal cancer spread in the body, it may spread as indicated in the table below:

Cancer Type:	Main Sites of Metastasis (Spread)
Bladder	Bone, liver, lung
Breast	Bone, brain, liver, lung
Colon	Liver, lung
Colorectal	Liver, lung, peritoneum (lining of abdomen)
Lung	Adrenal gland, bone, brain, liver, other lung
Melanoma	Bone, brain, liver, lung, skin, muscle
Ovary	Liver, lung, peritoneum (lining of abdomen)
Pancreas	Liver lung, peritoneum (lining of abdomen)
Prostate	Adrenal gland, bone, liver, lung

## Treatment for Colorectal Cancer

Most people with early colorectal cancer may have surgery.

Surgery - In many people with early bowel cancer the surgeon is able to cut away all of the cancer without any further treatment required.

There are different types of surgery for colorectal cancer. Which type of surgery is best will depend on where the cancer is, its type and size, and whether it has spread (metastatised) or not. If the cancer is removed from the bowel lining it is called a local resection.

**Biller, L.H. & Schrag, D. 2021.**

**Importance:** Colorectal cancer (CRC) is the third most common cause of cancer mortality worldwide with more than 1.85 million cases and 850 000 deaths annually. Of new colorectal cancer diagnoses, 20% of patients have metastatic disease at presentation and another 25% who present with localized disease will later develop metastases.

**Observations:** Colorectal cancer is the third most common cause of cancer mortality for men and women in the United States, with 53 200 deaths projected in 2020. Among people diagnosed with metastatic colorectal cancer, approximately 70% to 75% of patients survive beyond 1 year, 30% to 35% beyond 3 years, and fewer than 20% beyond 5 years from diagnosis. The primary treatment for unresectable metastatic CRC is systemic therapy (cytotoxic chemotherapy, biologic therapy such as antibodies to cellular growth factors, immunotherapy, and their combinations.) Clinical trials completed in the past 5 years have demonstrated that tailoring treatment to the molecular and pathologic features of the tumor improves overall survival. Genomic profiling to detect somatic variants is important because it identifies the treatments that may be effective. For the 50% of patients with metastatic CRC with KRAS/NRAS/BRAF wild-type tumors, cetuximab and panitumumab (monoclonal antibodies to the epithelial growth factor receptor [EGFR]), in combination with chemotherapy, can extend median survival by 2 to 4 months compared with chemotherapy alone. However, for the 35% to 40% of patients with KRAS or NRAS sequence variations (formerly termed mutations), effective targeted therapies are not yet available. For the 5% to 10% with BRAF V600E sequence variations, targeted combination therapy with BRAF and EGFR inhibitors extended overall survival to 9.3 months, compared to 5.9 months for those receiving standard chemotherapy. For the 5% with microsatellite instability (the presence of numerous insertions or deletions at repetitive DNA units) or mismatch repair deficiency, immunotherapy may be used in the first or subsequent

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiology and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 10

line and has improved treatment outcomes with a median overall survival of 31.4 months in previously treated patients.

**Conclusions and relevance:** Advances in molecular profiling of metastatic CRC facilitate the ability to direct treatments to the biologic features of the tumor for specific patient subsets. Although cures remain uncommon, more patients can anticipate extended survival. Genomic profiling allows treatment selection so that more patients derive benefit and fewer are exposed to toxicity from ineffective therapies.

**Kishora, C. & Bhadra, P.** 2021.

"5-Fluorouracil (5-FU) is the first-line chemotherapy drug for colorectal cancer but most of the patients get resistant to the drug on a longer course of treatment. After the successful use of immunotherapy in melanoma treatment, it was explored with enthusiasm in different types of solid cancers including colorectal cancer. Nivolumab and pembrolizumab (Programmed cell death-1 blocking antibodies) have shown efficacy in the mismatch repair deficient high microsatellite instability (dMMR-MSI-H) subtype of metastatic colorectal cancer (CRC) patients. Immunotherapy has shown long time remission in a subset of metastatic CRC patients. The molecular mechanism and emerging roles of immunotherapy in colorectal cancer are explored in this review article and future directions for the proper utilization of the development in immunobiology are suggested."

**Azzam, N., AlRuthia, Y., Alharbi, O., Aljebreen, A., Almadi, M., Alarfaj, M., Alsaleh, K., Almasoud, A., Alsharidah, M., Alseneidi, S., Alali, F. & Alalwan, M.** 2020.

**BACKGROUND:** Colorectal cancer is the third most common malignancy in Saudi Arabia. The best therapeutic regimen for colorectal cancer is a matter of ongoing debate and data on its treatment in Saudi Arabia are limited.

**PURPOSE:** The objective of this study was to explore the predictors of survival and to compare the risk of mortality among colorectal cancer patients treated with different therapeutic modalities.

**PATIENTS AND METHODS:** The study utilized data from the electronic colorectal cancer registry of a university-affiliated tertiary care hospital. The Kaplan-Meier survival analysis was used to estimate the survival rates over 36 months of follow-up across rectal and colon cancer patients as well as different sociodemographic and medical characteristics. Bivariate and multiple Cox proportional-hazards regressions were conducted to estimate the risk of mortality among rectal and colon cancer patients undergoing different treatments.

**RESULTS:** The number of patients in the registry who were followed up for 36 months was 143 patients. The majority of patients had colon cancer (74.13%). Rectal cancer patients had generally better survival estimates compared to their colon cancer counterparts. Colon cancer patients treated with chemotherapy had a significantly lower risk of mortality controlling for the use of surgery, radiotherapy, and other variables including age, gender, stage of cancer, and family history of colorectal cancer (HR=0.33;  $P=0.03$ ). Additionally, colon cancer patients with a family history of colorectal cancer had significantly higher risk of mortality (HR=3.40;  $P=0.02$ ).

**CONCLUSION:** The findings of this study highlight the value of chemotherapy in managing colon cancer patients.

**Akagi, R. & Inomata, M.** 2020.

"Surgical resection and adjuvant chemotherapy are the only treatment modalities for localized colorectal cancer that can obtain a "cure." The goal in surgically treating primary colorectal cancer is complete tumor removal along with dissection of systematic D3 lymph nodes. Adjuvant treatment controls recurrence and improves the prognosis of patients after they undergo R0 resection. Various clinical studies have promoted the gradual spread and clinical use of new surgical approaches such as laparoscopic surgery, robotic surgery, and transanal total mesorectal excision

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 11

(TaTME). Additionally, the significance of adjuvant chemotherapy has been established and it is now recommended in the JSCCR (the Japanese Society for Cancer of the Colon and Rectum) guideline as a standard treatment.”

Radiotherapy - Radiotherapy is not often used to treat cancer of the large bowel. It might be used before or after surgery for rectal cancer. It may include:

- External beam radiation therapy – radiation therapy from an external source
- Internal radiation therapy (also known as brachytherapy) where radioactive material is put into the rectum, and positioned close to the tumour. It is left in place for a predetermined period of time.

Chemotherapy - Chemotherapy uses anti-cancer (cytotoxic) drugs to destroy cancer cells. It works by disrupting the growth of cancer cells. As it circulates in the blood, it can reach cancer cells almost anywhere in the body and kill them. Chemotherapy may be given before surgery for rectal cancer. Chemotherapy may also given as a treatment for colorectal cancer that has spread (metastasised).

Biological Therapy - biological therapies are drugs that help the body to control the growth of cancer cells.

Immunotherapy - Current immunotherapies for colorectal cancer fall into several broad categories: checkpoint inhibitors and immune modulators, monoclonal antibodies, therapeutic vaccines, adoptive cell therapy, oncolytic virus therapy, adjuvant immunotherapies, and cytokines. Most of these therapies are still in early-phase clinical testing for colorectal cancer, but their successful use in other types of cancers suggests that they may ultimately prove useful for colorectal cancer as well.

**Coupez, D., Hulo, P., Touchefeu, Y., Bossard, C. & Bennouna, J. 2020.**

**Introduction:** Colorectal cancer (CRC) is one of the most frequent and lethal cancers in the world, and therapies are still insufficient. Immune checkpoint inhibitors (ICI) in metastatic CRC (mCRC) have not revolutionized treatment to the extent that they have in melanoma or renal carcinoma. Their use is limited to a molecular niche of mCRC with microsatellite instability (MSI). This review summarizes clinical data published with pembrolizumab in mCRC and also tries to identify potential new strategies.

**Areas covered:** This paper focuses on pembrolizumab in mCRC. We screened all trials on PubMed and ClinicalTrials.gov and describe the most significant ones in our opinion.

**Expert opinion:** Pembrolizumab seems to be effective in tumors with MSI-high status. It defines a new horizon for therapeutic strategy called 'agnostic' medicine. For microsatellite stable (MSS) colorectal cancers, the future challenge will be to successfully redraw the immune microenvironment to make it immunogenic with new therapeutic combinations, including ICI.

### **Treatment for Advanced Colorectal Cancer**

Advanced colorectal cancer means the cancer has spread to other parts of the body from where it started in the bowel (colon) or back passage (rectum). The cancer may be advanced when it is first diagnosed, or the cancer may recur some time after original treatment.

Chemotherapy and radiotherapy may be used to shrink a cancer and control symptoms. Surgery can be used in some situations to treat advanced colorectal cancer.

Specialised surgical treatments may be used to destroy bowel cancer that has spread to the liver (liver secondaries). These treatments may include hepatic artery chemoembolisation, radiofrequency ablation, cryotherapy, microwave ablation and laser therapy.

### **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/](http://www.sanctr.gov.za/)

### **Medical Disclaimer**

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSAs) does not accept any liability to any person (or his/her dependants/estate/heirs) relating to the use of any information contained in this Fact Sheet.

Whilst CANSAs has taken every precaution in compiling this Fact Sheet, neither it, nor any contributor(s) to this Fact Sheet can be held responsible for any action (or the lack thereof) taken by any person or organisation wherever they shall be based, as a result, direct or otherwise, of information contained in, or accessed through, this Fact Sheet.



## Sources and References Consulted or Utilised

**Akagi, R. & Inomata, M.** 2020. Essential advances in surgical and adjuvant therapies for colorectal cancer 2018-2019. *Ann Gastroenterol Surg.* 2020 Jan 28;4(1):39-46. doi: 10.1002/ags3.12307. eCollection 2020 Jan.

**Al-Ghafari, A.B., Balamash, K.S. & Al Doghaither, H.A.** 2019. Relationship between serum Vitamin D and Calcium levels and Vitamin D receptor gene polymorphisms in colorectal cancer. *Biomed Res Int.* 2019 Aug 26;2019:8571541. doi: 10.1155/2019/8571541. eCollection 2019.

### American Cancer Society

<http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-risk-factors>

<http://www.cancer.org/cancer/colonandrectumcancer/detailedguide/colorectal-cancer-staged>

<https://www.cancer.org/latest-news/six-ways-to-lower-your-risk-for-colon-cancer.html>

### Anatomy Colon

<http://www.nlm.nih.gov/medlineplus/ency/article/000262.htm>

**Azzam, N., AlRuthia, Y., Alharbi, O., Aljebreen, A., Almadi, M., Alarfaj, M., Alsaleh, K., Almasoud, A., Alsharidah, M., Alseneidi, S., Alali, F. & Alalwan, M.** 2020 Predictors of survival among colorectal cancer patients in a low incidence area. *Cancer Manag Res.* 2020 Jan 21;12:451-459. doi: 10.2147/CMAR.S233215. eCollection 2020.

**Barreiro Dominguez, E., Sánchez Santos, R., Diz Juenguen, S., Piñeiro, Teijeiro, A. & Carrera Dacosta, E.** 2019. Impact of preoperative oral nutrition therapy in patients undergoing surgery for colorectal cancer. *Utr Hosp.* 2019 Sep 23. doi: 10.20960/nh.02548. [Epub ahead of print]

**Biller, L.H. & Schrag, D.** 2021. Diagnosis and treatment of metastatic colorectal cancer: a review. *JAMA.* 2021 Feb 16;325(7):669-685.

**Botma, A., et al.** 2012. Dietary patterns and colorectal adenomas in Lynch syndrome. *Cancer*, 2012.

**Bruni, L., Albero, G., Serrano, B., Mena, M., Gómez, D., Muñoz, J., Bosch, F.X. & de Sanjosé, S.** 2019. ICO/IARC Information Centre on HPV and Cancer (*HPV Information Centre*). Human Papillomavirus and Related Diseases in South Africa. Summary Report 17 June 2019. [Date Accessed]

### Cancer Research Institute

<http://www.cancerresearch.org/cancer-immunotherapy/impacting-all-cancers/colorectal-cancer>

### Cancer Research UK

About Bowel Cancer - A Quick Guide

Treating Bowel Cancer - A Quick Guide

<http://www.cancerresearchuk.org/cancer-help/type/bowel-cancer/about/screening/about-bowel-cancer-screening>

<http://www.cancerresearchuk.org/cancer-help/type/bowel-cancer/living/coping-with-a-stoma-after-bowel-cancer>

**Carethers, .M.** 2010. Secondary prevention of colorectal cancer: is there an optimal follow-up for patients with colorectal cancer?

<http://www.escholarship.org/uc/item/4wp3r2t0>

### Centers for Disease Control and Prevention

[http://www.cdc.gov/cancer/colorectal/basic\\_info/screening/guidelines.htm](http://www.cdc.gov/cancer/colorectal/basic_info/screening/guidelines.htm)

**Chan, A.T. & Giovannucci, E.L.** 2010. Primary prevention of colorectal cancer. Gastrointestinal Unit, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts, USA. [achan@partners.org](mailto:achan@partners.org) [achan@partners.org](mailto:achan@partners.org). *Gastroenterology.* 2010 Jun;138(6):2029-2043.e10. doi: 10.1053/j.gastro.2010.01.057.

### Coloplast

<http://www.coloplast.com/ostomycares/topics/beforeoperation/usingthebag/>

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 14



### Colonoscope

[http://www.google.co.za/imgres?q=free+pics+colonoscope&start=0&hl=en&sa=N&tbo=d&rlz=1G1LEN-GBZA513&biw=1821&bih=817&tbm=isch&tbnid=KyGM4nJi\\_SapjM:&imgrefurl=http://www.dotmed.com/listing/colonoscope/olympus/video-colonoscope-cf-q160i-evis-exera-free-shipping/1161686&docid=UzDv7F8-0l1qM&itg=1&imgurl=http://images.dotmed.com/images/listingpics/1161686.jpg&w=470&h=353&ei=9ybHULCLKq\\_Z0QXonYDACA&zoom=1&iact=hc&vpx=376&vpy=131&dur=188&hovh=194&hovw=259&tx=153&ty=105&sig=109572939590628860228&page=1&tbnh=149&tbnw=199&ndsp=51&ved=1t:429,r:2,s:0,i:89\]](http://www.google.co.za/imgres?q=free+pics+colonoscope&start=0&hl=en&sa=N&tbo=d&rlz=1G1LEN-GBZA513&biw=1821&bih=817&tbm=isch&tbnid=KyGM4nJi_SapjM:&imgrefurl=http://www.dotmed.com/listing/colonoscope/olympus/video-colonoscope-cf-q160i-evis-exera-free-shipping/1161686&docid=UzDv7F8-0l1qM&itg=1&imgurl=http://images.dotmed.com/images/listingpics/1161686.jpg&w=470&h=353&ei=9ybHULCLKq_Z0QXonYDACA&zoom=1&iact=hc&vpx=376&vpy=131&dur=188&hovh=194&hovw=259&tx=153&ty=105&sig=109572939590628860228&page=1&tbnh=149&tbnw=199&ndsp=51&ved=1t:429,r:2,s:0,i:89])

### Colostomy

[http://www.google.co.za/search?q=colostomy+pic&hl=en&tbo=u&rlz=1G1LENN\\_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=EegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ&biw=1821&bih=817\]](http://www.google.co.za/search?q=colostomy+pic&hl=en&tbo=u&rlz=1G1LENN_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=EegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ&biw=1821&bih=817])

### Colostomy Bag

[http://www.google.co.za/search?q=colostomy+pic&hl=en&tbo=u&rlz=1G1LENN\\_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=EegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ\]](http://www.google.co.za/search?q=colostomy+pic&hl=en&tbo=u&rlz=1G1LENN_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=EegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ])

**Coupez, D., Hulo, P., Touchefeu, Y., Bossard, C. & Bennouna, J.** 2020. Pembrolizumab for the treatment of colorectal cancer. *Expert Opin Biol Ther.* 2020 Mar;20(3):219-226.

**Curry, S., Byers, T., & Hewitt, M.,** (eds). 2003. *Fulfilling the Potential of Cancer Prevention and early Detection.* Washington, DC: National Academies Press.

**Department of Health and Human Services.** The health consequences of smoking: a report of the Surgeon General. Atlanta, Ga.: Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; Washington, D.C.

**Ding, D., Han, S., Zhang, H., He, Y. & Li, Y.** 2019. Predictive biomarkers of colorectal cancer. *Comput Biol Chem.* 2019 Sep 3;83:107106. doi: 10.1016/j.compbiolchem.2019.107106. [Epub ahead of print]

### Fruit and Vegetables

[https://www.google.co.za/search?q=eat+a+variety+of+foods+everyday&source=Inms&tbm=isch&sa=X&ei=p8TSUZ-tlZOFhQfaooGgDg&ved=0CAcQ\\_AUoAQ&biw=942&bih=464#facrc=\\_&imgdii=\\_&imgrc=zNVsnv3FU24P4M%3A%3BMklI0x-AptLCyM%3Bhttp%253A%252F%252Fwww.supersprout.com.au%252Fblog%252Fwp-content%252Fuploads%252F2013%252F04%252Frainbow-of-food1-300x288.png%3Bhttp%253A%252F%252Fwww.supersprout.com.au%252Fblog%252F2013%252F04%252F24%252Ffeeding-nutritious-food-is-a-lifestyle-choice%252F%3B300%3B288\]](https://www.google.co.za/search?q=eat+a+variety+of+foods+everyday&source=Inms&tbm=isch&sa=X&ei=p8TSUZ-tlZOFhQfaooGgDg&ved=0CAcQ_AUoAQ&biw=942&bih=464#facrc=_&imgdii=_&imgrc=zNVsnv3FU24P4M%3A%3BMklI0x-AptLCyM%3Bhttp%253A%252F%252Fwww.supersprout.com.au%252Fblog%252Fwp-content%252Fuploads%252F2013%252F04%252Frainbow-of-food1-300x288.png%3Bhttp%253A%252F%252Fwww.supersprout.com.au%252Fblog%252F2013%252F04%252F24%252Ffeeding-nutritious-food-is-a-lifestyle-choice%252F%3B300%3B288])

### Globocan Cancer Observatory

<https://gco.iarc.fr/today>

**Hull, M.A.** 2020. Nutritional prevention of colorectal cancer. *Proc Nutr Soc.* 2020 Feb 5:1-6. doi: 10.1017/S0029665120000051. [Epub ahead of print]

### Ileostomy

[http://www.google.co.za/search?q=ileostomy+pictures&hl=en&tbo=u&rlz=1G1LENN\\_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=qegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ&biw=1821&bih=817\]](http://www.google.co.za/search?q=ileostomy+pictures&hl=en&tbo=u&rlz=1G1LENN_EN-GBZA513&tbm=isch&source=univ&sa=X&ei=qegZUcTnI8qp0AXmulDwBw&ved=0CCsQsAQ&biw=1821&bih=817])

**Janney, A., Powrie, F. & Mann, E.H.** 2020. Host-microbiota maladaptation in colorectal cancer. *Nature.* 2020 Sep;585(7826):509-517.

**Kishora, C. & Bhadra, P.** 2021. Current advancements and future perspectives of immunotherapy I colorectal cancer research. *Eur J Pharmacol.* 2021 Feb 15;893:173819.

**Life is Beautiful: Adopt a balanced lifestyle and live cancer-free.** 2012. A lifestyle publication of the Cancer Association of South Africa (CANSA).

**Makarem, N., Lin, Y., Bandera, E.V., Jaques, P.F. & Parekh, N.** 2015. Cancer causes and control. Doi:10.1007S10552-014-0509-9.

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 15

### Mayo Clinic – Colon Cancer

<http://www.mayoclinic.com/health/colon-cancer/DS00035/DSECTION=risk-factors>

<http://www.mayoclinic.com/health/colon-cancer/DS00035/DSECTION=symptoms>

<http://www.mayoclinic.com/health/colon-cancer/DS00035/DSECTION=prevention>

### MedlinePlus

<http://www.nlm.nih.gov/medlineplus/ency/article/002071.htm>

### National Bowel Cancer Screening Programme

<http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/fobt>

### National Cancer Institute

<http://www.cancer.gov/cancertopics/wyntk/colon-and-rectal/page14>

<http://www.cancer.gov/cancertopics/pdq/treatment/colon/Patient/page2>

<http://www.cancer.gov/clinicaltrials/learningabout/what-are-clinical-trials>

<http://www.cancer.gov/cancertopics.factsheet.Sites-Types/metastatic>

### NHS, UK.

<http://www.nhs.uk/Conditions/Cancer-of-the-colon-rectum-or-bowel/Pages/Diagnosis.aspx>

### Numeric Stages

<http://www.webmd.com/digestive-disorders/ss/slideshow-digestive-myths>

**Ogunwobi, O.O., Mahmood, F. & Akingboye, A.** 2020. Biomarkers in Colorectal Cancer: Current Research and Future Prospects. *Int J Mol Sci.* 2020 Jul 27;21(15):5311.

**Pandey, A., Shen, C. & Man, S.M.** 2019. Inflammasomes in colitis and colorectal cancer: mechanism of action and therapies. *Yale J Biol Med.* 2019 Sep 20;92(3):481-498. eCollection 2019 Sep.

**Ries, L.A.G., Eisner, M.P., Kosary, C.L., Hankey, B.F., Miller, B.A., Clegg, L., Mariotto, A., Feuer, E.J., & Edwards, B.K.** (eds). 2004. *SEER Cancer Statistics Review, 1975–2002*, National Cancer Institute. Bethesda, MD, based on November 2004 SEER data submission, posted to the SEER Website 2005.

**Rodriguez, A.M., Kuo, Y.F. & Goodwin, J.S.** 2014. Risk of colorectal cancer among long-term cervical cancer survivors. *Med Concol.* 2014 May;31(5):943. doi: 10.1007/s12032-014-0943-2. Epub 2014 Apr 3.

**Rombouts, A.J.M., Hugen, N., van Beek, J.J.P., Poortmans, P.M.P., de Wilt, J.H.W. & Nagtegaal, I.D.** 2018. Does pelvic radiation increase rectal cancer incidence? – A systematic review and meta-analysis. *Cancer Treat Rev.* 2018 Jul;68:136-144. doi: 10.1016/j.ctrv.2018.05.008. Epub 2018 Jun 26.

**Siegel, R.L., Jakubowski, C.D., Fedewa, S.A., Davis, A. & Azad, N.S.** 2020. Colorectal cancer in the young: epidemiology, prevention, management. *Am Soc Clin Oncol Educ Book.* 2020 Mar;40:1-14.

### Sigmoidoscope

[http://www.google.co.za/imgres?q=sigmoidoscope&hl=en&sa=X&tbo=d&rlz=1T4LENN\\_enZA490ZA490&biw=1821&bih=817&tbm=isch&tbid=-6eHQITzC\\_Qi4M:&imgrefurl=http://www.learncolorectalsurgery.com/colonoscopy/4549818623&docid=P33E-](http://www.google.co.za/imgres?q=sigmoidoscope&hl=en&sa=X&tbo=d&rlz=1T4LENN_enZA490ZA490&biw=1821&bih=817&tbm=isch&tbid=-6eHQITzC_Qi4M:&imgrefurl=http://www.learncolorectalsurgery.com/colonoscopy/4549818623&docid=P33E-PLF8ar56M&imgurl=http://www.learncolorectalsurgery.com/communities/2/004/008/282/282/images/4555247231.jpg&w=2048&h=1536&ei=7SjHUITMIPsq0AXT64DIAG&zoom=1&iact=hc&vpx=2&vpy=478&dur=1419&hovh=194&hovw=259&tx=107&ty=89&sig=109572939590628860228&page=1&tbnh=158&tbnw=205&start=0&ndsp=37&ved=1t:429,r:18,s:0,i:151)

[PLF8ar56M&imgurl=http://www.learncolorectalsurgery.com/communities/2/004/008/282/282/images/4555247231.jpg&w=2048&h=1536&ei=7SjHUITMIPsq0AXT64DIAG&zoom=1&iact=hc&vpx=2&vpy=478&dur=1419&hovh=194&hovw=259&tx=107&ty=89&sig=109572939590628860228&page=1&tbnh=158&tbnw=205&start=0&ndsp=37&ved=1t:429,r:18,s:0,i:151](http://www.learncolorectalsurgery.com/communities/2/004/008/282/282/images/4555247231.jpg&w=2048&h=1536&ei=7SjHUITMIPsq0AXT64DIAG&zoom=1&iact=hc&vpx=2&vpy=478&dur=1419&hovh=194&hovw=259&tx=107&ty=89&sig=109572939590628860228&page=1&tbnh=158&tbnw=205&start=0&ndsp=37&ved=1t:429,r:18,s:0,i:151)

**Sun, M., Wang, Y., Sundquist, J. Sundquist, K. & Ji, J.** 2020. Temporal trends of sex disparity in incidence and survival of colorectal cancer: variations by anatomical site and age at diagnosis. *Clin Epidemiol.* 2020 Jan 20;12:73-81. doi: 10.2147/CLEP.S240006. eCollection 2020.

**Thompson, R., Cheung, P., Chu, W., Myrehaug, S., Poon, I., Sahgal, A., Soliman, H., Tseng, C.L., Wong, S., Ung, Y., Beatriz Kinupe Abrahão, A., Erler, D., Zhang, L., Ko, Y.J. & Chung, H.T.** 2019. Outcomes of extra-cranial stereotactic body

---

Researched and Authored by Prof Michael C Herbst

[D Litt et Phil (Health Studies); D N Ed; M Art et Scien; B A Cur; Dip Occupational Health; Dip Genetic Counselling; Diagnostic Radiographer; Dip audiometry and Noise Measurement; Medical Ethicist]

Approved by Ms Elize Joubert, Chief Executive Officer [BA Social Work (cum laude); MA Social Work]

February 2022

Page 16

radiotherapy for metastatic colorectal cancer: Dose and site of metastases matter. *Radiother Oncol.* 2019 Sep 19. pii: S0167-8140(19)33064-6. doi: 10.1016/j.radonc.2019.08.018. [Epub ahead of print]

**Von Wagner, C., Versetraete, W., Hirst, Y., Nicholson, B.D., Stoffel, S.T. & Laszlo, H.** 2020. Public preferences for using quantitative faecal immunochemical test versus colonoscopy as diagnostic test for colorectal cancer: evidence from an online survey. *BJGP Open.* 2020 Feb 4. pii: bjgpopen20X101007. doi: 10.3399/bjgpopen20X101007. [Epub ahead of print]

**WebMD**

<http://www.webmd.com/digestive-disorders/digestive-diseases-stool-testing-blood-fecal-occult-blood-test>

<http://www.webmd.com/digestive-disorders/ss/slideshow-digestive-myths>