TOD early CRC *platform*

Training in optical diagnosis of early CRC
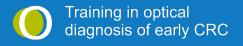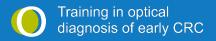
Course

Training in optical diagnosis of early colorectal cancer. What you need to know

Work plan
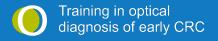
Index

Presentation

Training in optical diagnosis of early colorectal cancer (TOD early CRC) is a training platform created by the Althaia GOES research group, with the collaboration of world-leading endoscopists.

Scientific evidence of optical diagnosis with zoom or magnification in Japanese reference centres has shown high effectiveness in predicting the histology and, therefore, selecting the indication for advanced endoscopy treatments (such as submucosal endoscopic dissection, piecemeal, endoscopic mucosal resection) and surgery.

TOD early CRC aims to improve optical diagnosis of early colorectal cancer and estimate the histology in lesions found during a colonoscopy so that, based on the colonoscopy report, the endoscopist and a multidisciplinary committee may make a treatment decision considering other patient-related and local factors.

The content of the platform is aligned with the recommendations of international guidelines such as ESGE, ASGE, and JGES. This might help homogenise and centralise advanced procedures to offer optimal treatment to each patient.

TOD early CRC. What you need to know is the platform's main programme. It is a highly specialised virtual training course that provides theoretical knowledge and multiple tips and tricks to implement optical diagnosis of early CRC in clinical practice.

Please, read the Work plan below to get familiar with the programme.

I hope you enjoy the course!

Ignasi Puig
Director
TOD early CRC

Executive board and Scientific committee

Executive board

Director:

Ignasi Puig
Althaia, Xarxa Assistencial Universitària de Manresa, Barcelona, Spain

Deputy Director:

Maria Pellisé
Hospital Clínic i Provincial de Barcelona, Barcelona, Spain

Project Manager (medical content):

João da Costa
Consorci Sanitari de Terrassa, Barcelona, Spain

Project Manager (administrative, technical and communication):

Anna Cano-Català
Althaia, Xarxa Assistencial Universitària de Manresa, Barcelona, Spain

International Coordinators:

Bu Hayee
King's College Hospital NHS Foundation Trust, London, United Kingdom

Amyn Hajji
King's College Hospital NHS Foundation Trust, London, United Kingdom

Adolfo Parra
Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom

Taku Sakamoto
University of Tsukuba Hospital, Ibaraki, Japan

4

Sarah McGill
The University of North Carolina at Chapel Hill, NC, USA

Scientific Committee

Marco Bustamante
Hospital Universitari i Politècnic La Fe, Valencia, Spain

João da Costa
Consorci Sanitari de Terrassa, Barcelona, Spain

Alberto Herreros de Tejada
Hospital Universitario Puerta de Hierro, Madrid, Spain

José Carlos Marín
Hospital Universitario 12 de Octubre, Madrid, Spain

Akiko Ono
Hospital Clínico Universitario Virgen de la Arrixaca, Murcia, Spain

Adolfo Parra
Nottingham University Hospitals NHS Trust, Nottingham, United Kingdom

Maria Pellisé
Hospital Clínic i Provincial de Barcelona, Barcelona, Spain

Ignasi Puig
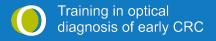Althaia, Xarxa Assistencial Universitària de Manresa, Barcelona, Spain

Enrique Rodríguez
Hospital Universitario Ramón y Cajal, Madrid, Spain

Marina Solano
Hospital Comarcal de Alcañiz, Teruel, Spain

Hugo Uchima
Hospital Germans Trias i Pujol, Barcelona, Spain

Objectives

General objectives

As all the courses and activities of the **TOD early CRC platform**, this programme aims to improve optical diagnosis of early colorectal cancer and estimate the histology in lesions found during a colonoscopy so that, based on the colonoscopy report, the endoscopist and a multidisciplinary committee may make a treatment decision considering other patient-related and local factors. More specifically, **TOD early CRC. What you need** to know aims to provide theoretical knowledge and multiple tips and tricks to implement optical diagnosis of early CRC in clinical practice.
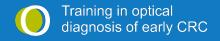
Modules objectives

Module 1. Decision-making in the treatment of colorectal polyps. Is there room for improvement?

Raise awareness that optical diagnostics may help to overcome the limitations of current clinical practice:
- Unnecessary surgery in patients without risk of lymph node metastasis.
- Unnecessary endoscopic treatments in unsuspected (and non-tattooed) lesions with deep submucosal invasion or risk of lymph node metastasis.
- Inadequate endoscopic treatment choice such as piecemeal EMR and poorly-orientated specimens do not allow submucosal invasion and resection margins to be measured.
- Unnecessary ESD in low-grade dysplasia.
- Scheduling colonoscopies to attempt removal of deeply invasive cancer.
- Making decisions based on biopsies, which can have sampling error.
- Inadequate diagnosis and referral to a tertiary centre.
- Treatment decisions that vary by centre.

Module 2. Understanding the pathologist's perspective

- To know how to identify the layers of the colon in histological slides.
- To know the risk factors for lymph node metastasis on which the indication for salvage surgery in endoscopically resected colorectal T1 is based.
- To understand the limitations that prevent the correct evaluation of colorectal T1s (piecemeal resection and poor orientation of the specimen).

- To know a checklist of endoscopic quality measures that should be performed when endoscopic suspicion of sm invasion is raised to facilitate pathological assessment.

Module 3. Image-enhanced endoscopy

- To present the available image-enhanced endoscopy systems used to evaluate early cancer in colorectal lesions:
  - Virtual chromoendoscopy: NBI and BLI.
  - Dye based chromoendoscopy: indigo carmine and crystal violet.
  - Magnifying endoscopy.
- To know the anatomy of the glandular crypt, recognise pits and vessels with each modality.
- Learn to systematically assess a lesion in clinical practice with each modality.

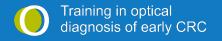## Module 4. Assessment with white-light imaging

- To know the risk of sm invasion according to location and size.
- To recognise each morphology type according to the main classifications for superficial lesions, and their risk of sm invasion:
  - Paris classification.
  - Lateral Spreading Tumour (LST) classification.
- To recognise the main gross morphological malignant features and their risk of sm invasion.

Module 5. Dye-based chromoendoscopy with indigo carmine

- Know what the endoscopist should look for when assessing a lesion with indigo carmine.
  - Delimit the lesion by identifying its margins.
  - Confirm morphology (Paris or LST classification).
  - Learn the key points to differentiate polypoid and non-polypoid growths and interpret their clinical significance.
  - Learn how to confirm or rule out the presence of a demarcated area and its clinical significance.

Module 6. Virtual chromoendoscopy without magnifying endoscopy

- Learn to assess lesions with virtual chromoendoscopy without magnifying endoscopy using the NICE classification. More specifically, learn how to assess:
  - Colour.
  - Vascular pattern.
  - Surface pattern.

- Know the most likely histology for each subtype of the NICE classification.
- Combine the NICE classification with some specific features assessed with white-light imaging for predicting the probability of deep sm invasion.
- Know the recommended diagnostic or therapeutic approach for each condition.

Module 7. Virtual chromoendoscopy with magnifying endoscopy

- To know the classifications that have been validated for predicting early colorectal cancer with virtual chromoendoscopy and magnifying endoscopy.
- To learn how to assess lesions according to the Japanese NBI Expert Team (JNET) classification.
- To ascertain the recommended approach for each type of lesion according to the JNET classification:
    - Piecemeal EMR.
    - En bloc resection.
    - Surgery.
    - Further investigation evaluating the Kudo pit pattern with crystal violet and magnifying endoscopy.

Module 8. Dye-based chromoendoscopy with crystal violet and magnifying endoscopy

- Learn how to assess the Kudo pit pattern with crystal violet and magnifying endoscopy.
- Learn the definition of the invasive pattern:
    - V irregular (Vi) severe in a demarcated area.
    - V non-structural (Vn).

Module 9. Special cases and limitations

- Raise awareness of limitations of optical diagnosis and special cases that will be discussed in the exercises.

Module 10. Summary of invasive pattern

- Learn to systematically characterise lesions and predict histology based on the optical diagnosis.
- To know how to describe this characterisation clearly and concisely in the colonoscopy report.
- Understand how to make treatment decisions based on the optical diagnosis (e.g. piecemeal EMR, ESD or biopsies and surgery), either alone or as part of a multidisciplinary team.

8

Content

The following information is given in the headings of the platform:
- **Announcements.** This is the way the Faculty will announce any new information.
- **Work plan.**
- **Welcome video (Director) and Welcome video (Deputy Director).**
- **Key steps in the optical diagnosis of early colorectal cancer.** A useful figure shown in Module 3 that shows 5 steps in the evaluation of lesions.
- **Reminder on Responsibility acceptance agreement.**

Before you start

This section contains:
- **Responsibility acceptance agreement.** A declaration stating that any decisions the participants might take during or after taking this course are their own responsibility. This is a requirement for the course to be displayed.
- **Work plan.**
- **Course introduction.** Welcome videos of the course Director and Deputy Director highlighting the main points of this training programme.
- **Participant characteristics.** Please, fill this information for internal purposes, so we will better understand course results and feedback according to participants' characteristics.
- **Initial test.** Test on 20 lesions assessed with magnifying endoscopy. Once the test is submitted, answers cannot be changed. As the participants repeat the same test at the end of the course, correct answers are shown after submitting the final test.

Modules

The topics of the modules are:
1. **Decision-making in the treatment of colorectal polyps. Is there room for improvement?**
2. **Understanding the pathologist's perspective**
3. **Image-enhanced endoscopy**
4. **Assessment with white-light imaging**
5. **Dye-based chromoendoscopy with indigo carmine**
6. **Virtual chromoendoscopy without magnifying endoscopy**
7. **Virtual chromoendoscopy with magnifying endoscopy**
8. **Dye-based chromoendoscopy with crystal violet and magnifying endoscopy**
9. **Special cases and limitations**
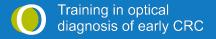10. **Summary of invasive pattern**

Each module contains the following sections:

9

Introduction
- o Objectives. The aims of the module are concisely listed.
- o Before you start. In this short video, a tutor introduces the topic and explains the main theoretical points.

Learning by reading
- o Theoretical knowledge. This section systematically presents all the theoretical content related to the module topic.
- o Key literature. Contains the main references on this topic.

Learning by doing
- o Exercises. This section presents multiple questions and feedback based on examples of colorectal lesions. Each question addresses different interest matters so the participants can learn to implement the theoretical knowledge and form their understanding based on experience.
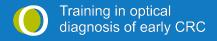
Test your knowledge

Test yourself on the main points of this module! Short self-assessment (multiple choice) about the main theoretical points that should have been learnt. All answers must be correct before moving on to the next module (multiple attempts are allowed).

Calendar

This course has an estimated duration of 22 hours. It can be done asynchronously at any time and does not include any scheduled activities. User access to the content will expire 3 months after the subscription. Below is a time estimation for each module, to help participants follow their own pace of work.

Section	Minutes
Before you start	80
Module 1	90
Module 2	90
Module 3	120
Module 4	120
Module 5	120
Module 6	120
Module 7	120
Module 8	150
Module 9	120
Module 10	150
Final evaluation	40

Final evaluation

The section contains:

- **Final test.** The same 20 lesions assessed in the initial test will be evaluated after completing the course. After submitting the test, questions with a wrong answer will be pointed out. A second attempt will be allowed to increase the final grade. See criteria to get the certificate in the section below.
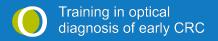
Certification

The section contains:

- **Global feedback.** A questionnaire to provide course organisation with your feedback.
- **Certificate.** It will be available for those participants who 1) have answered correctly 100% of the *Test your knowledge* questions at the end of each module (multiple attempts are allowed), 2) have answered correctly 80% of the final test with 20 images (two attempts are allowed), and 3) have completed the Global feedback. This course is endorsed by Asociación Española de Gastroenterología (AEG) and Sociedad Española de Endoscopia Digestiva (SEED).
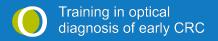
References

➢ Albeniz E, Pellise M, Gimeno Garcia AZ, et al. Clinical guidelines for endoscopic mucosal resection of nonpedunculated colorectal lesions. Gastroenterol Hepatol 2018; 41:175–190.

➢ Argilés G, Tabernero J, Labianca R, Hochhauser D, Salazar R, Iveson T, Laurent-Puig P, Quirke P, Yoshino T, Taieb J, Martinelli E, Arnold D; ESMO Guidelines Committee. Electronic address: clinicalguidelines@esmo.org. Localised colon cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. www.trainingopticaldiagnosis.com   Ann Oncol. 2020 Oct;31(10):1291-1305. doi: 10.1016/j.annonc.2020.06.022. Epub 2020 Jul 20. PMID: 32702383.

➢ Backes Y, Moss A, Reitsma JB, Siersema PD, Moons LM. Narrow Band Imaging, Magnifying Chromoendoscopy, and Gross Morphological Features for the Optical Diagnosis of T1 Colorectal Cancer and Deep Submucosal Invasion: A Systematic Review and Meta-Analysis. Am J Gastroenterol. 2017 Jan;112(1):54-64. doi: 10.1038/ajg.2016.403. Epub 2016 Sep 20. PMID: 27644737.

➢ Backes Y, Schwartz MP, Ter Borg F et al. Multicentre prospective evaluation of real-time optical diagnosis of T1 colorectal cancer in large non-pedunculated colorectal polyps using narrow band imaging (the OPTICAL study). Gut 2018, DOI: 10.1136/gutjnl-2017-314723.

➢ Beaton C, Twine CP, Williams GL, Radcliffe AG. Systematic review and meta-analysis of histopathological factors influencing the risk of lymph node metastasis in
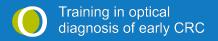
early colorectal cancer. Colorectal Dis. 2013 Jul;15(7):788-97. doi: 10.1111/codi.12129. PMID: 23331927.

➢ Bisschops R, East JE, Hassan C, Hazewinkel Y, Kamiński MF, et al. Advanced imaging for detection and differentiation of colorectal neoplasia: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2019. Endoscopy. 2019 Dec;51(12):1155-1179. doi: 10.1055/a-1031-7657. Epub 2019 Nov 11. Erratum in: Endoscopy. 2019 Dec;51(12):C6. PMID: 31711241.

➢ Boda K, Oka S, Tanaka S, et al. Clinical outcomes of endoscopic submucosal dissection for colorectal tumors: a large multicenter retrospective study from the Hiroshima GI Endoscopy Research Group. Gastrointest Endosc 2018;87:714– 722.

➢ Bogie R.M., Veldman M.H., Snijders L.A., Winkens B., Kaltenbach T., et al. Endoscopic subtypes of colorectal laterally spreading tumors (LSTs) and the risk of submucosal invasion: A meta-analysis. Endoscopy. 2018;50:263–282.

➢ Bosch SL, Teerenstra S, de Wilt JH, Cunningham C, Nagtegaal ID. Predicting lymph node metastasis in pT1 colorectal cancer: a systematic review of risk factors providing rationale for therapy decisions. Endoscopy. 2013 Oct;45(10):827-34. doi: 10.1055/s-0033-1344238. Epub 2013 Jul 24. PMID: 23884793.

➢ Bourke MJ, Neuhaus H, Bergman JJ. Endoscopic submucosal dissection: indications and application in western endoscopy practice. Gastroenterology 2018; 154:1887– 1900.e5.;28(47):6619-6631.

➢ Bronzwaer MES, Koens L, Bemelman WA, et al. Volume of surgery for benign colorectal polyps in the last 11 years. Gastrointest Endosc 2018;87:552–561.e1.

➢ Burgess NG, Hourigan LF, Zanati SA et al. Risk stratification for covert invasive cancer among patients referred for colonic endoscopic mucosal resection: a large multicenter cohort. 2017; 153: 732-742. e731.

➢ Bustamante-Balén M. How to avoid overtreatment of benign colorectal lesions: Rationale for an evidence-based management. World J Gastroenterol. 2022 Dec 21.

➢ Chattree A, Barbour JA, Thomas-Gibson S, et al. Report of the Association of Coloproctology of Great Britain and Ireland/British Society of Gastroenterology Colorectal Polyp Working Group: the development of a complex colorectal polyp minimum dataset. Colorectal Dis 2017; 19:67–75.

➢ Dattani M, Moran BJ. Understanding variations in the treatment of significant polyps and early colorectal cancer. Colorectal Dis 2019; 21(Suppl 1):57–59.

➢ Dattani M, Crane S, Battersby NJ, et al. Variations in the managementof significant polyps and early colorectal cancer: results from a multicentre observational study of 383 patients. Colorectal Dis 2018; 20:1088–1096.

➢ Dekker E, Houwen BBSL, Puig I, Bustamante-Balén M, Coron E, et al. Curriculum for optical diagnosis training in Europe: European Society of Gastrointestinal Endoscopy (ESGE) Position Statement. Endoscopy. 2020 Oct;52(10):899-923. doi: 10.1055/a-
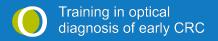
1231-5123. Epub 2020 Sep 3. Erratum in: Endoscopy. 2020 Oct;52(10):C10. PMID: 32882737.

➢ Dixon MF. Gastrointestinal epithelial neoplasia: Vienna revisited. Gut. 2002 Jul;51(1):130-1. doi: 10.1136/gut.51.1.130. PMID: 12077106; PMCID: PMC1773259.

➢ Du Boulay CE, Fairbrother J, Isaacson PG. Mucosal prolapse syndrome--a unifying concept for solitary ulcer syndrome and related disorders. J Clin Pathol. 1983 Nov;36(11):1264-8. doi: 10.1136/jcp.36.11.1264.

➢ Ferlitsch M, Moss A, Hassan C, Bhandari P, Dumonceau JM, et al. Colorectal polypectomy and endoscopic mucosal resection (EMR): European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. Endoscopy. 2017 Mar;49(3):270-297. doi: 10.1055/s-0043-102569.

➢ Fuccio L, Repici A, Hassan C, et al. Why attempt en bloc resection of nonpedunculated colorectal adenomas? A systematic review of the prevalence of superficial submucosal invasive cancer after endoscopic submucosal dissection. Gut 2018; 67:1464–1474.

➢ Hassan C, Wysocki PT, Fuccio L, Seufferlein T, Dinis-Ribeiro M, Brandão C, Regula J, Frazzoni L, Pellise M, Alfieri S, Dekker E, Jover R, Rosati G, Senore C, Spada C, Gralnek I, Dumonceau JM, van Hooft JE, van Cutsem E, Ponchon T. Endoscopic surveillance after surgical or endoscopic resection for colorectal cancer: European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Digestive Oncology (ESDO) Guideline. Endoscopy. 2019 Mar;51(3):266- 277. doi: 10.1055/a-0831-2522. Epub 2019 Feb 5. PMID: 30722071.

➢ Hayashi N, Tanaka S, Hewett DG, Kaltenbach TR, Sano Y, et al. Endoscopic prediction of deep submucosal invasive carcinoma: validation of the narrow-band imaging international colorectal endoscopic (NICE) classification. Gastrointest Endosc. 2013 Oct;78(4):625-32. doi: 10.1016/j.gie.2013.04.185. Epub 2013 Jul 30. PMID: 23910062.

➢ Higurashi T, Ashikari K, Tamura S, Takatsu T, Misawa N, Yoshihara T, Ninomiya Y, Okamoto Y, Taguri M, Sakamoto T, Oka S, Nakajima A, Tanaka S, Matsuda T. Comparison of the diagnostic performance of NBI, Laser-BLI and LED-BLI: a randomized controlled noninferiority trial. Surg Endosc. 2022 Oct;36(10):7577- 7587. doi: 10.1007/s00464-022-09197-8. Epub 2022 Apr 11. PMID: 35411460; PMCID: PMC9485093.

➢ Huang SL, Tan WX, Peng Q, Zhang WH, Qing HT, Zhang Q, Wu J, Lin LD, Lu ZB, Chen Y, Qiao WG. Blue laser imaging combined with JNET (Japan NBI Expert Team) classification for pathological prediction of colorectal laterally spreading tumors. Surg Endosc. 2021 Oct;35(10):5430-5440. doi: 10.1007/s00464-020- 08027-z. Epub 2020 Sep 24. PMID: 32974783.

➢ Ikematsu H., Matsuda T., Emura F., Saito Y., Uraoka T., et al. Efficacy of capillary pattern type IIIA/IIIB by magnifying narrow band imaging for estimating depth of invasion of early colorectal neoplasms. BMC Gastroenterol. 2010;10:33. doi: 10.1186/1471-230X-10-33.
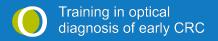
➢ Ishigaki T, Kudo SE, Miyachi H, Hayashi T, Minegishi Y, et al. Treatment policy for colonic laterally spreading tumors based on each clinicopathologic feature of 4 subtypes: actual status of pseudo-depressed type. Gastrointest Endosc. 2020 Nov;92(5):1083-1094.e6. doi: 10.1016/j.gie.2020.04.033.

➢ Ito R, Ikematsu H, Murano T, Shinmura K, Kojima M, Kumahara K, Furue Y, Sunakawa H, Minamide T, Sato D, Yamamoto Y, Takashima K, Yoda Y, Hori K, Yano T. Diagnostic ability of Japan Narrow-Band Imaging Expert Team classification for colorectal lesions by magnifying endoscopy with blue laser imaging versus narrow-band imaging. Endosc Int Open. 2021 Feb;9(2):E271-E277. doi: 10.1055/a-1324-3083. Epub 2021 Feb 3. PMID: 33553592; PMCID: PMC7857969.

➢ Iwatate M, Ikumoto T, Hattori S, Sano W, Sano Y, Fujimori T. NBI and NBI Combined with Magnifying Colonoscopy. Diagn Ther Endosc. 2012;2012:173269. doi: 10.1155/2012/173269. Epub 2012 Dec 9. PMID: 23304065; PMCID: PMC3523539.

➢ Kanao H, Tanaka S, Oka S, et al. Clinical significance of type V(I) pit pattern subclassification in determining the depth of invasion of col-orectal neoplasms. World J Gastroenterol 2008;14:211-217.

➢ Kitajima K, Fujimori T, Fujii S, Takeda J, Ohkura Y, et al. Correlations between lymph node metastasis and depth of submucosal invasion in submucosal invasive colorectal carcinoma: a Japanese collaborative study. J Gastroenterol. 2004 Jun;39(6):534-43. doi: 10.1007/s00535-004-1339-4. PMID: 15235870.

➢ Kobayashi S, Yamada M, Takamaru H, et al. Diagnostic yield of the Japan NBI Expert Team (JNET) classification for endoscopic diagnosis of superficial colorectal neoplasms in a large-scale clinical practice database. United European Gastroenterol J 2019; https://doi.org/10.1177/2050640619845987.

➢ Kudo S, Hirota S, Nakajima T, Hosobe S, Kusaka H, et al. Colorectal tumours and pit pattern. J Clin Pathol. 1994 Oct;47(10):880-5. doi: 10.1136/jcp.47.10.880. PMID: 7962600; PMCID: PMC502170.

➢ Kudo S, Tamura S, Nakajima T, Yamano H, Kusaka H, Watanabe H. Diagnosis of colorectal tumorous lesions by magnifying endoscopy. Gastrointest Endosc. 1996 Jul;44(1):8-14. doi: 10.1016/s0016-5107(96)70222-5. PMID: 8836710.

➢ Kudo Se, Lambert R, Allen JI, Fujii H, Fujii T, et al. Nonpolypoid neoplastic lesions of the colorectal mucosa. Gastrointest Endosc. 2008 Oct;68(4 Suppl):S3-47. doi: 10.1016/j.gie.2008.07.052. PMID: 18805238.

➢ Lee BI, Matsuda T. Estimation of invasion depth: the first key to successful colorectal ESD. Clin Endosc 2019; 52:100–106.

➢ Manabu Muto, Kenshi Yao, Yasushi Sano. Atlas of Endoscopy with Narrow Band Imaging. Springer, 2015.

➢ Matsuda T, Fujii T, Saito Y, Nakajima T, Uraoka T, et al. Efficacy of the invasive/non-invasive pattern by magnifying chromoendoscopy to estimate the depth of invasion of early colorectal neoplasms. Am J Gastroenterol. 2008 Nov;103(11):2700-6. doi: 10.1111/j.1572-0241.2008.02190.x. Epub 2008 Oct 3. PMID: 18853968.
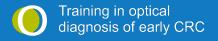
➢ Mehta N., Abushahin A., Sadaps M., Alomari M., Vargo J., et al. Recurrence with malignancy after ednoscopic resection of large colon polyps with high-grade dysplasia: Incidence and risk factors. Surg. Endosc. 2021;35:2500–2508. doi: 10.1007/s00464-020-07660-y.

➢ Motosugu Kato ST, Yutaka Saito, Manabu Muto, ed. New Image Enhanced Endoscopy NBI/BLI atlas. Tokyo, Japan: Nihon Medical Center, Inc, 2014.

➢ Nakadoi K, Tanaka S, Kanao H, Terasaki M, Takata S, et al. Management of T1 colorectal carcinoma with special reference to criteria for curative endoscopic resection. J Gastroenterol Hepatol. 2012 Jun;27(6):1057-62. doi: 10.1111/j.1440-1746.2011.07041.x. PMID: 22142484.

➢ Overwater A, Kessels K, Elias SG, et al. Endoscopic resection of high-risk T1 colorectal carcinoma prior to surgical resection has no adverse effect on longterm outcomes. Gut 2018; 67:284–290.

➢ Peery AF, Shaheen NJ, Cools KS, et al. Morbidity and mortality after surgery for nonmalignant colorectal polyps. Gastrointest Endosc 2018; 87:243–250.e2.

➢ Pimentel-Nunes P, Libânio D, Bastiaansen BAJ, Bhandari P, Bisschops R, et al. Endoscopic submucosal dissection for superficial gastrointestinal lesions: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2022. Endoscopy. 2022 Jun;54(6):591-622. doi: 10.1055/a-1811-7025.

➢ Puig I, López-Cerón M, Arnau A et al. Accuracy of the Narrow-Band Imaging International Colorectal Endoscopic Classification System in Identification of Deep Invasion in Colorectal Polyps. Gastroenterology. 2019 Jan;156(1):75-87. doi: 10.1053/j.gastro.2018.10.004.

➢ Puig I, Mármol C, Bustamante M. Endoscopic imaging techniques for detecting early colorectal cancer. Curr Opin Gastroenterol. 2019 Sep;35(5):432-439. doi: 10.1097/MOG.0000000000000570. PMID: 31246596.

➢ Raju G, Lum P, Ross W, et al. Quality of endoscopy reporting at index colonoscopy significantly impacts outcome of subsequent EMR in patients with >20 mm colon polyps. Endosc Int Open 2019; 7:E361–E366.

➢ Rex DK, Ponugoti P, Kahi C. The "valley sign" in small and diminutive adenomas: prevalence, interobserver agreement, and validation as an adenoma marker. Gastrointest Endosc. 2017 Mar;85(3):614-621. doi: 10.1016/j.gie.2016.10.011.

➢ Sakamoto T., Matsuda T., Otake Y., Nakajima T., Saito Y. Predictive factors of local recurrence after endoscopic piecemeal mucosal resection. J. Gastroenterol. 2012;47:635–640. doi: 10.1007/s00535-011-0524-5.

➢ Sakamoto T., Saito Y., Nakamura F., Abe S., Takamaru H., et al. Short-term outcomes following endoscopic submucosal dissection of large protruding colorectal neoplasms. Endoscopy. 2018;50:606–612. doi: 10.1055/s-0043-123578.

➢ Sano Y, Tanaka S, Kudo SE, Saito S, Matsuda T, et al. Narrow-band imaging (NBI) magnifying endoscopic classification of colorectal tumors proposed by the Japan NBI Expert Team. Dig Endosc. 2016 Jul;28(5):526-33. doi: 10.1111/den.12644. Epub

2016 Apr 20. PMID: 26927367.

➢ Shaukat A, Kaltenbach T, Dominitz JA, Robertson DJ, Anderson JC, Cruise M, Burke CA, Gupta S, Lieberman D, Syngal S, Rex DK. Endoscopic Recognition and Management Strategies for Malignant Colorectal Polyps: Recommendations of the US Multi-Society Task Force on Colorectal Cancer. Gastroenterology. 2020 Nov;159(5):1916-1934.e2. doi: 10.1053/j.gastro.2020.08.050. Epub 2020 Nov 4. PMID: 33159840.

➢ Schlemper RJ, Riddell RH, Kato Y, Borchard F, Cooper HS, et al. The Vienna classification of gastrointestinal epithelial neoplasia. Gut. 2000 Aug;47(2):251-5. doi: 10.1136/gut.47.2.251. PMID: 10896917; PMCID: PMC1728018.

➢ Shimoda T, Ikegami M, Fujisaki J, Matsui T, Aizawa S, Ishikawa E. Early colorectal carcinoma with special reference to its development de novo. Cancer. 1989 Sep 1;64(5):1138-46. doi: 10.1002/1097-0142(19890901)64:5<1138::aid-cncr2820640529>3.0.co;2-a. PMID: 2758387.

➢ Sidhu M, Tate DJ, Desomer L, et al. The size, morphology, site, and access score predicts critical outcomes of endoscopic mucosal resection in the colon. Endoscopy 2018; 50:684–692.

➢ Sumimoto K, Tanaka S, Shigita K, et al. Clinical impact and characteristics of the narrow-band imaging magnifying endoscopic classification of colorectal tumors proposed by the Japan NBI Expert Team. Gastrointest Endosc 2017; 85:816–821.

➢ Tanaka S, Sano Y. Aim to unify the narrow band imaging (NBI) magnifying classification for colorectal tumors: current status in Japan from a summary of the consensus symposium in the 79th Annual Meeting of the Japan Gastroenterological Endoscopy Society. Dig Endosc. 2011 May;23 Suppl 1:131-9. doi: 10.1111/j.1443-1661.2011.01106.x. PMID: 21535219.

➢ Tanaka S, Hayashi N, Oka S, Chayama K. Endoscopic assessment of colorectal cancer with superficial or deep submucosal invasion using magnifying colonoscopy. Clin Endosc. 2013;46(2):138-146.

➢ Tanaka S, Haruma K, Nagata S, Oka S and Chayama K. Diagnosis of invasion depth in early colorectal carcinoma by pit pattern analysis with magnifying endoscopy. Dig Endosc 13: S2-S5, 2001.

➢ Tanaka S, Kaltenbach T, Chayama K and Soetikno R: Highmagnification colonoscopy (with videos). Gastrointest Endosc. 64: 604-613, 2006.

➢ The Paris endoscopic classification of superficial neoplastic lesions: esophagus, stomach, and colon: November 30 to December 1, 2002. Gastrointest Endosc. 2003 Dec;58(6 Suppl):S3-43. doi: 10.1016/s0016-5107(03)02159-x. PMID: 14652541.

➢ Tobaru T, Mitsuyama K, Tsuruta O, Kawano H, Sata M. Sub-classification of type VI pit patterns in colorectal tumors: relation to the depth of tumor invasion. Int J Oncol. 2008 Sep;33(3):503-8.

➢ Uraoka T, Saito Y, Matsuda T, Ikehara H, Gotoda T, et al. Endoscopic indications for endoscopic mucosal resection of laterally spreading tumours in the colorectum. Gut. 2006 Nov;55(11):1592-7. doi: 10.1136/gut.2005.087452.

➢ Vleugels J.L., Koens L., Dijkgraaf M.G., Houwen B., Hazewinkel Y., et al. Suboptimal endoscopic cancer recognition in colorectal lesions in a national bowel screening programme. Gut. 2020;69:977–980. doi: 10.1136/gutjnl-2018-316882.

➢ Watanabe T, Muro K, Ajioka Y, et al. Japanese Society for Cancer of the Colon and Rectum (JSCCR) guidelines 2016 for the treatment of colorectal cancer. Int J Clin Oncol 2018; 23:1–34.

➢ Yamada M, Saito Y, Sakamoto T, Nakajima T, Kushima R, et al. Endoscopic predictors of deep submucosal invasion in colorectal laterally spreading tumors. Endoscopy. 2016 May;48(5):456-64. doi: 10.1055/s-0042-100453.

➢ Yoshida N, Hisabe T, Inada Y, et al. The ability of a novel blue laser imaging system for the diagnosis of invasion depth of colorectal neoplasms. J Gastroenterol 2014; 49:73–80.

➢ Yoshino T, Argilés G, Oki E, Martinelli E, Taniguchi H, Arnold D, Mishima S, Li Y, Smruti BK, Ahn JB, Faud I, Chee CE, Yeh KH, Lin PC, Chua C, Hasbullah HH, Lee MA, Sharma A, Sun Y, Curigliano G, Bando H, Lordick F, Yamanaka T, Tabernero J, Baba E, Cervantes A, Ohtsu A, Peters S, Ishioka C, Pentheroudakis G. Pan- Asian adapted ESMO Clinical Practice Guidelines for the diagnosis treatment and follow-up of patients with localised colon cancer. Ann Oncol. 2021 Dec;32(12):1496-1510. doi: 10.1016/j.annonc.2021.08.1752. Epub 2021 Aug 16. PMID: 34411693.

➢ Zwager LW, Bastiaansen BAJ, Montazeri NSM, Hompes R, Barresi V, et al. Deep Submucosal Invasion Is Not an Independent Risk Factor for Lymph Node Metastasis in T1 Colorectal Cancer: A Meta-Analysis. Gastroenterology. 2022 Jul;163(1):174-189. doi: 10.1053/j.gastro.2022.04.010. Epub 2022 Apr 15. PMID: 35436498.