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EXPERT REVIEW

Colorectal cancer: Screening, prevention and monitoring

Making Education Easy 2024

About the speakers

Dr Maggie Chapman-Ow

Maggie is an NZ-trained, highly experienced gastroenterologist and endoscopist, with a special interest in polyp conditions, bowel cancer, and familial syndromes. After completing her training in Auckland, she undertook her fellowship in the UK and was awarded her MD doctorate. In addition to working in private practice, Maggie is a consultant specialist at Auckland City Hospital and accredited by the National Bowel Screening Programme to perform screening colonoscopy. She is also a Senior Lecturer with University of Auckland.

Ms Kylie Russell

Kylie is an NZ-registered dietitian with over 15-years' experience in both public and private practice across Auckland. She is experienced in working with a variety of medical and surgical specialties, with a particular specialisation in gastrointestinal disease and surgery. Her scope of practice is endorsed with prescribing rights.

Mr Julian Hayes

Before joining Auckland City Hospital as a colorectal and general surgeon in 2007, Julian was employed as a Consultant and Senior Lecturer in the University Department of Surgery at Dunedin Hospital. His research includes the development of a "fast-track" recovery pathway for patients having laparoscopic colorectal surgery. Julian spent 2 years in colorectal training in Adelaide and Brisbane, gaining experience in laparoscopic colorectal surgery alongside surgeons considered world leaders in this field.

Abbreviations used in this review
ASA = American Society of Anaesthesiologists
CEA = carcinoembryonic antigen
CT = computed tomography
FIT = faecal immunochemical test
FOBT = faecal occult blood test
GP = general practitioner
HCP = healthcare professional
IBD= inflammatory bowel disease
WHO = World Health Organization

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This publication summarises a Goodfellow Unit Webinar by Dr Maggie Chapman-Ow, Ms Kylie Russell, and Mr Julian Hayes, who spoke on colorectal cancer screening, the role of diet in the prevention of colorectal cancer, and monitoring for recurrence following curative surgery. The Webinar and this review are sponsored by Allevia Hospitals.

The webinar is available from: https://www.goodfellowunit.org/events-and-webinars/colorectal-cancer-screening-prevention-and-monitoring

COLORECTAL CANCER SCREENING

Dr Maggie Chapman-Ow – Gastroenterologist and an accredited BSP Screening Colonoscopist

Introduction

Dr Chapman-Ow explained the four stages of colorectal cancer. In Stage 1, the cancer has penetrated the lining, or mucosa, of the colon or rectum, but has not spread to the wall of the organ. In Stage 2, the cancer has spread to the walls of the colon or rectum, but hasn't affected the lymph nodes or nearby tissues. In Stage 3, the cancer has moved to the lymph nodes, but not to other parts of the body – usually, one to three lymph nodes are involved at this stage. In Stage 4, the cancer has spread to other distant organs, such as the liver or lungs.

According to New Zealand data from 2020 on the distribution of colorectal cancer stage at diagnosis, 29.1% of cases were Stage 1, 17.5% Stage 2, 28.8% Stage 3, and 24.6% Stage 4.[1] Dr Chapman-Ow explained that the earlier colorectal cancer is diagnosed, the better the outcome, and this is clearly demonstrated in survival data such as that of the International Cancer Benchmarking Partnership (ICBP) SURVMARK-2 project, which found a significant decrease in 5-year colorectal cancer survival across seven high-income countries from 2010 to 2014 in later- versus earlier-stage diagnosis; 95%-64% for those presenting with Stage 1 to 3 disease, versus <20% for patients presenting with Stage 4 disease.[2]

Faecal immunochemical test (FIT) screening

According to Dr Chapman-Ow, unpublished data suggests that around 4-5% of individuals undergoing their first faecal immunochemical test (FIT) as part of the National Bowel Screening Programme will have a positive result. However, a positive FIT test does not definitively mean that a patient has cancer, with only a small proportion (6-7%) subsequently diagnosed with colorectal cancer. However, the rate of advanced adenoma among those with a positive FIT is around 25% and the combined rate for cancer, adenoma and advanced adenoma is almost 70%.

Dr Chapman-Ow explained that screening with FIT diagnoses cancer at earlier stages, with unpublished data from Auckland showing that just over half of patients with a screening-detected colorectal cancer present with Stage 1 cancer and that very few present with Stage 4 cancer (**Figure 1**). She added that participation rates in the National Bowel Screening Programme sit at around 50 to 60% and emphasised the need for further work to improve these rates. Furthermore, the participation rates for Māori and Pacific People are lower and work to engage these populations is ongoing (**Figure 2**).

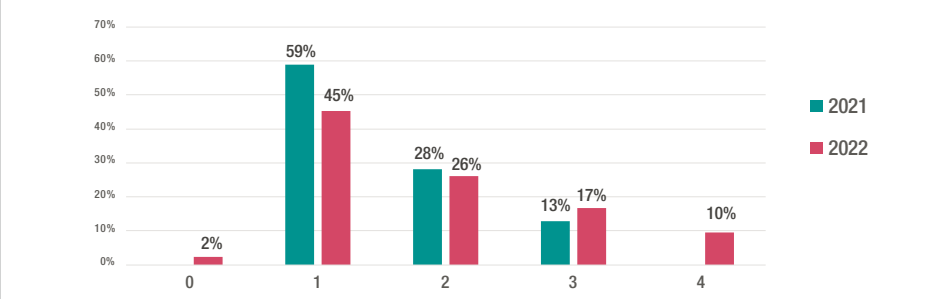

Figure 1. Cancer stage at FIT screening at Te Toka Tumai Auckland City Hospital (unpublished data).

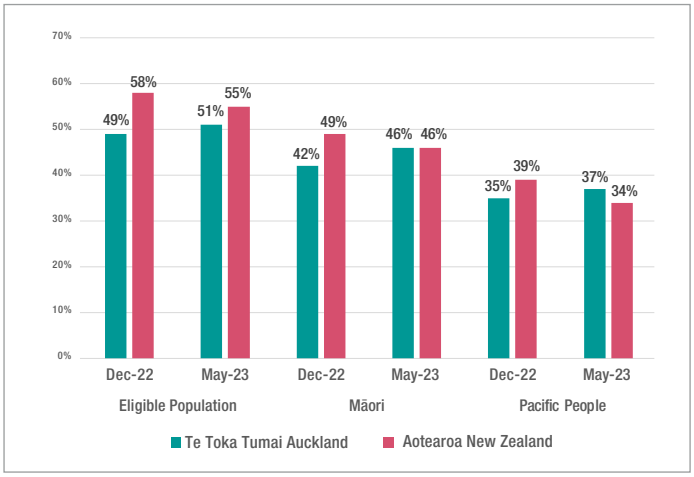

Figure 2. Participation rates in the National Bowel Screening Programme in Auckland and across Aotearoa New Zealand in December 2022 and May 2023 (unpublished data).

What happens after a positive FIT result?

Dr Chapman-Ow presented New Zealand data showing that approximately 80% of those with a positive FIT will undergo a screening colonoscopy under the programme, while around 7% will undergo this procedure in the private sector. The data also show that approximately 2% of patients will undergo screening colonoscopy under the symptomatic pathway, as these individuals have already been referred due to symptoms, 3% will undergo a CT colonography (sometimes due to comorbidities of other risk factors making them unsuitable for colonoscopy), 4% will decline investigation, and 4% will be deemed not suitable for investigation (having had a colonoscopy in the last 2-5 years is an exclusion criteria, although the quality of the colonoscopy should be taken into account). Dr Chapman-Ow added that CT colonography is not equivalent to colonoscopy for screening purposes and this should be discussed with the patient.

FIT outside the screening programme

According to Dr Chapman-Ow, patients sometimes ask about undergoing FIT screening or a faecal occult blood test (FOBT) as a self-funded test. However, these patients will not meet screening criteria to have a screening colonoscopy under the Bowel Screening Programme should they test positive. She explained that in these cases, the patient could be referred for symptomatic screening should they have symptoms, and that it is important to ask patients about any such symptoms. Furthermore, evidence of iron-deficiency anaemia also meets the criteria for funded colonoscopy. Alternatively, the patient could have their colonoscopy in the private sector.

Dr Chapman-Ow pointed out that the age criteria set by National Bowel Screening Programme is influenced by factors including resources. The screening age is from 60 to 74 years, and from 50 to 74 years in some parts of the country for Māori and Pacific Peoples. She explained that New Zealand data show that approximately 45 to 50% of Māori and 25-30% of non-Māori diagnosed with colorectal cancer are under the age of 60 years, and thus outside of the criteria set by the screening programme.

A negative FIT result

Although a negative FIT is reassuring, Dr Chapman-Ow points out that it is not a guarantee that the individual is free from colorectal cancer. She explained that the sensitivity of FIT in New Zealand is approximately 80%. Data from the US show that while the sensitivity of FIT is lower than that of colonoscopy for detecting colorectal cancer (74% vs 95%), it is substantially lower for predicting adenoma; 7.6% versus 75% for adenomas ≤5 mm, 7.6% versus 85% for adenomas 6-9 mm, 23.8% versus 95% for adenomas ≥10 mm.[3]

Dr Chapman-Ow explained that patients presenting with symptoms of bowel cancer but a negative FIT result should be referred for colonoscopy via the symptomatic pathway. She added that some insurance companies cover screening colonoscopy without the need for FIT screening.

Indications for surveillance

Dr Chapman-Ow pointed out that FIT screening is not appropriate for those at higher risk of colorectal cancer. Patients with a history of polyps or adenomas should have ongoing surveillance and not be falsely reassured by a negative FIT. She added that other criteria for surveillance include patients with IBD, those with a personal or family history of syndromes (serrated polyposis syndrome, oligopolyposis), and those with a family history of colorectal cancer. Updated polyp surveillance guidelines are available from: https://www.health.govt.nz
A family history of colorectal cancer means a first-degree relative diagnosed <55 years of age, two or more first-degree relatives (on the same side) diagnosed at any age, or multiple relatives on the same side diagnosed.

TAKE-HOME MESSAGES:

- Screen-detected colorectal cancers are found at an earlier stage, which translates to better treatment outcomes
- Participation in screening should be encouraged by GPs and other healthcare professionals
- A positive FIT result correlates to an approximate 6-7% risk of cancer
- A negative FIT result is not a guarantee, and symptoms and background risk are important considerations for surveillance
- Special circumstances not easily addressed as part of the screening programme include those undertaking FIT or FOBT outside the programme and those with recent colonoscopy.

THE ROLE OF DIET IN THE PREVENTION OF BOWEL CANCER

Ms Kylie Russell – Specialist surgical and gastroenterology dietitian

Introduction

Ms Russell explained that it is very difficult to directly study the impact of diet on cancer risk, and that epidemiological data is used to give insight. She cited The World Cancer Research Fund (WCRF)/American Institute for Cancer Research's (AICR) 2018 report on Diet, nutrition, physical activity and colorectal cancer as an excellent resource.[4] The report includes data from 99 studies involving 29 million adults and 247,000 cases of colorectal cancer.

According to the findings of the WCRF/AICR, there is strong evidence that red meat, processed meats, alcohol, overweight, obesity and being tall increase the risk of colorectal cancer, while physical activity, wholegrains, dietary fibre, and dairy products decrease the risk.[4] Furthermore, there is some evidence that consuming foods containing haem iron and low consumption of lower starch vegetables and fruits increases the risk of colorectal cancer, and that foods containing vitamin C, fish, vitamin D, and multivitamin supplements decrease the risk.[4]

Ms Russell explained that in addition to a good diet, 150 minutes of moderate-intensity physical activity per week is recommended by the WHO to decrease the risk of cancer.[5] She added that physical activity reduces adiposity, thus reducing insulin resistance and inflammation which are both linked to colorectal cancer, and that physical activity stimulates digestion, which may reduce transit time through the gut.

Addressing the issue of overweight and obesity

Ms Russell discussed the well-recognised correlation between overweight and obesity and the higher risk of colorectal cancer. She explained that higher body fatness is associated with changes in hormones, such as increased insulin, and that excess insulin can promote the growth of colon cancer cells and inhibit apoptosis.[4] Furthermore, body fatness can stimulate the body's inflammatory responses.[4]

According to the World Obesity Federation, World Obesity Atlas 2023, 51% of the world's population, roughly 4 billion people, are expected to be overweight or obese by 2035.[6] Ms Russell pointed out that this will also contribute to the burden of many chronic diseases, but that clinicians on the whole are not proactive in diagnosing obesity and having relevant discussions with patients about weight loss. In fact, studies show that only 36% of patients with obesity are diagnosed and that only 21% receive a follow-up consultation related to their weight.[7] A survey of healthcare professionals (HCP) and their patients asking HCPs why they did not address the issue of weight with their obese patient has shown that while 68% of HCPs perceived the patient was not motivated to lose weight, only 20% of patients reported they felt this way.[7] HCPs perceived that the patient was in good health and did not have weight-related comorbidities 39% of the time, while only 10% of patients believed this to be the case. Furthermore, 47% of HCPs believed there were more important health issues to discuss, while only 16% of patients agreed, and 71% of HCPs believed that the patient was not interested in losing weight, while this was true for only 7% of patients. Ms Russell

says that these data were eye opening and have actually changed her practice with regard to how she manages conversations with overweight and obese patients. She adds that such conversations need to be undertaken sensitively.

Improving the diet

Foods that decrease the risk of colorectal cancer

It is well-known that whole grains such as wheat, rice, maize (corn), millet, sorghum, barley, oats and rye reduce the risk of colorectal cancer, and Ms Russell explained that this means consuming the whole part of the seed, which contains the bran, the germ and the endosperm. Wholegrains contain starch and protein along with variable amounts of fibre, B vitamins and other micronutrients that are most concentrated in the germ and outer layers of the grain. Wholegrains are a rich source of various bioactive nutrients and non-nutrient compounds including vitamin E, selenium, copper, zinc, lignans, phytoestrogens and phenolic compounds and dietary fibre. Many of these compounds have plausible anti-carcinogenic properties.

Ms Russell explained that consuming foods containing dietary fibre also decreases the risk of colorectal cancer. Microbial fermentation within the large bowel forms short-chain fatty acids such as butyrate, that have been shown in experimental studies to have anti-proliferative effects on colon cancer cells. Furthermore, dietary fibre reduces intestinal transit time and increases faecal bulk, and high-fibre diets may also reduce insulin resistance, which is a risk factor for colorectal cancer.

The recommendation for fibre intake is around 30 g per day, in the form of wholegrains, non-starchy vegetables, fruit, and pulses (legumes) such as beans and lentils, which should be included in most meals.[4] It is also recommended that 400 g of fruit and vegetables be consumed daily.[8] Ms Russell explained that in order to achieve these targets, fruit and vegetables should be included in every meal. As a guide, she has provided an example of a low- and high-fibre diet (**Figure 3**) and stressed that around 10 g of fibre should be consumed at every meal.

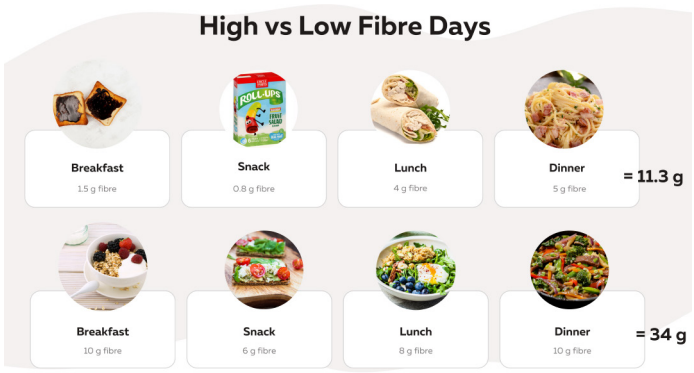

Figure 3. An example of a low- and high-fibre daily diet.

Ms Russell explained that inverse associations have been identified in the epidemiological data between the consumption of dairy products and colorectal cancer and their benefits are largely thought to be due to their high calcium content.[4] Other bioactive constituents include lactoferrin, vitamin D (fortified products), and the short-chain fatty acid butyrate.

Foods that increase the risk of colorectal cancer

Epidemiological evidence suggests that consuming red meat increases the risk of colorectal cancer.[4] Cooking meats at high temperatures results in the formation of heterocyclic amines and polycyclic aromatic hydrocarbons, both linked to cancer development. Haem iron, which is present at high levels in red meat, has been shown to promote colorectal tumorigenesis. Furthermore, fat dropping on hot fire, such as on a barbeque, causes flames and these flames contain polycyclic aromatic hydrocarbons that stick to the surface of food.

Processed meat has also been linked to an increased risk of colorectal cancer. Processed meat is rich in fat and haem iron, which can promote tumorigenesis. Processed meats are often cooked at high temperatures producing heterocyclic amines and polycyclic aromatic hydrocarbons. Furthermore, processed meat is also a source of exogenously-derived N-nitroso compounds, which may have carcinogenic potential. Ms Russell recommends that if you eat red meat, such consumption is limited to no more than about three portions per week. Three portions are equivalent to about 350 to 500 g. If the meat is processed, the recommendation is to consume very little, if any.

Consuming alcoholic drinks has also been found to increase the risk of colorectal cancer.[4] Acetaldehyde, the principal and most toxic metabolite of alcohol, disrupts DNA synthesis and repair and thus may contribute to a carcinogenic cascade. Higher ethanol consumption also induces oxidative stress through increased production of reactive oxygen species, which are potentially genotoxic. Furthermore, higher consumers of alcohol may also have diets that are lacking essential nutrients.

Ms Russell points out that there is strong evidence that drinking alcohol is a cause of many cancers and that there is no safe level of alcohol intake. The evidence justifies the recommendation not to drink alcoholic drinks.

TAKE-HOME MESSAGES:

- Be a healthy weight
- Be physically active
- Eat a better diet
- Limit fast foods
- Limit red and processed meat
- Cut down on sugary drinks
- Limit alcohol consumption
- Don't use supplements for prevention alone (use diet)
- Breast feed (if possible)
- Aim for quality over quantity when it comes to food.

COLORECTAL CANCER FOLLOW-UP: FINDING THE BALANCE

Mr Julian Hayes – Endoscopy/General surgery

Introduction

Mr Hayes explained that colorectal cancer follow-up is a large part of a colorectal surgeon's workload. He emphasised that the aim of follow-up is to detect cancer recurrence at an early stage so that additional curative treatment can be offered and outcomes improved. He reiterated the importance of early detection, and cited data from The New Zealand PIPER Project showing 5-year colorectal cancer recurrence rates of 5% for Stage 1, 22% for Stage 2, 32% for Stage 3, and 60% for Stage 4 disease.[9]

Mr Hayes emphasised that a balance needs to be found between finding a treatable disease recurrence but not over investigating the patient. The latter can lead to both patient and doctor anxiety, and over use of resources. Finding this balance is supported by a Cochrane Review that reported that over investigation for colorectal cancer recurrence following curative surgery for non-metastatic colorectal cancer does not improve survival outcomes.[10]

Treatable recurrence?

With regard to treatable recurrence, Mr Hayes explained that patient fitness and life expectancy are relevant. As an example, a 40-year-old patient who is in good physical shape will be kept a very close eye on for colorectal cancer recurrence for the next 5 years, but for an 80-year-old patient with significant comorbidities the situation may be different. For an elderly patient, it is quite likely that chemotherapy or surgery may not be a good option should they develop a recurrence. He added that one must think very carefully about how much recurrence is chased, considering the options for treatment (radiotherapy; chemotherapy – cytotoxic vs immunotherapy; surgery – liver/lung/local/peritoneal recurrence; palliation).

Interventions

For follow-up, Mr Hayes emphasised the importance of a good talk with the patient, taking their history, and undertaking an abdominal examination including a per rectal examination for those who have had rectal cancer resected. Ideally the patient should be seen twice a year for the first 2-3 years. Other investigations include blood tests (carcinoembryonic antigen [CEA]), imaging (typically CT chest/abdomen/pelvis), and colonoscopy. Mr Hayes explained that in the past, CTs were undertaken more frequently, but Cochrane evidence suggests that once every 18 months to 2 years is adequate, as more frequent CTs do not improve the outcomes. Furthermore, advice should be given on diet and exercise. He added that if the colonoscopy was incomplete at the time of the initial colorectal cancer surgery, a repeat colonoscopy should be undertaken within the first year postoperatively.

Mr Hayes explained that most colorectal recurrences are detected in the first 2-3 years postoperatively. The New Zealand PIPER Project found that 73% of colorectal cancer recurrences occur within the first 2 years following the index operation.[9] New Zealand data also show that over a 5-year period, most (41%) colorectal cancer recurrences were detected by CEA testing, followed by imaging (32%) and clinical signs and symptoms (27%).[9] Most colorectal recurrences were found in the liver, followed by the lung and local recurrence.

Carcinoembryonic antigen (CEA) testing

Mr Hayes pointed out that CEA is a simple blood test and that it is usually performed every 6 months in the first 2 years post colorectal cancer surgery. CEA is a non-specific tumour marker that may be increased in colorectal cancer, but CEA can also be increased in ovarian, gastric, pancreatic, lung and breast cancer, and in IBD, pancreatitis, cirrhosis and smokers. Thus, CEA is currently not used as a screening test. The normal range is 0-3, but this value depends on the laboratory undertaking the test. Mr Hayes added that the trend in CEA levels may be more important than an absolute level, unless the level is ≥10. He explained that with an increasing level of 6, 7, or 8, the CT scan may be brought forward and if it is up to 10 then the CT would definitely be brought forward.

Intensive versus less intensive follow-up

According to Mr Hayes, traditionally in the Auckland area, 3-monthly follow-up was undertaken after curative surgery for bowel cancer. Over the past 20 years, regular Cochrane reviews have investigated the issue of follow-up for colorectal cancer. These reviews, including that by Jeffery M et al., have shown no overall survival benefit to intensifying follow-up after curative surgery for colorectal cancer, despite salvage surgery with curative intent being more likely with intensive follow-up.[10] Mr Hayes explained that between 5 and 10 years ago, the follow-up intervals in Auckland were changed to every 6 months for the first 2-3 years and then yearly out to 5 years.

The Auckland City Hospital colorectal cancer follow-up protocol following curative surgery for Stage 1 to 3 colorectal cancer is as follows:

Stage 1 colorectal cancer follow-up:

- Six-week clinic follow-up then discharge
- Re-refer if any concerns/symptoms
- Follow-up colonoscopy 1-3 years post-operatively (depends on pre-operative colonoscopy).

Stage 2-3 colorectal cancer follow-up:

- Six-monthly clinical review for 2 years, then yearly to 5 years
- CEA blood test 6-monthly for 5 years
- CT (chest/abdomen/pelvis) at 18 months and 3 years post-operatively
- "Exit" CT (chest/abdomen/pelvis) at 5 years, especially if had adjuvant chemotherapy
- If elevated CEA (especially >10) or upward trend then bring forward CT scan
- Consider discharge from follow-up at age 75, or 80 years if patient is very fit (ASA I-II).

TAKE-HOME MESSAGES:

- Stratify risk and follow-up for individual patients
- CEA is still the most useful test for colorectal cancer follow-up
- Don't hesitate to ask/refer
- Find the balance.

QUESTION AND ANSWER SESSION

Q. Is there a place for CEA in screening of patients at high-risk of colorectal cancer?
A. There is currently no evidence to support the use of CEA for such screening. CEA is not specific enough to be used in this manner.

Q. What are the differences between colon, rectal and anal cancer?
A. Anal cancer is usually squamous cell cancer. In the colon and rectum, adenocarcinoma is usually seen. Anal squamous cell cancer is typically related to human papillomavirus (HPV) infection. We should see less anal squamous cell cancer in the next 10 or 20 years due to HPV vaccination. The gold-standard treatment for anal cancer is chemoradiotherapy and typically 70-80% of patients will have a complete response, but those without a response will need resection and a permanent colostomy.

Q. Is there an increased risk of developing colorectal cancer with recurring diverticulitis?
A. There is no increased risk of colorectal cancer with diverticulitis. In patients with complicated diverticulitis, it can be difficult on the CT scan to identify if there is cancer as well. Those patients will often be referred for a colonoscopy.

Q. Is psyllium husk useful as a dietary fibre?
A. Psyllium husk is great for increasing faecal bulk and speeding up transit time. However, fruit and vegetables are a better alternative as they provide extra vitamins.

Q. Is cardiovascular exercise more beneficial than other types of exercise in terms of colorectal cancer prevention?
A. It is not known if one type of exercise is more beneficial.

Q. What is the risk of colorectal cancer in patients with IBD?
A. There is an increased risk of colorectal cancer in individuals with IBD and colonic involvement. The risk is dependent on the degree of chronic inflammation. Those with well-controlled colitis are at lower risk than those with active colitis. The extent of the inflammation is also relevant. Those with proctitis are less at risk than those with left-sided colitis or pancolitis. Risk is also higher in IBD patients with a family history of bowel cancer and those with primary sclerosing cholangitis (which can co-exist with IBD), or strictures. The surveillance intervals for these patients are determined by the above factors. The first surveillance colonoscopy should be undertaken 8-10 years after IBD diagnosis, with intervals varying between 1, 3 and 5 years.

Q. What can be done to encourage Māori and Pacific Peoples' participation in FIT screening?
A. There have been a number of engagement programmes over the last few years to increase Māori and Pacific Peoples' participation in FIT screening? Raising awareness and education is important. This is an ongoing goal, but encouragingly, the increase in community engagement has already translated to increased participation in FIT screening.

Q. Is there a resource for healthy food ideas, especially for kids' lunchboxes?
A. The NZ Nutrition Foundation (https://nutritionfoundation.org.nz) has good simple recipe ideas, as does Health Navigator (https://healthify.nz/hauora-wellbeing/h/healthy-recipes-library/).

Q. Should diabetic patients be screened for colorectal cancer at a younger age?
A. There is no evidence to suggest this would be beneficial.

Q. How do the Stage 1-4 diagnosis numbers from the screening compare with international data?
A. It is early days for the FIT screening programme, but there are more Stage 2 to 4 cancers being diagnosed than in other countries such as Australia or the UK. This may change over time.

Q. What are the recommendations regarding dairy?
A. A few serves of dairy per day is recommended. There are a number of dairy alternatives such as oat, soy and almond milk, and some of these are calcium fortified. Plant-based, calcium-fortified milks are a good alternative.

Q. Is there a direct correlation between nitrates in water and colorectal cancer?
A. There is no proven evidence for this.

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