

COLORECTAL CANCER IN NEW ZEALAND

**TREADING CAREFULLY TOWARDS A NATIONAL COLORECTAL
CANCER SCREENING PROGRAM**

Produced by the Cancer Research Charitable Trust

Compiled by Annabel I. Ingham

SUMMARY

Colorectal Cancer is the leading cause of new cancer registrations in New Zealand and the second leading cause of cancer deaths. There is a 1 in 18 and 1 in 23 lifetime risk of developing Colorectal Cancer for men and women respectively. Colorectal cancer causes the loss of over 16,000 Disability-Adjusted Life Years annually and the burden of disease is set to rise in the future.

Despite its long natural history, taking between 5 and 10 years to develop into cancer from its benign precursors, CRC is often not diagnosed until a later stage. Colorectal cancer is largely clinically asymptomatic in its early stages, demonstrating the need for a screening program to detect CRC while it is still at an early stage, and more easily treatable. Colorectal cancer that is treated at Stage A (confined to the bowel wall) has a 5-year survival rate of 88%, compared to a 5-year survival rate of 7% when treated at Stage D (when the cancer has spread outside the colon).

Colorectal Cancer is a good candidate for a national screening program due to its high incidence in New Zealand, clear benefits from early treatment, slow and predictable growth and the existence of effective treatment. However, workforce shortages in New Zealand, particularly with colonoscopy services have remained a barrier to implementation of a screening program in the past. Furthermore, no screening modality has been conclusively shown to be superior.

In 1998, a working party found that implementation of a national colorectal cancer screening program was not feasible due to workforce shortages, the small but real potential for harm and the modest potential benefit. This was reviewed in 2006, and it was recommended that a feasibility study of colorectal cancer screening be undertaken in New Zealand. In May 2008, the former Health Minister announced the fast-tracking of the creation of a national colorectal cancer screening program. The projected completion date was updated from the end of 2011 to before 2014 when a new Government was voted in, as a result of the 2008 New Zealand elections.

Despite the universal excitement around the creation of a national colorectal cancer screening program, critics remain sceptical about the ability of the New Zealand healthcare system to support the program in the projected time-frame.

Other options for reducing the incidence of colorectal cancer include modifying behaviours and changing the prevalence of risk factors within the community through public awareness campaigns, and a possible colorectal cancer vaccine. The continued development of medical knowledge and an increase in health funding may also lead to improved survival following a diagnosis of colorectal cancer.

It is estimated that primary prevention could potentially prevent 81 deaths in men and 77 deaths in women from Colorectal Cancer in New Zealand each year. Research has shown that New Zealand citizens recognise that there are ways to reduce their risk of cancer but fail to identify specifically which actions to take. With this in mind, the Cancer Research Charitable Trust recommends the implementation of public awareness and prevention campaigns to educate New Zealand citizens about risk minimisation and positive behavioural change. The Cancer Research Charitable Trust, in light of this, will continue its ongoing prevention and awareness strategies, including the comprehensive all year around door-knock campaign.

ABBREVIATIONS

BMI = Body Mass Index

Cis: Carcinoma-in-situ

CRC: Colorectal Cancer

DALY = Disability Adjusted Life Year

DCBE = Double Contrast Barium Enema

FAP = Familial Adenomatous Polyposis

FGT = Faecal Guaiac Test

FIT = Faecal Immunochemical Test

FOBT = Faecal Occult Blood Test

GP = General Practice

HNPCC = Hereditary Non-Polyposis Colorectal Cancer

NHC = National Health Committee

NSU = National Screening Unit

NZ: New Zealand

OECD = Organisation for Economic Co-operation and Development

OTD = Overseas Trained Doctor

RCT = Randomised Controlled Trial

UK = United Kingdom

WHO = World Health Organization

FIGURES

Figure 1: The location of the colon and the rectum within the alimentary tract

Figure 2: The adenoma-carcinoma sequence

Figure 3: Pathologic staging of colorectal cancer

Figure 4: Decreased survival with increased extent of spread of carcinoma at diagnosis

Figure 5: Colorectal Cancer, registrations and death, 1995-2005

Figure 6: Projections for Colorectal Cancer mortality rates (per 100,000 people) for males and females by age group

Figure 7: Colorectal Cancer, registrations and deaths by ethnicity, 2005

Figure 8: Cumulative relative survival ratios, by ethnicity

Figure 9: Comparison of incidence and mortality rates of Colorectal Cancer between OECD countries, 2002

TABLES

Table 1: The inverse relationship between Dukes' Stage at diagnosis and 5-year prognosis

Table 2: Risk factors for Colorectal Cancer

Table 3: A comparison of the relative benefits of the various screening tests for Colorectal Cancer and colonic polyps

PART 1

What is Colorectal Cancer?

The colon and the rectum form the terminal portion of the alimentary tract. Colorectal Cancer (CRC) results from unchecked growth of malignant tissue in either the colon or the rectum.[1] 98% of these malignant growths are named adenocarcinomas.[2] A benign (not cancerous) tissue growth is known as an adenomatous polyp. In some cases, an adenomatous polyp may undergo cellular changes to become an adenocarcinoma.[3]

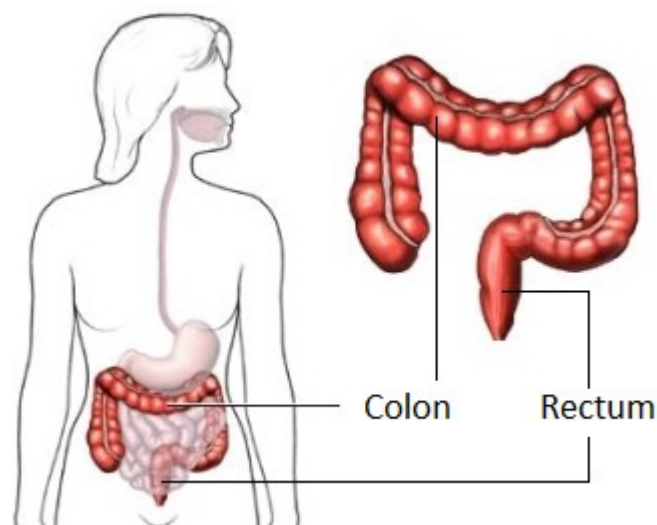


Figure 1: The location of the colon and the rectum within the alimentary tract [modified from 4]

The natural history of CRC is termed the adenoma-carcinoma sequence (Figure 2).[3] Occasionally, tissue within the colon undergoes excessive growth resulting in the formation of an adenomatous polyp. For unconfirmed reasons, an accumulation of congenital and acquired mutations can occur and transform a polyp into an adenocarcinoma. This is demonstrated in Figure 2. Only 10% of all polyps will progress to a carcinoma.[5] Unfortunately, there is no reliable method of determining whether a polyp is progressive. It is for this reason that all polyps are removed on colonoscopy.

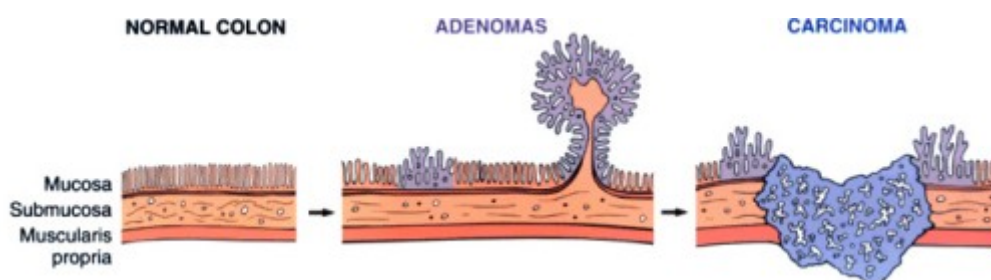


Figure 2: The adenoma-carcinoma sequence [modified from 3]

Adenocarcinomas are dangerous for an individual because when left untreated, the cancerous cells can spread to other parts of the body. On diagnosis of CRC, a doctor aims to estimate the extent of spread: this is called staging. In New Zealand (NZ), the Dukes' Modified Staging System is used.[6] An individual's cancer is given a letter (A, B, C or D) based on how much of the body has been colonised by cancer cells. Figure 3 depicts the gradual spread of cancer. Staging is useful as it can predict a patient's prognosis. Table 1 shows the inverse relationship between the degree of cancer spread at time of diagnosis and 5 year survival. Figure 4 demonstrates the reduced risk of survival after diagnosis with increased spread of carcinoma at diagnosis.

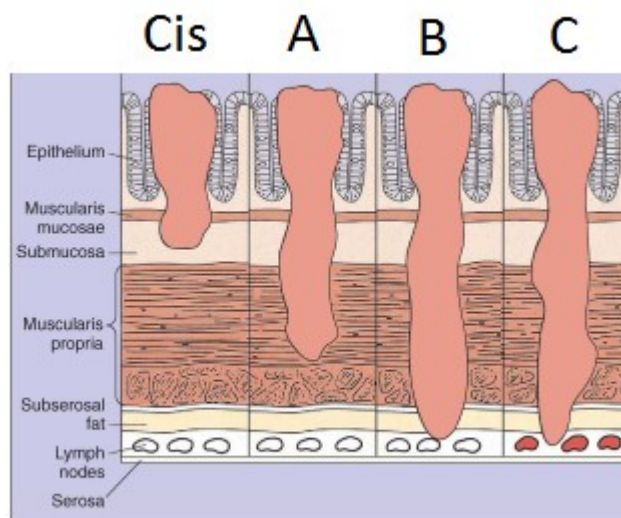


Figure 3: Pathologic staging of colorectal cancer (Letters indicate Dukes' Modified Stage). Staging is based on the depth of tumour invasion. (Cis = Carcinoma-in-situ) [modified from 7]

Table 1: The inverse relationship between Dukes' Stage at diagnosis and 5-year prognosis		
Maximum Spread	Dukes' Stage[7]	Prognosis (5 year Survival, %)[8]
Mucosa	Carcinoma-in-situ	Data not available
Submucosa	A	88
Beyond muscularis propria	B	70
Regional lymph node involvement	C	43
Distant metastases	D	7

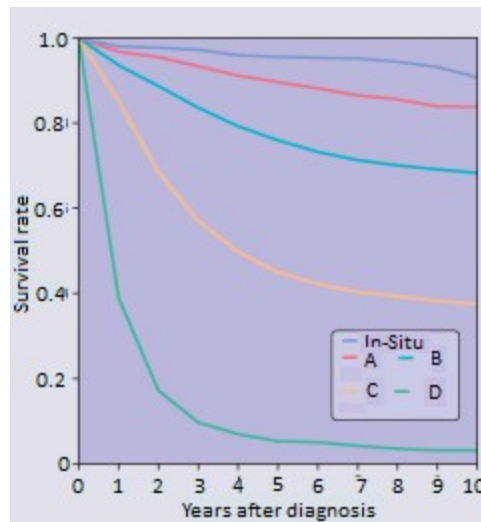


Figure 4: Decreased survival with increased extent of spread of carcinoma at diagnosis (using Dukes' Modified Staging)[7]

Risk factors for Colorectal Cancer

A person may be classified as being at average risk of CRC if they are aged 50 years or older, with no personal or first degree relative with a history of adenoma or CRC.[9] As recognised in the recently published *New Zealand Guidelines for Surveillance and Management of Groups at Increased Risk of Colorectal Cancer*,[10] an individual is recognised to be at higher risk of CRC if they have a family history of CRC; a personal history of CRC; a colorectal adenoma; or inflammatory bowel disease. However, 70% of patients who develop CRC are considered to be at 'average risk'. [9]

The risk factors for CRC are summarised in Table 2. The large number of modifiable risk factors highlights possible areas for intervention to reduce the incidence of CRC. Recognised modifiable risk factors for CRC include low fruit and vegetable consumption, obesity and living in industrialised nations. Controversial modifiable risk factors include physical inactivity, low dietary fibre, high fat and red meat intake. Older age is also an important recognised risk factor for CRC. [11]

Table 2: Risk factors for Colorectal Cancer

Non-Modifiable Risk Factors	Modifiable Risk Factors
Old age	Low fruit and vegetable consumption
Genetic disease: FAP, HNPCC, Peutz-Jeghers syndrome, Juvenile polyposis, Non-syndromic colon cancer, Hyperplastic polyposis	Obesity
Inflammatory Bowel Disease: Ulcerative Colitis, Crohn's Disease	Smoking cigarettes
Personal history of CRC or Colonic Adenomatous Polyps	Alcohol
	Living in industrialised nations
	Physical inactivity*
	Low aspirin intake*
	Low calcium*
	High fat diet*
	High red meat in diet*
	Low selenium*
	Low folate*
	Low carotenoid diet*
	Low fibre diet*
	Breast cancer*
	Diabetes Mellitus*
	Prior cholecystectomy*
* controversial risk factors [11,12]	
FAP = Familial Adenomatous Polyposis	
HNPCC = Hereditary Non-Polyposis Colorectal	
Cancer	

Clinical Manifestations of Colorectal Cancer

CRC can remain asymptomatic for many years before it is detected, especially if located more proximally in the colon.[2] Occasionally CRC presents with 'high-risk' symptoms including bleeding which is not bright in nature; change in bowel habit; unexplained weight loss; abdominal pain or; mucous discharge.[13] 'High-risk' symptoms are generally associated with more advanced disease. However, the majority of patients will present with non-specific symptoms such as fatigue or palpitations.[2] The asymptomatic nature of early CRC underlines the need for a screening program to detect smaller polyps before they reach a more serious symptomatic stage.

PART 2

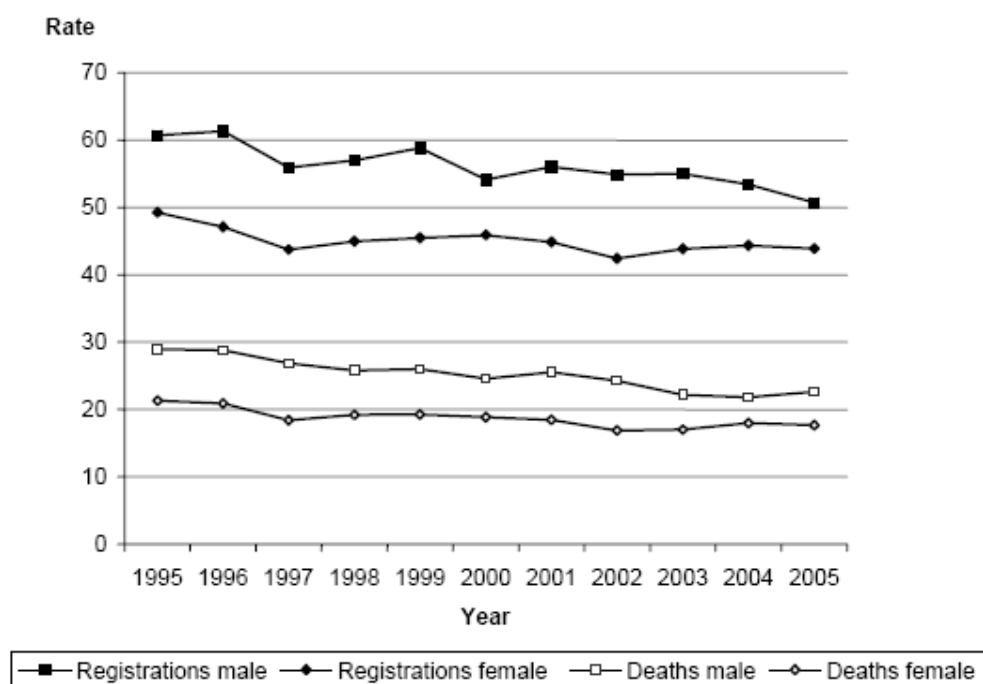
Epidemiology of Colorectal Cancer

CRC is the leading cause of new cancer registrations in NZ, with 2,716 new cases recorded in 2005. CRC is also the second leading cause of cancer deaths behind lung cancer, accounting for 1,222 deaths (15.3% of all deaths from cancer).[14] Reflecting NZ's aging population, CRC came in second in both the age-standardised rate of cancer registrations and the age-standardised cancer death rate. The lifetime risk of developing CRC is 1 in 18 for men and 1 in 23 for women.[15]

For both males (1,331 cases) and females (1,385 cases), CRC recorded the second highest incidence, and age-standardised incidence of all cancers. CRC was also named the second leading cause of cancer deaths for both males (608 deaths) and females (614 deaths). Following age-standardisation, CRC was still the second leading cause of cancer death in males, whereas CRC dropped to third place for females. The death-to-registration ratio of 0.46 for men and 0.44 for women demonstrates the better prognosis following a CRC diagnosis compared with other cancers.[14]

On age analysis, it was shown that CRC incidence and deaths gradually rise with age for both males and females. CRC accounts for the highest number of new cancer registrations and cancer deaths among females over the age of 75.[14]

NZ has made some progress in terms of reducing both CRC incidence and deaths over the past ten years. The 2005 age-standardised registration rate of CRC for males and females was 16% and 11% respectively less than in 1995. The 2005 age-standardised mortality rate of CRC for males and females was 22% and 17% respectively less than in 1995. This is shown in Figure 5 below.[14]



Note: rates per 100,000, age-standardised to WHO world population.

Figure 5: Colorectal Cancer, registrations and death, 1995-2005 [14]

This trend is projected to continue, removing any influence of a possible screening program.[16] Mortality rates are projected to decline in all age by sex groups (except 75+ males), falling overall by almost one quarter in the ten-year period to 2010-2014. However, these statistics do not negate the future importance of CRC in NZ: the burden of CRC is set to rise by 6% for males and 3% for females due to the effect of NZ's aging population and growth in population size. Figure 6 below illustrates these mortality projections for males and females by age group, in addition to the trend of largely decreasing mortality since 1972.[17]

Figure 6: Projections for Colorectal Cancer mortality rates (per 100,000 people) for males and females by age group (NB - empirical data points are used up to 2002, after which projections are made)[17]

The importance of CRC differs substantially between ethnic groups in NZ. CRC accounts for only 8.7% and 4.5% of new cancer registrations among Māori and Pacific males respectively, compared to 14.4% among non-Māori, non-Pacific males. The situation is similar for females: CRC accounts for only 6.2% and 5.8% of new cancer registrations among Māori and Pacific females respectively, compared to 16.7% among non-Māori, non-Pacific females.[14]

Figure 7 below compares rates of new CRC registrations and deaths between males and females of different ethnic groups in NZ.[14] The remarkable discrepancy between new CRC registration rates for Māori, Pacific and non-Māori, non-Pacific is noted for both genders. However, this discrepancy lessens on making the same comparison between the different CRC death rates. While Māori are less likely to be diagnosed with CRC, they are more likely to die from CRC than non-Māori.[18] Figure 8 below demonstrates the reduced survival of Māori compared to Non-Māori.[16]

Figure 7: Colorectal Cancer, registrations and deaths by ethnicity, 2005 [14]

Figure 8: Cumulative relative survival ratios, by ethnicity [19]

On the international stage, NZ performs badly in terms of CRC mortality. As shown in Figure 9, in 2002 NZ recorded the highest incidence per 100,000 population among the Organisation for Economic Co-operation and Development (OECD) countries. Similarly, NZ had the fourth highest age-standardised CRC mortality rate among OECD countries in 2002. It must be noted that age-standardised rates were not available for CRC incidence, and also that some OECD countries (Belgium, Denmark and Turkey) did not record CRC incidence for that year. [20]

CRC is not simply a health burden, but also an economic burden. In 1996, CRC is estimated to cost 16,262 Disability Adjusted Life Years (DALY – the loss of one year of healthy life) to NZ. This comprises 8,259 DALYs for males and 8,003 DALYs for females. CRC accounted for 2.9% of the total DALYs from all causes of disease, the 9th and 10th highest ranked disease in terms of DALYs for males and females respectively.[21]

PART 3

Is Colorectal Cancer a suitable disease for a national screening program?

Screening is defined by the NZ National Health Committee (NHC) as

“a health service in which members of a defined population, who do not necessarily perceive they are at risk of, or are already affected by, a disease or its complications, are asked a question or offered a test to identify those individuals who are more likely to be helped than harmed by further tests or treatments to reduce the risk of disease or its complications.”[22]

Certain characteristics of a disease will make it more suitable for a screening program.

In NZ, a disease is evaluated for its suitability for a national screening program against criteria for screening developed by the NHC.[22] These criteria are based on accepted international criteria, including World Health Organization (WHO) principles [23] for the introduction of population screening programs, adapted for the NZ context.[6] These criteria are listed below followed by discussion of their application to CRC in NZ.

The condition is a suitable candidate for screening. [22]

To be an appropriate candidate for screening, the disease needs to be an important health problem for NZ, or have defined subgroups with high incidence of the disease. As outlined in Part 2, CRC was the leading cause of new cancer registrations and the second leading cause of cancer deaths in 2005. [14] Certain subgroups, including those with genetic diseases such as FAP and HNPCC or a history of inflammatory bowel disease have been identified as having a higher incidence of CRC.[10,11]

There is an effective and accessible treatment or intervention for the condition identified through early detection. [22]

CRC is highly treatable, especially at earlier stages. The two treatment options are surgery; or surgery with adjuvant radiation and chemotherapy. Surgery alone can suffice as treatment for early stage cancers, whereas radiation and chemotherapy are useful to accompany surgery in the later stages. Surgery aims to physically remove the adenocarcinoma, while radiation and chemotherapy target the rapidly multiplying cancerous cells that may have been missed on surgery, or have moved to other parts of the body. At present there is access to surgery throughout NZ, however outcomes (especially for rectal cancer) can vary).[6,24,25] Both radiation and chemotherapy are also available in NZ; however these treatments are only indicated for certain patients. [12]

There is consideration of social and ethical issues. [22]

Possible areas for consideration include acceptability, inequalities and informed consent. Acceptability of the screening test (discussed below) depends on the particular test; however a British study found that 75% of United Kingdom (UK) residents were happy to participate in Faecal Occult Blood Test (FOBT) by post.[26] Possible inequalities could arise because of the differing levels of acceptability between ethnic groups, or differing levels of understanding of the importance of the

test. The Australian Pilot found lower participation among Aboriginal and Torres Strait Islander Australians, and among lower socio-economic groups.[27]

Currently, inequalities exist between ethnic groups in NZ. Māori are significantly less likely than non-Māori to be diagnosed at a localised (early) stage. The odds of Māori being diagnosed when their cancer has spread (Stage D) is two-thirds more than for non-Māori. Once diagnosed, Māori are two-thirds more likely than non-Māori to die from their cancer.[28] Any potential CRC screening program would have to take these statistics into account when deciding on the design, and ensure that efforts were made to encourage Māori participation.

All screening tests can cause potential harms: either physical risks (i.e. 1:10 000 risk of bowel perforation in colonoscopy)[29] or psychological harms (i.e. a false positive result). It is important that these risks are adequately communicated to potential participants so that informed consent is obtained.

The potential benefit from the screening program should outweigh the potential physical and psychological harm (caused by the test, diagnostic procedures and treatment). [22]

Screening is unique in that apparently healthy individuals are invited to take part in a process that can potentially be of benefit, but may also lead to harm. The potential for harm was one of the factors behind a CRC screening program not being implemented earlier in NZ. As stated above, potential harms can be physical or psychological.

Recently, data available from the UK pilot has reassured the NZ government. Physical risks (i.e. bowel perforation in colonoscopy) can be prevented by quality control and workforce training. Psychological harms, due to false negative or false positive results, have also found to be less important than previously thought.[30] It is believed in NZ, that physical and psychological harms are no longer a significant barrier to a national CRC screening program. [6]

The health care system will be capable of supporting all necessary elements of the screening pathway, including diagnosis, follow-up and program evaluation. [22]

A CRC screening program requires a large amount of infrastructure including colonoscopy services, pathology services and access to General Practice (GP) services. This has been of concern in the past, and continues to pose a challenge to the current Government. This is discussed at length in Part 5.

There is consideration of cost-benefit issues. [22]

The cost of treating CRC increases dramatically with the stage of the cancer. An Australian study found costs vary from \$A1,250 for removal of non-cancerous polyps to over \$A23,400 for treatment of later stage CRC. [31] In the past, it has been found that inadequate data existed to evaluate cost-effectiveness. More recently, it has been found that based on overseas studies, Faecal Guaiac Test (FGT) CRC screening appears to be cost-effective; however, the benefits are at best modest. Other screening modalities (flexible sigmoidoscopy, colonoscopy and Faecal Immunochemical Test (FIT)) are expected to bring greater benefits, but supporting Randomised Controlled Trial (RCT) data is not yet available.[6]

There is a suitable test. [22]

There is high quality evidence, ideally from randomised controlled trials, that a screening program is effective in reducing mortality or morbidity. [22]

The natural history of CRC is well understood: CRC is known to develop from a benign adenoma to an adenocarcinoma over a period of 5-10 years.[32,33] It is in this 5-10 year window that a screening program may be able to detect an early stage cancer. Treating CRC at Stage A, leads to a five-year survival rate of 88%, whereas treating CRC at Stage D had a far worse prognosis – a five-year survival rate of 7%. This underlines the need to detect CRC at an earlier, more treatable stage.[8]

There are many suitable tests to screen for CRC, however none has conclusively been shown to be superior to any others. The tests vary in acceptability based on individual’s preferences and their willingness to undergo an invasive test. A collection of screening tests is presented below (summarised in Table 3), together with the evidence for its efficacy.

Table 3: A comparison of the relative benefits of the various screening tests for Colorectal Cancer and colonic polyps [11]						
Beneficial screening characteristics	Faecal Guaiac Test	Faecal Immunochemical Test	Flexible Sigmoidoscopy	Barium Enema	Colonoscopy	Virtual Colonoscopy
Low cost	++++	+++	++	++	+	+
Convenient	++++	++	++	+	+	+
Easily Accessible	++++	+++	+++	++	++	+
Noninvasive	++++	++++	++	++	+	++
Safe	++++	++++	++	++	+	++ ^a
High Sensitivity	+	++	++	++	++++	+++
Relatively specific	+	++	+++	++	++++	++
Does not require a second (diagnostic)	+	+	++	+	++++	+
Therapeutic	+	+	++	+	++++	+
The above relative scale ranges from poor (-) to excellent (++++)						
^a Serious concerns have been raised about radiation risks to asymptomatic patients from mass screening of the general population						

Faecal Guaiac Test (FGT)

Colonic polyps and CRCs contain badly formed leaky capillaries which often bleed[34] microscopic amounts of blood intermittently. When a stool sample containing blood undergoes the guaiac test, a reaction occurs with an enzyme called peroxidase in blood to give a positive result.[11] The detection of blood is often followed up with diagnostic colonoscopy.

Specificity is increased by avoiding ingestion of broccoli, cauliflower, red meats and discontinuing aspirin and iron therapy for three days before the test. If these guidelines are not followed, false

positives and unnecessary follow-up can result.[11] Sensitivity of FGT for detection of CRC is at best 85%, and specificity is less than 50%.[11] RCTs have found that FOBT can decrease mortality by 15-33%.[35-37]

FGT is regarded as non-invasive, safe and convenient, making it a relatively acceptable test and a test that is likely to have a relatively higher compliance rate.

Faecal Immunochemical Test (FIT)

FIT aims to detect blood in stool, but does so by a different method to FGT. The FIT works by detecting a protein present in human haemoglobin (the main constituent of human red blood cells) in the sample.[11] Sample collection for the FIT only requires swishing a brush over the stool rather than collecting an actual stool sample (that is required for the FGT), making it a simpler process. [34]Diagnostic colonoscopy following a positive result is common to both the FGT and FIT.

The FIT has been found to be more sensitive than the FGT.[38] FIT has been found to reduce colon cancer mortality by almost 70% compared with unscreened controls.[39]

Advantages of the FIT include being non-invasive, safe and convenient and as opposed to the FGT, does not require any dietary or medication restrictions. However, FIT is a more expensive test than the FGT.

Barium enema

A barium enema aims to identify abnormalities in the lining of the colon and rectum. A liquid known as barium sulphate is swallowed and a series of X-rays is taken as the liquid moves through the bowel.[40] This test is being replaced by virtual colonoscopy (see below). Diagnostic colonoscopy will most likely follow a positive finding, depending on the size of the polyp.[11]

Most available information is derived from observational studies as no RCTs of its efficacy have been conducted.[34] Rex et al. found that barium enema had a sensitivity of 80% for the detection of CRC, but was far less sensitive at detecting colonic polyps.[41] In a study comparing colonoscopy to double contrast barium enema (DCBE – when air is inserted into the bowel in addition to the barium sulphate for better visualisation), DCBE had a sensitivity of 48% (polyps >1 cm) and a specificity of 85%.[42] DCBE is only indicated if colonoscopy is not available due to its inferior performance.

A low level of risk is associated with barium enema including the risk of bowel perforation (1:25,000) and risk of death (1:55,000).[43] The need for bowel preparation may reduce compliance rates.

Flexible sigmoidoscopy

A flexible sigmoidoscope is a colonic probe that is inserted into the rectum and visualises the distal bowel. The proximal colon cannot be visualised, although 35% of CRC occurs here.[44] Flexible sigmoidoscopy is invasive and requires bowel preparation, therefore healthy people may be unwilling to undergo this when they perceive themselves as asymptomatic.[9] Furthermore, the test is performed without sedation and many patients experience some discomfort.[9] Other challenges involved in using flexible sigmoidoscopy as a screening method are the high level of training required to administer the test, and the need for diagnostic colonoscopy (and a second bowel preparation) for follow-up – only biopsy is possible using a sigmoidoscope.[9]

The efficacy of flexible sigmoidoscopy has not been proven, as no RCTs have been conducted. A case-control study reported a reduction of 70% in the incidence of distal cancers in patients reporting a single flexible sigmoidoscopy.[45]

Colonoscopy

Colonoscopy is the gold standard for diagnosing and removing polyps and CRC. It has the advantage of being both a screening and diagnostic test, so that a polyp can be removed as soon as it is detected. Yet, as a screening tool, colonoscopy is resource intensive, expensive, invasive and uncomfortable.[11] The risk of bowel perforation and death are 1:1,000 and 1:10,000 respectively. [29]

Sensitivity of colonoscopy is high, with one study[41] finding a miss rate of only 6% for large colonic polyps and a miss rate of 27% for small (<0.6cm) colonic polyps. Colonoscopy is also a highly specific test.[11] RCTs of screening using colonoscopy have yet been conducted.[46]

Virtual Colonoscopy

CT colonography non-invasively creates a three-dimensional image of the colon by combining multiple helical CT scans with the help of a computer program.[47] It requires high level of skill to interpret CT images, a bowel preparation to minimise false positives, and a positive result will require diagnostic colonoscopy and a second bowel preparation. Compliance may be increased due to the non-invasive nature of the test.[48] The risk of radiation-induced cancer is similar to the risk of bowel perforation on colonoscopy.[49]

Sensitivity for detecting a polyp greater than 10mm was found to be 55%-94% in three recent large studies.[50-52] Yet, virtual colonoscopy is still regarded as an evolving technique and is not currently recommended as the primary method of screening for CRC.[53]

The decision to proceed with a national screening program is not straightforward. Barriers to implementation of a national screening program include limited evidence for efficacy of different screening tests, workforce shortages, and potential inequalities in participation. However, CRC is an important disease for NZ, with a window of opportunity to allow for intervention and early treatment. Part 4 and Part 5 will discuss the historical approach to CRC screening in NZ, and the potential challenges faced in regard to CRC control in the future.

PART 4

What is being done in New Zealand?

On the 30th of May 2008, former Labour Minister for Health, David Cunliffe and former Labour Associate Minister for Health, Damien O'Connor announced the fast-tracking of the creation of a national CRC screening program.[54] Initially, a roll-out of a national program was planned to be implemented by the end of 2011.[55] The newly elected National government have updated the roll-out date to before 2014, based on new projections.[56] This section will review the history of NZ's journey towards a national CRC screening program and will delve into some of the pressing issues and challenges the current government faces in proposing the implementation of this screening program.

The Initial Rejection of a Colorectal Cancer Screening Program

In 1998, an independent working party was commissioned to critically appraise the literature available (up until May 1998) and weigh up the benefits and adverse effects of screening in a NZ context. Based on "the modest potential benefit, the considerable commitment of health sector resources and the small but real potential for harm, population-based screening for CRC with faecal occult blood tests [was] not recommended in New Zealand" in 1998.[57]

The report underlined the fact that no RCTs had been conducted into screening by other modalities (i.e. flexible sigmoidoscopy, colonoscopy or double-contrast barium enema). As no evidence existed to show these screening modalities could lead to a decrease in CRC mortality, a possible screening program using these screening tests could not be recommended either. However, the report advised that this decision be reviewed as new information became available, and recommended that NZ actively participate in international research in CRC screening.

Finally, the report recommended that guidelines be developed concerning the surveillance recommendations for groups identified to be at a higher risk of bowel cancer.[57]

The Development of Surveillance Guidelines for those at Increased Risk of Colorectal Cancer

In 1999, a subcommittee of the original working party was formed to develop the recommended guidelines and used an evidence-based approach to review the literature.

The report found that the average New Zealander has a 0.6% risk of developing CRC by the age of 55 years, and 5.6% by the age of 75 years. Four groups were identified as being at increased risk of CRC: individuals with a family history of CRC; individuals with a personal history of CRC; individuals with a colorectal adenoma; and individuals with inflammatory bowel disease. These groups were advised to undergo colonoscopy at defined intervals to detect possible CRC at an earlier stage.[10]

In those individuals with a possible hereditary bowel cancer syndrome, offering genetic counselling and a referral to a familial bowel cancer registry was advised. Surveillance colonoscopies were recommended to be carried out by experienced operators, and the individual should be made aware of the rare but possible risk of the procedure.[10]

It must be noted that these individuals who have been recognised to be at higher-than-average risk would not participate in a potential population-based screening program.

Review of the Previous Decision, and Moving Forward

In early 2005, the National Screening Unit (NSU) appointed a Colorectal Cancer Screening Advisory Group to review the decisions formulated by the 1998 Working Group. The rationale for a review of the previous decision was the publishing of the evaluation reports of recent CRC screening pilots held in the UK[58] and Australia[27], as well as long-term follow-up data of RCTs of FOBTs.[35-36]

The report recommended a feasibility study of CRC screening with FIT as the screening test to be undertaken in NZ. A feasibility study is defined as “a preliminary study undertaken to determine and document a project’s viability”.[59] The Colorectal Cancer Screening Advisory Group specifically noted that a feasibility study should occur prior to the decision about a national screening program. Although the terms ‘feasibility’ and ‘pilot’ studies are used synonymously in most literature, the term ‘feasibility study’ was used in this context to underline the fact that the NZ government had not yet committed to a national screening program on publication of the report in 2006. This feasibility study was noted to be a pre-requisite to a decision regarding a pilot study.[6]

The working party recommended an initial phase of the feasibility study where the FIT positivity rate is modified throughout to determine the optimum positivity rate. This was successfully achieved in the Australian CRC Screening Pilot. [27]

Screening with flexible sigmoidoscopy and colonoscopy was not recommended to be reconsidered until RCT evidence becomes available. The Ministry of Health and the NZ Cancer Control Council were encouraged to consider participating in a Nordic multicentre colonoscopy trial.[6]

The working party also made a number of recommendations to optimise diagnosis, and treatment of CRC in NZ. These included the expansion of colonoscopy capacity to adequately diagnose symptomatic patients, and to provide timely provision of surveillance colonoscopy in accordance with the newly published 2004 guidelines.[10] Development of agreed parameters for performance of colonoscopy, standardised endoscopy training and a consensus on methods of treating CRC surgically and oncologically, and reporting pathology were also encouraged. Policy work on the effect of CRC screening and surveillance on the pathology workforce was also underlined as a priority.[6]

Finally, the working party recommended that the inequalities between Māori and Pacific peoples, and non-Māori, non-Pacific peoples in terms of increasing CRC mortality rates be investigated and addressed with urgency. Any potential CRC screening program should be sensitive to the needs of Māori and collaborate closely with Māori health providers.[6]

Towards a Feasibility Study

In accordance with the recommendations of the Cancer Screening Advisory Group, a further report was released in March 2008, detailing the practical aspects of implementing a feasibility study. This report was compiled by members of the Department of Health at the University of Otago.[59]

The authors recommended a prevalence and incidence round, of minimum four years duration, with a minimum of two years allowed for planning for the feasibility study. A multicentre study with a minimum of two sites should be planned. Each site should have a diverse ethnic population; an urban and rural mix; personnel with capacity and experience to deliver and manage a screening program and; willingness of local health professionals to participate in a screening feasibility study. A minimum of 60 000 people must be invited for screening to ensure a satisfactory number of cancers are detected and a satisfactory number of Māori are screened – this ensures adequate explanatory power for participation and test positivity rates. These pilot sites must be chosen early so that they can contribute to the decision making process.[59]

An important focus of the feasibility study will be eliminating inequalities. This focus will be particularly in mind when determining screening age range, method of delivery of screening to Māori and Pacific populations and method of disseminating the invitation to screen. The feasibility study will also help to elucidate the optimal type of FOBT to use, and the role of different health professionals, particularly General Practitioners in the screening pathway.[59]

As identified in the *New Zealand Guidelines for Surveillance and Management of Groups at Increased Risk of Colorectal Cancer*,[10] a separate approach towards individuals at increased risk of CRC, and thus not eligible for FOBT screening must be determined at the outset of the feasibility study.

The Current Situation in New Zealand

As outlined above, on the 30th of May 2008, the former Health Minister, David Cunliffe announced the fast-tracking of the creation of a national CRC screening program.[54] By August 2008, a six-member taskforce had been established to provide guidance on the development and implementation of the CRC screening pilot. The taskforce includes medical specialists, a member of the nursing profession and a specialist in public health medicine. Initially, it was aimed to implement the CRC screening pilot by the end of 2009 and roll out a national CRC screening program from the end of 2011.[55]

On the 8th of November 2008, a new National government was elected in NZ. Consequently, new policies changed the outlook on a National Screening Program. Although the new government shares the view that a pilot program can commence in 2009, a national roll-out is now aimed to begin before 2014. Funding for preliminary work has already been secured for work in the 2008/09 year; however a bid to fund the pilot program will need to be made for consideration in the 2009 Budget.[56]

Key requirements for a national program have already been identified by the Taskforce. As well as deciding on the exact screening pathway, a population based register and information system must be established to coordinate invitation, recall and tracking of participants through the pathway. Workforce capacity has been identified as a potential challenge, and ensuring there are adequate colonoscopy and pathology services will be a priority. District Health Boards have been provided with additional funding for additional colonoscopy procedures. Additional training for colonoscopists is also being facilitated. Other initiatives of the Ministry of Health include the development of a National Familial Bowel Cancer Registry and a national surveillance program for high risk

populations, guidelines for people with suspected cancer, and undertaking an audit of CRC surgery.
[56]

Given the importance of CRC in NZ, being accountable for the highest number of new cancer registrations in 2005, it is promising that the Government has announced a concrete date for implementation of a national CRC screening program. It has been estimated that a CRC screening program using FOBT would prevent 44 deaths in men and 35 deaths in women annually in NZ.[60] However, some commentators have reservations about the time-frame set to roll out the national program.[61-62] In any case, a number of issues will prove challenging to Government while implementing a national screening program.

PART 5

Potential Future Challenges in establishing a New Zealand National Colorectal Cancer Screening Program

Workforce shortage

The issue of workforce shortage has been recognised since NZ first considered a potential national screening program. Colonoscopy resources are a major area of concern. A positive result from any of the screening modalities will ultimately result in referral for colonoscopy, as well as follow-up colonoscopy three months after a positive screening test, or following removal of a benign adenoma. In the 1998 Working Party report, demand for colonoscopies was estimated to rise by 33-40%, should a screening program be introduced. This was not judged as a feasible option, as the public hospital system was already struggling to meet the colonoscopic demands of symptomatic patients at that time.[57]

A recent NSU-commissioned study investigated the colonoscopy capacity in NZ's public hospitals. Only 3 of 7 large centres, and 11 of 17 small centres were able to offer a diagnostic colonoscopy to patients with symptoms suggestive of CRC within 3 months of referral – and at the time of survey, 828 patients had been waiting greater than 6 months. At the time of the survey, 2,550 patients had been waiting more than 6 months for surveillance colonoscopy. The main limiting factors of colonoscopy provision were availability of endoscopy nurses and endoscopists.[63] A separate literature review, also commissioned by the NSU, also found that at time of publication (June 2007), public hospitals cannot deliver timely diagnostic or surveillance colonoscopy.[60]

Former Associate Minister of Health, Mr Damien O'Connor, acknowledged this was a consideration - upon announcing the roll-out of the national program in May 2008. He stated that it was recognised that at least 20 extra clinicians are needed to perform colonoscopies for the national program. [54] He has also stated that the necessary workforce development will happen alongside the pilot. [61] In addition, the Royal College of Pathologists of Australasia has pointed out the program will potentially add hundreds of hours of work to an already stretched pathology workforce.[61]

As recognised in the colonoscopy capacity study, availability of endoscopists and endoscopy nurses is the main limiting factor to achieving colonoscopy targets.[63] There appears to be three solutions to this problem. Firstly, an absolute increase in the number of doctors admitted to training programs where endoscopy is taught (i.e. general surgery, gastroenterology, colorectal surgery) would result in an increased number of qualified endoscopists. However, this solution will have little effect in the short run. Secondly, other health professionals could be trained in performing endoscopy. An audit of 100 patients of a nurse practitioner-led CRC screening clinic in South Australia revealed 'service and procedural outcomes that compared favourably with other colorectal screening services as well as a high level of patient satisfaction'. [64] Within the UK, there are over 200 nurse endoscopists but none are employed in NZ. This solution seems a less likely option, as it has been found that only 25% of public units and none of the private units surveyed in NZ would be willing to employ or train non-physician endoscopists to perform colonoscopy.[6] Thirdly, Overseas Trained Doctors (OTDs) could be recruited to fill the workforce shortage. In 2003, OTDs comprised 34% of the medical workforce in NZ.[65] This is a realistic option; however OTDs have noted difficulties in initially integrating into

their work role and understanding the NZ medical working environment. [65] A locally-trained doctor may move more seamlessly into the NZ work environment. Health ethicists may also argue that by recruiting these OTDs, NZ is contributing to the 'brain drain' effect, depriving poor countries of their highly skilled professionals.[66]

Evidently, workforce shortage remains an important problem for policymakers to address. The workforce shortage will be more strongly felt in rural and remote areas which can lead to inequalities in healthcare delivery.

Lowering Inequities between Māori and Non-Māori

As described in Part 2, although Māori are less likely to be diagnosed with CRC, they are more likely to die from CRC than non-Māori.[56] This translates as a reduced survival of Māori compared to Non-Māori.[19,67]

Under the Treaty of Waitangi (NZ's founding document), it must be ensured that Māori enjoy at least the same level of health as non-Māori.[68] A history of colonisation and urbanisation has impacted strongly on Māori development and the socio-economic position of Māori in today's society.[69] It is recognised that Māori are more likely than non-Māori to live in more deprived socio-economic circumstances, and are likely to experience worse health outcomes than non-Māori who experience the same level of social and economic deprivation.[70]

The increased death-to-registration ratio for Māori compared to non-Māori indicates that once diagnosed, Māori have a worse prognosis than non-Māori.[14] This can be attributed to under-utilisation of primary and tertiary services and late presentation of cancer. Some of the barriers to accessing health services for Māori include: cost; location of services, particularly in relation to travelling distances and attitudes towards services, including reluctance to attend GP clinics and embarrassment.[68]

It has been shown that CRC outcomes are improved if undertaken by surgeons who experience large caseloads.[71-73] However, two separate studies looking into rural CRC surgical management found that a low-volume hospital environment was not a significant barrier to quality of CRC care, and good results can be achieved.[24-25] As 1 in 6 Māori live in rural areas[74], (and are more likely to live in a rural area than non-Māori[75]), the geographical accessibility to high-quality CRC treatment is promising. However, the reduced survival rates for Māori highlight the need to overcome other barriers to treatment. One possibility is increased utilisation of Kaupapa Māori, or 'by-Māori, for Māori' health services. Māori health workers can treat patients with reference to the Māori holistic health philosophy (hauora).[68] A Māori patient may feel more comfortable when their treatment is administered by a health professional that understands his cultural context.

The 2006 Advisory Group Report underlined the need to build alliances with relevant Māori organisations (such as the Māori Medical Practitioners Association, Māori Nurses Organisation, and Māori Development Organisations) to increase Māori participation rates in a potential screening program.[6] A 2006 consumer study of acceptability and knowledge of CRC screening was commissioned by the NSU. Māori participants stated that they would be more likely to consider the test if it were recommended to them by their local Māori health provider, GP, community worker or nurse. [76]

The lessons learnt in Australia's CRC screening pilot in regards to tailoring the program to its indigenous populations, may prove useful in a NZ context. It was decided that a public awareness campaign should be commenced in tandem with the national screening program, and this campaign should take the indigenous cultural context into consideration. Educational material, and instructions distributed with the FOBT in the mail should be written in simple concise English and other languages where possible. The availability of mobile colonoscopy services was viewed as a possible solution to the shortage in some rural areas.[27]

The inequalities between Māori and non-Māori must be combated from a number of different angles, including increasing literacy levels, socioeconomic status and living conditions. To allow adequate participation of the Māori population in a national CRC screening program, these barriers to healthcare must be addressed.

Is a screening program the only way to combat the problem of Colorectal Cancer in New Zealand?

A screening program is known as secondary prevention – detecting an illness before it becomes symptomatic.[77] Primary prevention is the avoidance of new illness by eliminating risk factors for the illness from an individual's lifestyle or environment.[77] It is estimated that primary prevention could potentially prevent 81 deaths in men and 77 deaths in women from CRC each year. Eliminating the frequency with which individuals in NZ demonstrate the risk factors for CRC (as outlined in Part 1), may be the key to lowering the incidence of CRC.[60]

An anonymous telephone questionnaire was conducted in 2001 in NZ to elucidate the perceptions of NZ adults about reducing their risk of cancer. Nearly 90% of respondents considered there were things which people could do to reduce cancer risk, however over half of respondents could not name any risk-reduction measures.[78] It is recognised that public knowledge is an important prerequisite for behaviour change[79] and awareness of risk factors is associated with increased participation in cancer screening programs. [80] To increase the level of participation in a potential CRC screening program and to educate the public about the risk factors for CRC, an increased level of public awareness campaigns could be beneficial.

NZ has implemented a number of strategies to educate the public about benefits of behaviour change. In 2003, the Healthy Eating – Healthy Action: Oranga Kai – Oranga Pumau strategy was launched with the aim of disseminating information to the NZ public in regards to the importance of nutrition and physical activity.[81] Low levels of physical activity, low fruit and vegetable consumption, high fat and alcohol intake are purported as risk factors for CRC.[11] In 2007, the first social marketing campaign to result from this strategy was launched. "Feeding our Futures" aimed to educate parents and caregivers about achieving healthy diets for their children.[82] By attempting to change children's eating behaviours from a young age, it is hoped that cancer incidence (including colorectal) will decrease in the long term.[83] It is estimated that if everyone consumed 350g/day of fruit and vegetables, a maximum of about 70 deaths in men and 67 deaths in women could have been prevented.[60] It is estimated that the average Body Mass Index (BMI) will rise by 1.3kg/m² over the next decade.[84] Eleven male and ten female deaths could be prevented annually if the expected increase in average BMI could be restricted to 1kg/m². It will remain to be seen how the Healthy Eating – Healthy Action strategy is able to change people's behaviours, and thus cancer risk.

The NZ Government has long been warning of the dangers of tobacco consumption, a recognised risk factor for CRC. The “Every cigarette is doing you damage” campaign has been televised for many years, and was adapted from the National Australian Tobacco Campaign.[85] In June 2008, a world-first quit smoking program by mobile phone was launched in NZ.[86] The *It’s about whānau* campaign, comprised of a number of unscripted interviews from a diverse range of Māori ex-smokers and was aimed to empower Māori to quit smoking in a non-confrontational fashion. [85]

The Alcohol Advisory Council of New Zealand has been working since 1976 to encourage responsible use and minimise misuse of alcohol.[87] Their campaigns have also been carefully planned to provide information to the general population, but also tailored to the Māori population. Released in April 2008, the *It’s not the drinking* campaign encourages responsible drinking as opposed to binge-drinking. The television campaigns aim to change behaviours by demonstrating the dire consequences that can arise from excessive drinking.[88] Although past campaigns have not concentrated on the link of alcohol consumption with cancer, this could be the focus of a potential future campaign.

The elimination of risk factors is hoped to prevent the development of CRC, however another form of primary prevention may contribute to the decreased incidence of CRC. A study published in July 2008 found evidence that a colon cancer vaccine may one day be possible. Currently, however, the study has only been conducted in mice. Further work must be carried out to see if the human cancer development can be halted using the same scientific procedures. [89,90]

Finally, the option of increasing survival of CRC patient through better surgical and oncological intervention exists. It is estimated that improvements in surgical practice and reorganisation of surgical services together with improved use of radiotherapy and chemotherapy could prevent 82 deaths in men and 78 deaths in women from CRC annually. [60]

A 2006 study aimed to delineate chemotherapy prescription patterns in colon cancer. Oncologists responding to the survey sometimes prescribed different combinations of drugs based on whether the patient was in the private sector. This indicates that prescription patterns may be influenced by the patient’s capacity to pay for the drugs. Health care in NZ is largely government funded and treatment practices are, at times, limited by funding restrictions. CRC survival rates may improve if more effective drugs (that may also be more expensive) are funded by the Government for patients. [92] A NZ study compiling data from a single university surgical unit identified factors that were associated with good cancer-specific survival rates. These factors included low operative mortality rates, low local recurrence rates in rectal cancer, the increasing use of adjuvant therapies, and careful follow-up to detect. Survival rates following treatment for CRC will hopefully increase as NZ doctors continue to draw on international updates in knowledge.

In conclusion, the future of CRC in NZ will depend strongly upon the actions of the ruling Government during their term. The commitment to roll out a national CRC screening program is promising; however the challenges posed by workforce shortage and eliminating inequalities will need to be dealt with. Furthermore, by continuing to change behaviours through the funding of public education programs, NZ citizens will hopefully not only reduce their lifetime risk of CRC, but also increase their overall health and wellbeing as well.

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