The Gastroenterological Society of Taiwan

# The Taiwan Guideline for Colorectal Cancer Screening

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# Preface

Colorectal cancer is the most common cancer in Taiwan. Every year, about 15,000 people are diagnosed with colorectal cancer, and about 6,000 people die from it. Our study showed that the colorectal cancer screening program with fecal immunochemical tests could effectively reduce the mortality rate of colorectal cancer by 35%. Because early-stage colorectal cancer is asymptomatic, regular screening is the most important way for early detection of precancerous colonic lesions and early-stage colorectal cancers. To reduce the incidence and mortality of colorectal cancer in Taiwan, the Health Promotion Administration launched the biennial fecal immunochemical test-based colorectal cancer screening program for people aged 50-69 in 2004. Since 2010, these services have been included in the preventive health care service project, and services were provided by contracted medical institutions of national health insurance. Therefore, according to the incidence of colorectal cancer in Taiwan, the target population of the Taiwan Colorectal Cancer Screening Program was expanded to the general population aged 50-74. With these strategies, precancerous lesions and colorectal cancers could be detected early and adequately treated. Then, the incidence and mortality of colorectal cancer will decrease in Taiwan.

The Taiwan Colorectal Cancer Screening Program includes many processes, and each process affects the effectiveness of the program. Therefore, it is very important to establish comprehensive and standardized processes for the screening test and further confirmatory colonoscopy. In order to improve the quality of colorectal cancer screening program, it is necessary to cooperate with the government and clinical physicians. Hence, the Health Promotion Administration commissioned the Gastroenterological Society of Taiwan (GEST) to cooperate with the Digestive Endoscopy Society of Taiwan (DEST), Taiwan Association of Family Medicine (TAFM), and Taiwan Society of Colon and Rectal Surgeons (TSCRS) to establish a consensus on colorectal cancer screening program with expert meetings and write

the Taiwan Guideline for Colorectal Cancer Screening. This guideline helps these professional associations to promote the implementation of the colorectal cancer screening program, and relevant medical personnel can follow the guidelines for the processes of colorectal cancer screening. The guideline can improve the consistency and quality of the colorectal cancer screening program and thereby reduce the threat of colorectal cancer to the health of Taiwanese people.

Health Promotion Administration, Ministry of Health and Welfare

# Preface

Colorectal cancer screening is the most important part of cancer prevention and treatment in Taiwan. Several studies showed that screening was the most cost-effective for the prevention of colorectal cancer. It has been 17 years since the Health Promotion Administration launched a nationwide population-based colorectal cancer screening program in 2004. In the inaugural period, the screening services were mainly carried out by the local public health bureaus. Nowadays, colorectal cancer screening services have become major services of medical institutions. People's awareness of colorectal cancer and their participation in the colorectal cancer screening program have also made significant progress. The coverage rate of the screening program was improved from 21% in the initial five years to 70% in the current years. For the effectiveness of the fecal immunochemical test-based screening program, it reduced the incidence of late-stage colorectal cancer (stage II or above) by 29%, and the mortality of colorectal cancer by 35% in the first 10 years. These results were very outstanding. In the future, if the coverage rate and regular repeat screening rate of the screening program can be further steadily increased, the incidence and mortality rate of colorectal cancer in Taiwan will obviously decrease within a short time.

However, the screening program still has room for improvement. The fecal immunochemical test-based colorectal cancer screening involves many complex steps, e.g., inviting the people to participate in the screening, receiving the stool test tube, taking a stool sample into the test tube and submitting the test tube, undergoing the colonoscopy after the fecal immunochemical test is positive, and undergoing the surveillance colonoscopy after polypectomy and regular screening test after a negative result. The quality of each step affects the effectiveness of the screening program. However, for colleagues in health bureaus or medical institutions who are busy with daily business, it is not easy to become familiar with these complicated steps. The Taiwan Breast Cancer, Oral Cancer, and Colorectal

Cancer Screening Evaluation Center and the Gastroenterological Society of Taiwan jointly established the Taiwan Guideline for Colorectal Cancer Screening. This guideline can let the medical personnel engaged in the screening program have a clear standard to follow. In this guideline, we not only comprehensively reviewed the latest international literature and guidelines, but also collected a lot of evidence from the Taiwan Colorectal Cancer Screening Program and clinical studies in Taiwan. It makes this guideline more practical for Taiwanese people.

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# Contents

# Introduction

Colorectal cancer has become the most common cancer in men and the second-most common cancer in women in Taiwan.[1] Most colorectal cancer cases progress from precancerous lesions, which are colorectal adenomas. Therefore, early detection and treatment of colorectal adenoma and early-stage colorectal cancer are the most effective ways to reduce the mortality rate of colorectal cancer. Screening for precancerous colorectal lesions and early colorectal cancer has been proven to reduce both the mortality and incidence of colorectal cancer. To provide standard-of-care in colorectal cancer screening and diminish the discrepancies in practice, it is essential to establish colorectal cancer screening guidelines for the Taiwanese population.

These colorectal cancer screening guidelines were developed based on empirical and scientific evidence by the Taiwan Colorectal Cancer Screening Guideline Development Group established by the Ministry of Health and Welfare. The Taiwan Colorectal Cancer Screening Guideline Development Group (TCCSGDG) is a multidisciplinary panel of experts comprising gastroenterologists, colorectal surgeons, and family physicians. After systematic literature reviews and expert panel meetings, these clinical practice guidelines cover seven clinical topics and have been approved as guidance for current clinical practice in colorectal cancer screening.

# Materials and Methods

TCCSGDG conducted a literature search using Medline (via PubMed) and the Cochrane Central Register of Controlled Trials up to August 2020. A manual search was performed for any missing documents. We evaluated all of the references and selected those relevant to our subject, as well as developed statements and supporting evidence for each statement. Then, the drafting committee set the evidence level of each reference in each field and the strength and evidence level supporting each of the statements according to the GRADE (Grading of Recommendations Assessment, Development and Evaluation).[2] TCCSGDG graded the recommendations using the GRADE method after performing a systematic review. The results of the search were presented to all members of the Guideline Development Group during two online meetings on August 28, 2020, and October 30, 2020. After these two meetings, drafts were made and distributed to the group members for revision and online discussion. The statements were created by consensus.

# I. Benefits of colorectal cancer screening

### *a. The fecal immunochemical test (FIT) effectively reduces the mortality rate of colorectal cancer.*

The fecal immunochemical test (FIT), as the current method of colorectal cancer screening in Taiwan, is more sensitive than the conventional guaiac fecal occult blood test (gFOBT). Its sensitivity is approximately 20-40% for advanced adenoma (i.e., diameter more than 1 cm or pathological finding of adenoma with tubulovillous/villous histology or high grade dysplasia),[3] approximately 80% for all colorectal cancer, approximately 62% for early colorectal cancer (stages 0, I), and approximately 91% for advanced colorectal cancer (stages II, III, IV).[4-7] Therefore, the identification of asymptomatic high-risk populations and early treatment of precancerous lesions and early cancer help to reduce the mortality rate of colorectal cancer.

During the inaugural five years (2004-2009) of the FIT-based Taiwan Colorectal Cancer Screening Program it was shown that fecal screening reduced the mortality rate of colorectal cancer by 10% at a mean follow-up time of 3 years.[8] Most updated data from the same study cohort showed that FIT screening reduced the mortality rate of colorectal cancer by 35% over a mean follow-up period of 10 years.[9] Italian data showed that FIT screening reduced the mortality rate of colorectal cancer by 22%.[10]

In a modeling study, it was demonstrated that regular FIT reduced the mortality rate of colorectal cancer by 50.4% in the general population aged 55-75, assuming 72.6% screening uptake.[11]

### *b. FIT is cost-effective and reduces healthcare costs.*

Most cost-effectiveness analysis studies on colorectal screening showed that FIT-based screening strategies were cost-effective.[12-14] By a microsimulation study with the MISCAN model, it was demonstrated that FIT screening, when feasible, was more cost-effective than gFOBT.[15]

In addition, cost-effectiveness analyses with MISCAN and SimCRC models showed that with a high screening participation rate, every 19-25 FIT-positive patients could obtain one life-year gain. Moreover, compared with colonoscopy-based screening strategies, the models reduce the number of colonoscopy exams by 10,000 while effectively reducing the incidence of colorectal cancer by 47.2% and mortality by 64.6%.[16] A cost-effectiveness analysis in Australia also showed that with a high screening participation rate, the biennial FIT screening strategy was more cost-effective than annual screening or colonoscopy screening strategies.[17] A large randomized controlled trial showed that the participation rate was significantly higher for the biennial FIT screening strategy than for the colonoscopy screening strategy, and as a result, there was no significant difference in detecting colorectal cancer between the biennial FIT and screening colonoscopy groups.[18] A simulation study by the USPSTF showed that, with a high participation rate, the FIT screening strategy produces similar benefits as the screening colonoscopy strategy while reducing colonoscopy-associated complications.[19]

# II. The target population of colorectal cancer screening and screening tests

### *a. Biennial FIT screening is recommended for the general population aged 50-74.*

According to the World Bank, colorectal cancer screening is cost-effective if the incidence is 30 or more per 100,000 individuals.[20] As per the report by the Taiwan Cancer Registry in 2018, the age-standardized incidence of colorectal cancer is 74.5 per 100,000 individuals aged 50 to 54 (84.0 for men and 65.3 for women).[1] Therefore, the target population for colorectal screening in Taiwan is the general population aged 50-74, defined as having no clinical symptoms, family history of colorectal cancer, history of inflammatory bowel disease (IBD), history of familial adenomatous polyposis (FAP), or history of hereditary nonpolyposis colorectal cancer (HNPCC; also known as Lynch syndrome). According to the data of the Ministry of Health and Welfare, colorectal cancer screening is highly cost-effective, and biennial screening in the age group of 50-74 saves an average of NT$83,073 (USD $2770) per person at lower costs with more benefits.

One cost-effectiveness analysis with the MISCAN model showed that if the upper age limit for colorectal cancer screening is extended to 85, only a small amount of additional benefit can be obtained but at the cost of far more colonoscopy exams and relevant healthcare resources and is therefore not cost-effective.[19] In recent years, the incidence of colorectal cancer has been rising worldwide in younger populations, but the cost-effectiveness (at what level of willingness to pay) of starting screening at 45 remains unclear compared with starting at 50.[21] More studies are needed to investigate whether it is appropriate to lower the age for screening in Taiwan.

While the screening colonoscopy strategy is the best approach to reducing the mortality rate of colorectal cancer, its invasiveness, high cost, and constrained clinical capacity

limit its role as the first-line screening test in Taiwan.[22-24] As mentioned before, FIT is noninvasive and can detect populations at high risk for colorectal cancer or advanced neoplasm, who can undergo confirmatory colonoscopy, thereby effectively reducing the costs associated with screening colonoscopy. As such, the FIT-based two-tier screening strategy is cost-effective and is the most common tool for colorectal cancer screening in many countries.[25] Biennial FIT screening for colorectal cancer was implemented in Taiwan in 2004, and its effectiveness in reducing colorectal cancer mortality was fully demonstrated. [9] Therefore, the biennial FIT is recommended for colorectal cancer screening in the general Taiwanese population.

Individuals with previous colonoscopy findings of adenoma or who had ever undergone polypectomy are at high risk for colorectal cancer and should undergo colposcopy surveillance instead of FIT screening.[26-28]

### *b. No need to stop antiplatelet or anticoagulant use before FIT.*

Two high-quality prospective studies confirmed that taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs), or anticoagulants does *not* affect the accuracy of FIT. In contrast, taking antiplatelets or anticoagulants *improves* the sensitivity of FIT without affecting its specificity or increasing its false-positive rate.[29,30] Moreover, three studies show that taking aspirin or anticoagulants has no effect on FIT's detection rate of advanced colorectal neoplasms.[31-33] Therefore, we advise that screening participants not stop using antiplatelets or anticoagulants before FIT.

### *c. FIT stool samples should be refrigerated and submitted within 7 days.*

FIT requires intact hemoglobin (Hb), and its accuracy is significantly affected by the sample storage temperature and the duration until the sample is assayed. Previous studies in other countries showed that the FIT positivity rate was lower for samples collected in summer than for those collected in winter.[34-36] The positivity rate decreases by approximately 0.7% for every 1 °C increase in temperature.[35] A study from Korea showed that the concentration of Hb in stool samples was lower in summer (≥ 25 °C) than in winter (< 10 °C) (0.25 vs. 0.36 ng/ml), although the difference was not significant enough to affect the positivity rate or detection rate for colorectal cancer.[37]

In that study, most samples were sent for testing on the day of collection; if this was not possible, the subjects were instructed to keep their samples in a refrigerator, which highlights the importance of prompt sample return or refrigeration if the prompt return of the stool sample is not feasible. Another study from France showed that storing stool samples at 30 °C for more than 4 days affected the positivity rate, and approximately 24% of the positive samples had a false-negative result by Day 7.[38] A Korean study showed that the detection rate for colorectal cancer by FIT was lowest for samples being collected in the summer season, with a notably elevated subsequent risk of interval cancer compared with winter screening (adjusted odds ratio = 1.31), suggesting that temperature was a significant factor affecting the efficacy of FIT.[39] In the metropolitan area of Taiwan, the temperature exceeded 30 °C for an average of 160 days annually from 1981 to 2010.[40] Moreover, most of the screening activities in the individual municipalities of Taiwan take place from spring to autumn, hence increasing the likelihood of FIT with false-negative results. Given the trend of global warming in recent years, it is strongly recommended that FIT kits should be refrigerated after sample collection and sent for testing within 7 days to minimize false-negative results.

### *d. High-risk populations with a family history of colorectal cancer in first-degree relatives should undergo screening colonoscopy from age 40.*

A meta-analysis showed that for individuals with a family history of colorectal cancer in their first-degree relatives (parents, siblings, children), the risk of colorectal cancer was 2.25 times higher than in those without such a family history. The risk was 3.87 times higher if a first-degree relative developed colorectal cancer before age 45 and was 4.25 times higher if two or more first-degree relatives developed colorectal cancer.[41] Clearly, individuals with a family history of colorectal cancer in their first-degree relatives are at higher risk for colorectal cancer. Colorectal cancer screening guidelines in many countries recommend early screening with colonoscopy in this population.[42-44] A study in Taiwan showed that among individuals with a colorectal cancer family history, they were 2.5 times more likely to have an adenoma and 4.5 times more likely to have an advanced adenoma detected during colonoscopy compared with those without such a family history, and approximately 50% of their

colorectal lesions were located in the proximal colon.[45] For proximal advanced colon lesions, the sensitivity of FIT is only 24.1%, which is much lower than for those in the distal colon.[6,46] Accordingly, direct colonoscopy should be considered the primary screening tool in such a high-risk population.

For individuals with a family history of colorectal cancer in their first-degree relatives, the recommended age in the guidelines to start screening varies from country to country. According to the 2017 US Multi-Society Task Force guidelines, if a first-degree relative developed colorectal cancer before age 60, an individual should start screening at age 40 or 10 years before the age of onset of the colorectal cancer in the first-degree relative, whichever was earlier, and then be screened every 5 years afterward.[42] If a first-degree relative developed colorectal cancer after age 60, then individuals should start screening at age 40, with the same screening frequency as that for the average-risk population.

### *e. Individuals with suspected or genetically confirmed HNPCC (Lynch syndrome) should start biennial screening colonoscopy at age 20-25.*

According to the 2015 American College of Gastroenterology (ACG) colorectal cancer screening guidelines, patients with clinically suspected HNPCC (Lynch syndrome) should start biennial (or more frequent) screening colonoscopy at age 20-25.[47] Suspected cases should also be referred for genetic counseling and genetic testing. Individuals with confirmed HNPCC-associated mutations should undergo annual colonoscopies. These subjects should also undergo regular screenings for endometrial cancer, ovarian cancer, gastric cancer, and duodenal cancer.

### *f. Individuals with suspected or genetically confirmed familial adenomatous polyposis (FAP) should start annual screening colonoscopy at age 10-12.*

According to the 2015 American College of Gastroenterology (ACG) colorectal cancer screening guidelines, patients with clinically suspected or genetically confirmed adenomatous polyposis syndrome (including FAP, MUTYH-associated polyposis, and attenuated polyposis) should start annual screening colonoscopies during adolescence (age 10-12).[47] Suspected cases should be referred for genetic counseling and genetic testing. Moreover, these subjects should also receive regular screenings for gastric cancer, proximal small intestine cancer, and thyroid cancer.

### *g. Colorectal cancer screening is not recommended for individuals who are contraindicated for colonoscopy or who have an expected survival of less than 10 years.*

According to the American College of Physicians (ACP) guidance statement, colorectal cancer screening should not be recommended for individuals with an expected survival of less than 10 years.[48] Therefore, clinicians should be cautious and should not recommend colorectal cancer screening for patients with severe chronic diseases, advanced-stage cancers, or those who are contraindicated for colonoscopy.

# III. Diagnostic tools

### *a. Individuals with a positive FIT should undergo confirmatory colonoscopy within 6 months.*

According to the Taiwan Colorectal Screening Program database, Lee et al. reported that a lack of confirmatory colonoscopy following positive FIT increased the mortality rate of colorectal cancer by 64%.[49] Therefore, it is recommended to undergo colonoscopy as soon as possible after a positive FIT. According to the 2016 US Preventive Services Task Force guidelines, for small adenoma, the sensitivity of colonoscopy was approximately 75-93%, and the specificity was approximately 86-91%.[50] Individuals with a positive FIT should be informed about the importance of confirmatory colonoscopy and the potential benefits as well as the associated possible complications, such as bleeding, intestinal perforation, infection, and post-polypectomy syndrome, and informed consent should be obtained before colonoscopy. According to the National Health Insurance Research Database of Taiwan, the colonoscopy-related complication rate was approximately 0.8%, including bleeding (approximately 0.7%) and intestinal perforation (approximately 0.1%), with the majority occurring within 7 days of colonoscopy.[51]

Many colorectal cancer screening programs in other countries have established a timeline for completing a colonoscopy following a positive FIT.[52] Several studies have shown that the risk of colorectal cancer and advanced colorectal cancer increases significantly over time if a colonoscopy is delayed for 6 months or longer following a positive FIT. [53-57] Flugelman et al. showed that an interval of more than 12 months between positive FIT and colonoscopy significantly increased the risk of being diagnosed with advanced-stage colorectal cancer and its related mortality. [58]

According to the Taiwan Colorectal Cancer Screening Program, for individuals who received a colonoscopy within 1-3 months or 3-6 months after a positive FIT, the incidence of colorectal cancer was approximately 5%, among which 1% were advanced-stage cases.[49] Among individuals who received colonoscopy after 6

months, the incidence of colorectal cancer rose to 6.8%, among which 2.4% were advanced-stage cases. Among individuals who received colonoscopy after 12 months, the incidence of colorectal cancer rose to 9.8%, among which 3.1% were advanced-stage cases. Therefore, it is desirable to undergo a colonoscopy within 6 months of a positive FIT (**Table 1**).

**Table 1.** Outcomes of different referral times following positive screening

| Time from positive FIT to colonoscopy | < 6 months | 6-12 months | > 12 months |
|---|---|---|---|
| Risk of colorectal cancer | 5% | 6.80% | 9.8% |
| Risk of advanced colorectal cancer | 1% | 2.4% | 3.1% |

### *b. Individuals with a positive FIT who are unwilling to receive colonoscopy should not undergo repeat FIT or gFOBT.*

Some participants in the FIT screening program are hesitant or reluctant to undergo a diagnostic colonoscopy and then ask for repeat FIT, claiming they would undergo colonoscopy only if this FIT turns out to be positive. Although the prevalence of such a practice remains low, it is not advisable to do so because this will decrease the detection of colorectal cancer or advanced adenoma. This is supported by a previous study using 1- or 2-sample FIT for colorectal cancer screening, with positive FIT (1-sample group) and either one positive (2-sample group) having a higher detection rate compared with a double positive FIT in the 2-sample group.[59,60]

### *c. Double-contrast barium enema should not be used as a diagnostic tool.*

In 1997, double-contrast barium enema was recommended by the Multi-Society Gastroenterology Consortium and American Cancer Society as one of the screening methods for colorectal cancer.[61] However, no randomized controlled studies have shown that double-contrast barium enema as a screening method for colorectal cancer in the general population could effectively reduce the mortality of colorectal cancer. Winawer et al. reported that for colorectal polyps, the sensitivity of double-contrast barium enema was as low as 39%, and the specificity was 86%.[62] Kung et al. reported that the sensitivity of double-contrast barium enema was only 5.1% for neoplastic lesions larger than 1 cm and 6.2% for advanced neoplastic lesions of any size. [63] In Taiwan, the usage rate of double-contrast barium enema has decreased

by 5.36% per year.[64] Furthermore, individuals with a negative double-contrast barium enema are 2.46 times more likely to develop colorectal cancer than those with a negative colonoscopy.[65]

With the advancement of colonoscopy and computed tomography image processing, double-contrast barium enemas are rarely used in clinical practice, especially given their false-positive results due to fecal residue, air, and mucosal folds associated with colonic peristalsis. Due to its low sensitivity and high false-positive rate, a double-contrast barium enema is not recommended as a diagnostic tool for individuals with a positive fecal screen. Even in cases of an incomplete colonoscopy, a repeat colonoscopy could achieve complete examination at a high rate by experienced hands.[66] Therefore, double-contrast barium enema should not be used as a backup to an incomplete colonoscopy, and establishing a referral system of repeat colonoscopies for patients with incomplete colonoscopies is an essential issue within the screening program.

# IV. Bowel preparation before colonoscopy

### *a. Adequate bowel preparation helps improve the adenoma detection rate and reduce interval-type post-colonoscopy colorectal cancer (PCCRCi).*

Substandard colonoscopy will increase the risk of interval-type post-colonoscopy colorectal cancer (PCCRCi) and affect the effectiveness of colorectal cancer screening. A large body of evidence suggests that bowel preparation has major effects on the key quality indicators (QIs) of colonoscopies, such as the adenoma detection rate and the cecal intubation rate, and many international guidelines have been established for bowel preparation. [67,68]

Several large meta-analyses showed that unsatisfactory bowel preparation significantly reduced the adenoma detection rate of colonoscopy by 23%-47%.[69,70] Moreover, poor bowel preparation affected the cecal intubation rate and caused more discomfort during the exam.[71-73] A study in Taiwan reported that adequate bowel preparation increased the adenoma detection rate and, more importantly, the detection rate of proximal advanced neoplasms.[74]

Incomplete colonoscopy and missed colonic lesions, especially those located in the proximal colon, are essential risk factors for PCCRCi, and every effort to enhance complete colonoscopy and adenoma detection should be made.

### *b. Split dose or same-day dose is the recommended method of bowel preparation for colonoscopy.*

*Split dose method*: The subjects are instructed to take 50% of the bowel preparation liquid the night before the exam and then take the rest on the morning of the exam day.

*Same-day dose method*: The subjects were instructed to take all of the bowel preparation liquid on the morning of the exam day.

The split dose method is widely used and was proven to improve the overall adenoma detection rate and cecal intubation during colonoscopy.[75-77] It is important

to start to take the second dose 5-8 hours before the exam, usually on the morning of the exam day.[78] For colonoscopy under anesthesia, the anesthesiologist may be concerned about choking or aspiration due to residual liquid in the stomach. However, an extensive literature review found no direct link between the risk of aspiration pneumonia during colonoscopy and the preexamination fasting time.[79] Huffman et al. reported that patients given split-dose bowel preparation solution had residual gastric volumes similar to those of patients who received the entire preparation solution the evening before colonoscopy. These data supported the safety of split-dose bowel preparation for outpatients undergoing colonoscopy. [80]

The same-day dose method has been popular in Japan and Taiwan and has recently also been used in Western countries. It is believed that starting to take all of the bowel preparation liquid 5-8 hours before the exam yields optimal results.[78,81] The same-day dose method (starting 5-8 hours and finishing by 3 hours before the exam) can ensure the efficacy and safety of colonoscopy and is as effective as the split dose method.[82] A study in Taiwan showed that the majority of subjects were willing to get up early to take bowel preparation liquid for a colonoscopy scheduled in the morning, indicating that a same-day dose method is a feasible way of administrating purgative agents.[83]

Current international guidelines recommend the split dose method for patients undergoing morning colonoscopy with a high volume (4 L) PEG regimen, where the patients are instructed to take the first dose (2-3 L) the day before the procedure and the second dose (1-2 L) within 5-8 hours of the procedure and to complete it at least 2 hours before the beginning of the procedure. For patients undergoing afternoon colonoscopy, the same-day method is an acceptable method.[67,68] In Taiwan, where the 2 L regimen is the mainstay (as opposed to a total of 4 L in the international guidelines), implementing the same-day preparation method is much easier for morning and afternoon colonoscopies.

### *c. Using bowel preparation regimens approved by international guidelines.*

International guidelines recommend several kinds of regimens for bowel preparation. In Taiwan, isotonic PEG electrolyte lavage solution (PEG-ELS), magnesium citrate,

and oral sodium phosphate (OSP) are some of the most popular purgatives for colonoscopy bowel preparation. In recent years, a growing body of evidence has shown that OSP may cause serious and irreversible kidney damage.[84,85] Therefore, the European Society of Gastrointestinal Endoscopy (ESGE) and American Gastroenterological Association (AGA) guidelines recommend that patients who are pregnant, are under 18 years old, or have preexisting renal dysfunction, electrolyte imbalance, or heart disease are absolutely contraindicated for OSP. OSP is no longer recommended as a first-line regimen for bowel preparation before colonoscopy.[67,68]

Unlike OSP, PEG-ELS does not affect the electrolyte concentration or kidney function and is safe for a wide spectrum of patients. In addition, PEG-ELS does not increase water absorption in the intestine, even when it is used with a large amount of water, making it a safe option for subjects sensitive to the change in the amount of fluid in the body (such as those with kidney injury, renal failure under dialysis therapy, or congestive heart failure).[86] Cesaro et al. developed a low-volume PEG-ELS with adjuvants method that combined PEG-ELS with a small amount of water (2 L) and bisacodyl.[87] They found that compared with traditional high-volume PEG-ELS, low-volume PEG-ELS with bisacodyl achieved better bowl preparation and minimized discomfort. Since then, low-volume PEG-ELS has been combined with different adjuvants, such as ascorbate, citrate, and bisacodyl. Regardless of the specific adjuvants, low-volume PEG-ELS achieved the same bowel preparation results as high-volume PEG.[67] Therefore, low-volume PEG-ELS are recommended for bowel preparation in Taiwan.

No high-quality prospective studies have investigated the best bowel preparation method in hemodialysis patients. Given the pharmacological properties of various bowel preparation regimens and the study results in healthy individuals vs. patients with chronic renal failure, isotonic PEG-ELS is a safe option for hemodialysis patients, with few side effects such as fluid overload or electrolyte imbalance.[67,86] For hemodialysis patients, preexamination bowel preparation should be personalized, based on their physical condition and hemodialysis schedule.[88]

# V. Standardized colonoscopy reporting and colonoscopy quality

For quality assessment, it is important to verify whether the colonoscopy meets the internationally recognized QIs, such as the cecal intubation rate and adenoma detection rate, and their benchmarks.[89] However, the quality of colonoscopy is usually assessed based on the colonoscopy report prepared by the endoscopist. This means that the quality assessment may not be accurate if some QIs are missing from the report or are misreported by the endoscopist.

To continuously improve the quality of colonoscopy, the first step is a proper assessment of the current quality to correct or improve unsatisfactory areas. Therefore, a correct and comprehensive colonoscopy report is the first step for achieving continuous improvements in colonoscopy quality.

### *a. Picture Archiving and Communication System with standardized items should be used in the screening program.*

Colonoscopy reporting varies greatly among endoscopists and endoscopy units. Li et al. analyzed 110 colonoscopy reports from a US endoscopy unit in 2005-2006 and found numerous missing QIs.[90] For example, bowel preparation adequacy was mentioned in only 73% of the reports, and withdrawal time was missing from almost all reports.

The largest study on colonoscopy reports was conducted by Lieberman et al. based on the US Clinical Outcomes Research Initiative (CORI) database.[91] They collected more than 500,000 colonoscopy reports across the US in 2004-2006 and found vast discrepancies in colonoscopy reports and notable missing QIs. Incomplete and nonstandardized colonoscopy reports impede large-scale quality assessment of colonoscopy. Lieberman et al. developed preliminary criteria for colonoscopy reporting in 2007, which is known as the Colonoscopy Reporting and Data System (CO-RADS).[92] The CO-RADS recommendations are listed in Table 2.

**Table 2.** CO-RADS recommendations for standardized colonoscopy reporting

| | |
|---|---|
| ϒ Procedure date and time | ϒ Bowel preparation adequacies |
| ϒ Patient description | ϒ Documentation of cecal intubation |
| Risk factors | ϒ Colonoscopy withdrawal time |
| ASA class | ϒ Colonoscopic findings |
| ϒ Indications | ϒ Management |
| Consent form signed | ϒ Impression |
| ϒ Sedation medication | ϒ Complication/Unplanned event |
| Previous colonoscopy time | Pathology |
| Previous colonoscopy findings | ϒ Recommendation |
| ϒ Agent for bowel preparation | Follow-up plan |

ϒ: Already included in the standard colonoscopy report format in the Taiwan Colorectal Cancer Screening Program

A picture archiving and communication system (PACS) is a medical imaging technology that provides economical storage and convenient access to images from multiple modalities (source machine types). Combined with available and emerging web technology, the PACS has the ability to deliver timely and efficient access to images, interpretations, and related data. The PACS reduces the physical and time barriers associated with traditional film-based image retrieval, distribution, and display, so the PACS provides an interchangeable and interoperable platform for managing medical images, including endoscopic photos. Furthermore, the dataset generated by the output of the PACS system can help calculate and monitor the key QIs, such as the cecal intubation rate and the adenoma detection rate, and contribute to improving the quality of colonoscopy.

### *b. An electronic reporting system should be used with a built-in drop-down menu to prevent missing items.*

To improve the quality of colonoscopy via standardized reporting, only establishing criteria is insufficient. Beaulieu et al. reported that even with a general understanding of CO-RADS recommendations, the compliance rate among endoscopists is unsatisfactory, and their analyses showed that improving the electronic reporting system was helpful.[93]

In many hospitals, endoscopy reports include many free-text inputs by endoscopists. Several studies showed that compared with free text, menu-driven input reduced missing data in colonoscopy reports.[93,94]In recent years, international societies have recommended this format for colonoscopy reporting, which has improved the integrity of the report and reduced interendoscopist variation.[95]

To understand the overall quality of colonoscopy within a region or a country, it is important to analyze the quality of all colonoscopy reports. In recent years, more colonoscopy reports have been integrated into a cloud-based mega-database for later analysis. As a result, endoscopic electronic medical record (EEMR) systems are being rapidly developed to incorporate the endoscopy reporting system (ERS), electronic medical record (EMR), and mega-database.[96] In the Netherlands, van Doorn et al. confirmed that the use of an EEMR system helped improve the overall quality of colonoscopy with quality assessment and feedback on each colonoscopy report. [97]

### *c. The standard template recommended by the Taiwan Colorectal Cancer Screening Program should be used for colonoscopy reporting.*

The Ministry of Health and Welfare, in collaboration with the Digestive Endoscopy Society of Taiwan, developed a standard report template for colonoscopy performed within the Taiwan Colorectal Cancer Screening Program in 2015, which applies to medical institutes involved in the screening program and quality improvement program for cancer prevention and treatment. This standard colonoscopy report template is briefly described below.

The report is itemized with a drop-down menu in place of manual input. First, the operator must record the patient's basic information in detail, such as the use of anticoagulants, the type of anesthetic drugs (if applicable), and the regimens for bowel preparation and their dosing times. Moreover, the endoscopist must assess the bowel preparation adequacy (four-level scale: excellent, good, fair, poor). Details such as the start time, time of deepest intubation, and time of withdrawal from the cecum to the rectum must be recorded to assess the withdrawal time. To determine the depth of the exam, the operators are also asked to take photographs of cecum landmarks and/or record the deepest location (such as the cecum and ascending

colon). For “Findings”, the most important section, all colorectal segments are listed in the menu, and the operator can easily select the lesion type, size, and location. Furthermore, any treatment and the reason for no treatment must be recorded. Please see Appendix for a complete standard template for colonoscopy reports in Taiwan.

Proper quality assessment of colonoscopy cannot happen without standardized and comprehensive colonoscopy reports, and no improvement in the colonoscopy protocol or method or, indeed, in colorectal healthcare can occur without proper quality assessment. Recording all key QIs in a standardized colonoscopy report via an electronic reporting system integrated with a mega-database is an important step to improve the quality of colonoscopy and the effectiveness of screening in Taiwan.

# VI. Methods for quality assessment of colonoscopy

### *a. Important colonoscopy QIs and benchmark thresholds in the Taiwan Colorectal Cancer Screening Program include the following: rate of adequate bowel preparation ≥ 90%, adenoma detection rate ≥ 40%, cecal intubation ≥ 95%, complete polypectomy ≥ 90%.*

Different QIs apply to colonoscopy when there are different indications. For colorectal cancer screening, the most important QI is the incidence of interval-type post-colonoscopy colorectal cancer (PCCRCi). PCCRCi is defined as developing colorectal cancer during the recommended surveillance interval based on the negative findings of the baseline colonoscopy. According to Lee et al., an appropriate QI should have an impact on patient outcomes, while PCCRCi itself directly affects patient outcomes. [98] However, it is impractical and useless to wait for PCCRCi to occur before reviewing the QIs of a previous endoscopy. Alternative surrogate QIs are needed to help researchers perform quality assessments after each exam and prevent any subsequent risk of PCCRCi. A previous study from our program revealed that a lower ADR (<15%) and incomplete colonoscopy were associated with a higher risk of PCCRCi.[99]

International guidelines have addressed QIs for colonoscopy in detail.[100-102] Given that FIT is used as the first-line screening method in Taiwan, we reference the QIs used in other countries that also use the same screening strategy (i.e., FIT screening) to develop the colonoscopy QIs applicable to Taiwan (Table 3). [102,103]

**Table 3.** Benchmarks of colonoscopy quality indicators in the Taiwan Colorectal Cancer Screening Program

| Indicator | Criteria |
|---|---|
| Rate of adequate bowel preparation (Aronchick scale: good or above) | ≥ 90% |
| Cecal intubation rate | ≥ 95% |
| Withdrawal time: 6 minutes or more | ≥ 90% |
| Adenoma detection rate | ≥ 40% |
| Complete polypectomy rate | ≥ 90% |
| Sample retrieval rate | ≥ 90% |

The most important QIs are the rate of adequate bowel preparation, cecal intubation rate, and adenoma detection rate, which can be evaluated immediately and are repeatable and easy to measure at the individual endoscopist and endoscopic unit levels. Much evidence has shown that meeting these QIs directly or indirectly reduces PCCRCi.[104-106]

We should bear in mind that QIs may vary from population to population undergoing colonoscopy for colorectal cancer screening. A study from the Asia-Pacific countries comparing the adenoma detection rate in a direct colonoscopy cohort and a FIT-positive cohort showed that the adenoma detection rate was high in those with positive FIT results. [107] This means that appropriate QIs and benchmark thresholds should be applied for auditing the quality of colonoscopy.

### *b. Different QIs applicable for assessing the performance of individual endoscopists and endoscopy units.*

Quality assessment for colonoscopy could be performed at different levels (Table 4). The adenoma detection rate, cecal intubation rate and rate of adequate bowel cleansing are much easier to calculate and can be used to provide feedback to individual endoscopists or endoscopic units. Some indicators, such as the colonoscopy-related complication rate, incidence of PCCRCi, and mortality from colorectal cancer, are very low in incidence and/or require a long period of time to observe.

**Table 4.** Different levels of applicable quality indicators

| Individual endoscopist | Endoscopy unit | National level |
|---|---|---|
| Rate of adequate bowel preparation | Rate of adequate bowel preparation | Rate of adequate bowel preparation |
| Withdrawal time | Withdrawal time | Cecal intubation rate |
| Cecal intubation rate | Cecal intubation rate | Adenoma detection rate |
| Adenoma detection rate | Adenoma detection rate | Complication rate |
| | Complication rate | Incidence of colorectal cancer |
| | | Mortality of colorectal cancer |
| | | Incidence of PCCRCi |

### *c. Improving the quality of colonoscopy through quality assessment.*

With the ongoing trend of standardized reporting and big data analysis, large-scale analyses are being conducted to assess the quality of colonoscopies.[91,108] To improve the colonoscopy quality in the entire country, just understanding the average colonoscopy performance is not sufficient.

Studies have shown vast discrepancies in the quality of colonoscopy reports across different levels of medical institutes.[91] According to the Taiwan Colorectal Cancer Screening Program database, it was demonstrated that there were significant variations in the cecal intubation rate and the adenoma detection rate across medical institutes. Moreover, the quality of colonoscopy varied from endoscopist to endoscopist, as well as between different specialists, which affected patient outcomes.[104,105,107,109]Early studies on the quality of colonoscopy showed that the quality varied greatly from physician to physician. Therefore, it is crucial to develop personalized, continuous quality improvement targets for colonoscopy.[110] Coe et al. reported that regular assessment of endoscopy performed by individual physicians and a personalized improvement plan helped to improve the overall quality of endoscopy.[111] In the Netherlands, van Doorn et al. reported that a novel electronic reporting system with automated calculation of the endoscopy quality score enables medical institutes to assess the performance of individual endoscopists, and a tabulated display helped individual endoscopists better understand the areas they need to focus on for improvement and correction.[112] With the help of a transparent quality display, the overall quality of endoscopy in these medical institutes could be

improved within 2 years.[112]

It is important to extend the quality assessment to individual medical institutes and healthcare professionals. It is also important to incorporate feedback as an important item for quality monitoring to help individual medical institutes or healthcare professionals take measures to improve colonoscopy quality.

In 2014, a joint project for improving colonoscopy quality was launched as part of the collaboration between the Taiwan Colorectal Cancer Screening Program and the Digestive Endoscopy Society of Taiwan. This project includes standardization of colonoscopy reporting, regular audits of colonoscopy quality, and training workshops on colonoscopic techniques. After the launch of this joint project, both ADR and CIR significantly improved along with different phases of the screening program, which was accompanied by the gradual decline of PCCRCi.

# VII. Recommendations for surveillance colonoscopy

### *a. The determination of the surveillance interval after the initial colonoscopy is only based on a high-quality baseline colonoscopy.*

Many studies have linked the quality of colonoscopy to PCCRCi and patient outcomes after surveillance colonoscopy.[100,106,113,114] The surveillance interval is mostly based on the risk level determined after the baseline colonoscopy.[26,28,115] Therefore, each baseline colonoscopy must be completed and be of high quality.

High-quality colonoscopy meets the following criteria: [26,28,115]

1. Cecal intubation.
2. Adequate bowel preparation (Aronchick scale: good or excellent).
3. Clear lesion photos: The size of the adenoma is an important basis for determining the surveillance interval. Clear endoscopic photos are needed, with an opened snare or slice clip as the reference to determine the lesion size.
4. All visible adenomas were removed and sent for pathology, with pathological findings of free margins.

Only qualified endoscopists may perform diagnostic colonoscopy for FIT-positive subjects to provide a reliable risk assessment and surveillance recommendation. Adequate bowel preparation is an important step in ensuring the quality of colonoscopy, and individuals with inadequate bowel preparation should repeat the colonoscopy as soon as possible.

### *b. High-risk populations should undergo surveillance colonoscopy within 3 years.*

High-risk populations, as determined by baseline colonoscopy, should undergo surveillance colonoscopy within 3 years. Such a “high-risk” was defined according to the risk of metachronous advanced neoplasm, which is related to the baseline colonoscopic findings. “High-risk” is defined as:

1. Three or more colorectal adenomas[116-122]
2. Adenoma of 1 cm or greater[116-118,121,122]
3. Pathological findings of adenoma with tubulovillous/villous histology or adenoma with high-grade dysplasia[117,118,121,123]

Based on clinical guidelines in different countries, we recommend the high-risk definition and surveillance timeline used in most countries. This means that high-risk populations should undergo surveillance colonoscopies at 3-year intervals (Figure 2). In addition, according to the American Gastroenterological Association (AGA) guidelines, individuals with 10 or more adenomas should undergo surveillance colonoscopy in 1 year unless otherwise directed by their physician.[28]

### *c. Low-risk populations should undergo surveillance colonoscopy every 3-5 years.*

Individuals with neoplasms that do not meet the abovementioned definition of high-risk adenoma (per baseline colonoscopy) are at low risk of developing advanced neoplasms, defined as having 1-2 adenomas that are smaller than 1 cm, without pathological findings of adenoma with tubulovillous/villous histology and without high-grade dysplasia.

Some studies showed that according to surveillance colonoscopy, the risk of colorectal cancer was lower than in the general population in individuals with 1-2 adenomas smaller than 1 cm.[124,125] The current data do not show that the location of the adenoma (proximal or distal colon), age at adenoma detection, or sex are risk factors for metachronous advanced neoplasms. More research is needed to validate these results.

For low-risk populations, the US guidelines fine-tune the surveillance timelines into 5-10 years and 7-10 years.[28] The European guidelines consider low-risk populations as being the same as individuals with negative colonoscopy and recommend surveillance colonoscopy in 10 years.[26] Current data indicate that low-risk populations still have a higher risk of colorectal cancer than individuals with negative colonoscopy.[126,127] Given the current healthcare accessibility and colonoscopy quality level in Taiwan

and to simplify the guidelines for practice, we recommend that low-risk populations undergo surveillance colonoscopy every 3-5 years (Figure 2).

### *d. Individuals with a positive FIT but a negative colonoscopy should undergo FIT every other year.*

Individuals with negative colonoscopy have a low risk of colorectal cancer in the future, but this was mainly based on studies conducted in primary screening colonoscopy settings, and whether the risk is equivalent in FIT screening settings is not clear. [24,128-130] Current data in Taiwan show that the incidence of colorectal cancer is significantly lower in individuals who underwent FIT screening after a negative colonoscopy compared with those who did not. [131] In Australia, individuals with negative colonoscopy are recommended to undergo FIT screening every other year and undergo additional colonoscopy if their FIT is positive.[132] A similar recommendation was also made by the ESGE guidelines.[26] We therefore recommend that individuals with a positive FIT but a negative colonoscopy in the Taiwan program should subsequently undergo biennial FIT screening (Figure 1).

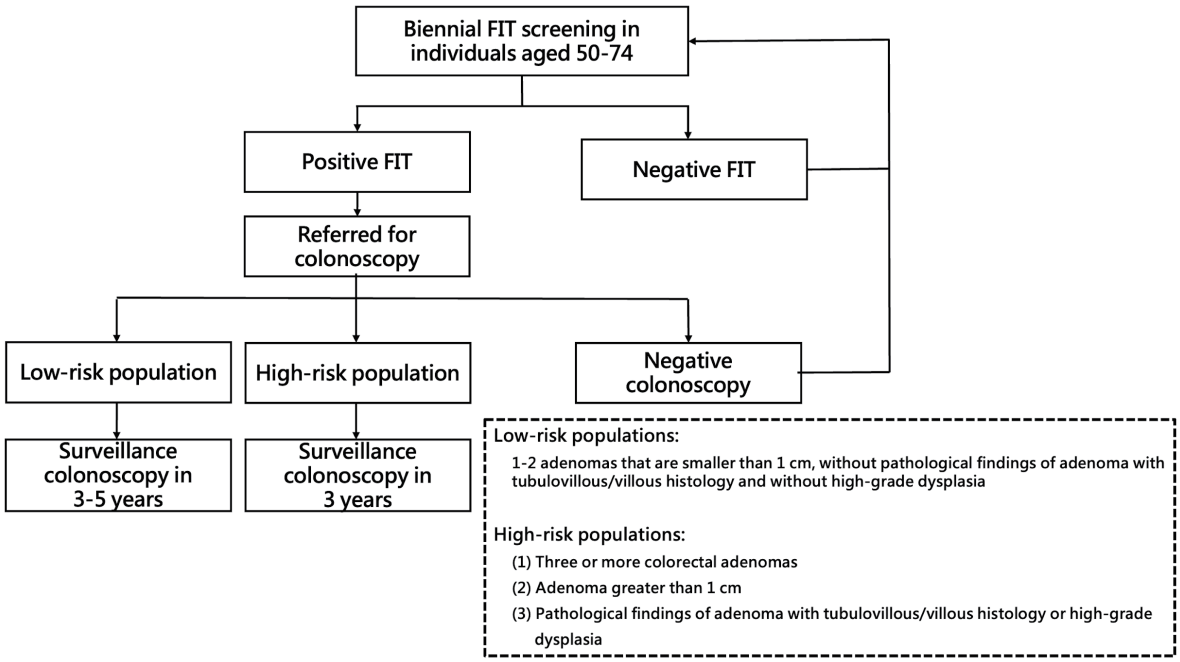
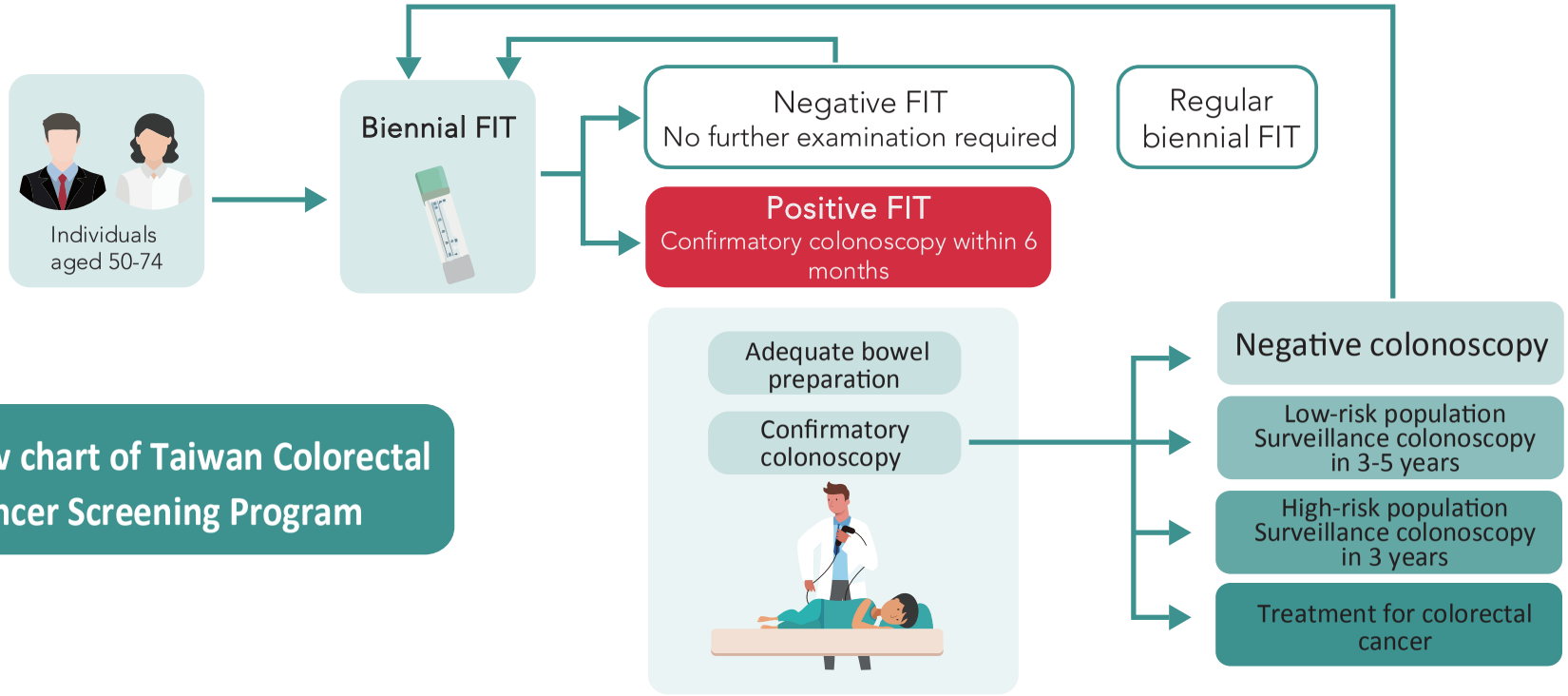



**Figure 1.** Recommended process for populations with different levels of risk

# The flow chart of Taiwan Colorectal Cancer Screening Program




**Quality assessment of colonoscopy**

- Adenoma detection rate
- Rate of adequate bowel preparation
- Cecal intubation rate

**Standardized colonoscopy reporting**

**Low-risk populations:**

1-2 adenomas that are smaller than 1 cm, without pathological findings of adenoma with tubulovillous/villous histology and without high-grade dysplasia

**High-risk populations:**

(1) Three or more colorectal adenomas
(2) Adenoma greater than 1 cm
(3) Pathological findings of adenoma with tubulovillous/villous histology or high-grade dysplasia

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# Appendix I.

## 大腸鏡報告 Colonoscopy Report

110.01

| 個人基本資料(必要)： | 適應症(Indication) (必要)： |
|---|---|
| 身分證字號：_____<br>性別：□①男 □②女<br>姓名：_____<br>出生年月日：西元_____年_____月_____日<br>年齡：_____ | □①國民健康署糞便潛血檢查陽性<br>□②自費健康檢查<br>□⑨其他臨床目的施行之大腸鏡_____<br>*(有下拉選項，選擇)* |

大腸鏡檢醫事機構代碼(必要)：_____

病歷號碼(必要)：_____

大腸鏡檢檢查日期(必要)：西元_____年_____月_____日

檢查醫師姓名(必要)：_____

檢查醫師科別(必要)：□①消化腸胃系內科 □②大腸直腸外科 □③一般外科 □⑨其他科別_____

*時間登錄(24 小時制)：**(選擇)***
*檢查開始時間：_____時_____分_____秒*
*檢查至盲腸時間：_____時_____分_____秒*
*檢查結束時間：_____時_____分_____秒*

大腸鏡伸入位置(Insertion level)最深位置(必要)：

□⑩Terminal ileum □⑪Cecum □⑫Ascending colon □⑬Hepatic flexure
□⑭Transverse colon □⑮Splenic flexure □⑯Descending colon □⑰Sigmoid colon
□⑱Rectum □⑲Anastomosis □⑩Anus

檢查前用藥(Premedication)(必要)：

止痙攣藥物： *□⓪無(有下拉選項，選擇* □①有
止痛鎮靜藥物：□⓪無 *□①有(有下拉選項，選擇)*

**清腸用藥(Colon cleansing agent)** (必要)：**(可複選)**

□①PEG-ELS 類 □②Phosphosoda 類 □③Magnesium citrate 類 □④Castor oil
□⑤Dulcolax □⑥Enema □⑨其他_____

***清腸給藥時間(Preparation time)：(選擇)***

*□⓪Morning single dose □②Evening single dose □③Split dose*

**清腸程度(Colon cleansing level)** (必要)：

□①良好(Excellent) □②適當(Good) □③尚可(Fair) □④不良(Poor)

*抗凝血藥物(Anti platelet/Coagulant)：**(選擇)***

*□⓪無 □①有(有下拉選項，選擇) □②不知道(或不清楚吃何藥)*

大腸鏡檢後併發症(Complication) (必要)：**(可複選)**

□⓪Nil □①Significant bleeding □②Perforation □③Cardiopulmonary complication
□⑨其他_____

**檢體總數(必要)：_____顆(含增生性息肉)**

| **臨床診斷(內視鏡診斷)結果** (必要) | | |
|---|---|---|
| □Ⓐ正常 | *(選擇)□⑪Negative finding □⑫Negative finding in the observable segments □⑰Poor preparation* | |
| □Ⓑ痔瘡 | *(選擇)□⑭External hemorrhoids □⑮Mixed hemorrhoids □⑯Internal hemorrhoids* | |
| □Ⓒ息肉 | □①增生性息肉 | *(選擇)□⑬Hyperplastic polyp* |
| | □②腺瘤 | *□⑱Tubular adenoma □⑲Tubulovillous adenoma □⑳Villous adenoma □㉑Sessile serrated lesion(SSL) □㉒Traditional serrated adenoma □㊹post-treatment residual neoplasm* |
| | □③其他息肉 | *(選擇) □㉓Inflammatory polyp □㉜Juvenile polyp □㊸Peutz-Jeghers syndrome □㊶Colon polyposis, familiar □㊷Colon polyposis* |
| □Ⓓ腫瘤 | □①疑似惡性腫瘤 | *□㉔Early colorectal cancer □㉕Advanced colorectal cancer* |
| | □②其他腫瘤 | *(選擇)□㉞Lymphangioma □㉟Lipoma □㊱Carcinoid □㊹Submucosal tumor □㊺Colon MALToma □㊻Lymphoma* |
| □Ⓔ發炎/潰瘍 | *(選擇)□㉖Colitis □㉗Non-specific colitis □㉘Ischemic colitis □㉙Infectious colitis □㉚Amebic colitis □㉛Ulcerative colitis □㉜Radiation colitis □㉝Pseudo-membranous colitis □㉞Drug induce colitis □㉟Cytomegalovirus colitis □㊱GVHD related colitis □㊲Crohn's disease □㊳Colonic ulcer □㊴Bechet's disease □㊵Proctitis □㊺Hemorrhagic colitis □㊻Colitis aphthosa* | |
| □Ⓕ其他異常 | *(選擇)□㉘Colonic diverticulum □㉙Colonic diverticulosis □㉛Melanosis coli □㉘Xanthoma □㉚S/P partial colectomy □㊵S/P left hemicolectomy □㊶S/P right hemicolectomy □㊷Situs inversus □㊸Colonic wall cyst □㊺Angiodysplasia (angiectasia) □㊻Lymphoid follicles □㊼Operation scar □㊽Suture granuloma □㊾Petechia □㊿Colonic tuberculosis □㊲Amyloidosis □㊽Mega colon □㊾Rectal varices □㊿Mucosa prolapse □㊶Intussusception □㊷colon fistula □㊸post endoscopy treatment scar □㊺Colonic stricture* | |
| □Ⓖ其他診斷 | **請填寫說明(必要)：**_____ | |

**第 N 個病灶處位置(必要)：**

□⑩Terminal ileum □⑪ICV □⑪Cecum □⑫Ascending colon □⑬Hepatic flexure
□⑭Transverse colon □⑮Splenic flexure □⑯Descending colon □⑰Sigmoid colon
□⑫Rectosigmoid junction(RSJ) □⑱Rectum □⑲Anastomosis □⑩Anus
□⑲位置不明(若位置不明，請登記病灶距離肛門口_____公分)

◆ 臨床診斷(內視鏡診斷)結果為「C 息肉且為 2 腺瘤」，細分項結果必填。
◆ 臨床診斷(內視鏡診斷)結果為「D 腫瘤且為 1 疑似惡性腫瘤」，細分項結果必填。
◆ 臨床診斷(內視鏡診斷)結果為「G 其他診斷」，說明必填。
◆ 臨床診斷(內視鏡診斷)結果為「C2 腺瘤」或「D1 疑似惡性腫瘤」者，病灶處位置**必填**；其餘診斷結果非必填。
◆ 臨床診斷(內視鏡診斷)結果為「C2 腺瘤」或「D1 疑似惡性腫瘤」者，病灶處位置應為**單選**；其餘診斷得複選。

**第 N 個病灶處處置(必要)：(可複選)**

□⑩Nil**(未處置)** □⑪S/p biopsy □②ₐS/p hot snare polypectomy □②ᵦS/p cold snare polypectomy □③ₐS/P hot EMR(Endoscopic mucosal resection)

□③ᵦS/P cold EMR(Endoscopic mucosal resection) □⑭S/p ESD(Endoscopic submucosal dissection) □⑮S/p hemostasis □⑯S/p biopsy and removal □⑰S/p hot biopsy and removal □⑱S/p hemoclipping □⑲S/p tattooing □⑩S/p stenting □⑪S/p endolooping □⑬S/p EPMR(Endoscopic piecemeal mucosal resection)□⑭APC (argon plasma coagulation) □⑨⑨Other(其他處置)_____

◆ 臨床診斷(內視鏡診斷)結果為「C2 腺瘤」或「D1 疑似惡性腫瘤」者，病灶處處置**必填**；其餘診斷結果非必填。

**第 N 個病灶處未處置(Nil)原因(必要)：(可複選)**

□ⓐUse of anti-platelet or anti-coagulant

□ⓑUnexpected trouble during management (cardiopulmonary event, other complication, mechanical trouble, etc.)

□ⓒDifficulty in management (will resect at another session of colonoscopy)

□ⓓDifficulty in management (refer to other hospital)

□ⓔDifficulty in management (refer for surgery)

□ⓕConsent not obtained from the patient

□ⓖPatient's schedule does not match (will resect at another session of colonoscopy)

□ⓩOthers_____

◆ 臨床診斷(內視鏡診斷)結果為「C2 腺瘤」或「D1 疑似惡性腫瘤」者，病灶處未處置(Nil)原因**必填**；其餘診斷結果非必填。

**第 N 個病灶處有無檢體(必要)：**

□⓪無檢體 □①有檢體(無檢體以下無需填寫)

檢體大小(內視鏡下大小)：_____ 公分(小數點 1 位)

檢體編號：_____ (以 A 到 Z 呈現，區分每一檢體)

◆ 若勾選「1 有檢體」且臨床診斷(內視鏡診斷)結果為「C2 腺瘤」或「D1 疑似惡性腫瘤」者，檢體必須逐顆呈現。

◆ 若病灶處處置為「05 S/p hemostasis」、「08S/p hemoclipping」、「09S/p tattooing」、「10 S/p stenting」、「11 S/p endolooping」、「14 APC (argon plasma coagulation)」，可為「0 無檢體」

註 1：若病灶不止一個，請再自行增加欄位。

註 2：若臨床診斷(內視鏡診斷)診斷為「增生性息肉」，得無須送驗檢體；惟，需算在總顆數內。

註 3：若無病灶完全正常者，至少應附 8 張照片(盲腸、升結腸、肝彎曲、橫結腸、脾彎曲、降結腸、乙狀結腸、直腸)；若有病灶，應附病灶照片。**(照片無須上傳，留於醫院存查)**

註 4：**清腸程度**

(1)良好(Excellent)：僅有少量的清澈糞水，且 95%以上的腸道黏膜可被清楚觀察。

(2)適當(Good)：較多量的清澈糞水佔據小於 25%的黏膜，且 90%以上的腸道黏膜可被清楚觀察。

(3)尚可(Fair)：半固體的糞便可被清除，清洗後 90%以上的腸道黏膜可被清楚觀察。

(4)不良(Poor)：半固體的糞便無法被清除，且不到 90%的腸道黏膜可被清楚觀察。

註 5：**併發症** Significant bleeding 息肉切除後發生出血情形

(1)中度(Moderate)：達輸血治療者。

(2)重度(Severe)：接受介入性治療者，例如：經血管攝影栓塞、外科手術等。

# Appendix II.

## Recommendations for surveillance colonoscopy

| Country /Association | The recommended interval for surveillance colonoscopy | | | | | | |
|---|---|---|---|---|---|---|---|
| | Without adenoma | Low-risk | | Moderate-risk | High-risk | Sessile serrated polyp <10mm | Sessile serrated polyp ≥10mm, or with dysplasia |
| AGA | 10 years | 7-10 years (1-2 tubular adenoma, <10mm in size) | 5-10 years (1-2 sessile serrated polyp, >10mm in size) | 3-5 years (3-4 tubular adenomas, <10mm in size, or hyperplastic polyp, >10mm in size) | 3 years | 5 years | 3 years |
| ESGE | | | Regular screening or 10 years | | 3 years | 10years | 3 years |
| BSG | | | Regular screening and no colonoscopic surveillance | | 3 years | | |
| Australia | Biennial FIT, or 10 years | | 5 years | | 3 years | | |

# The Taiwan Colorectal Cancer Screening Guideline Development Group

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