Crimson Publishers
Wings to the Research

Opinion

New Diagnostics Methods for Colorectal Cancer Early-Detection

Roberto Sont[1,2], Alejandra Garrido[2,3], Walid Dghoughi[2], Sergi Marcoval[2], Elena Costa[2], Dominique Monferrer[2], Glòria Fernández-Esparrach[2,4], Marta Guardiola[1,2] and Ignasi Belda[1,2]*

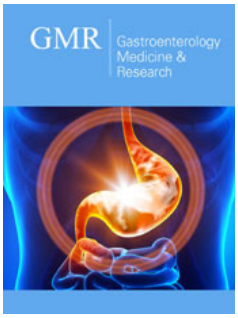
[1]Department of Basic Sciences, International University of Catalonia, Spain

[2]MiWEndo Solutions, Spain

[3]CommSensLab, Polytechnic University of Catalonia, Spain

[4]Endoscopy Unit, Hospital Clínic de Barcelona, University of Barcelona, Spain

ISSN: 2637-7632



***Corresponding author:** Ignasi Belda, Department of Basic Sciences, International University of Catalonia, Spain

Submission: July 19, 2022

Published: October 11, 2022

Volume 7 - Issue 1

How to cite this article: Roberto Sont, Alejandra Garrido, Walid Dghoughi, Ignasi Belda, et al. New Diagnostics Methods for Colorectal Cancer Early-Detection. Gastro Med Res. 7(1). GMR. 000655. 2022.
DOI: 10.31031/GMR.2022.07.000655

Opinion

Colorectal Cancer (CRC) is currently one of the main public health challenges in Western countries. In many countries, it is the most prevalent cancer, and it is estimated that 2 million new cases have arisen worldwide in 2020 [1]. CRC has a relatively low 5-year survival rate of 50%, even though, if it is diagnosed in its earliest stages, survival increases to 95% [2]. The problem is that survival is only 8% if the diagnosis is made in the late stages of cancer. Given these data, we should ask why such a high number of CRC are diagnosed in their later stages. In most advanced countries, the population has access to annual or biannual screening campaigns. This screening system is based on Faecal Immunochemical Test (FIT) in many countries and tries to identify traces of blood in the stool. If a patient has a positive FIT test, a colonoscopy is recommended because the chances of having polyps (the pre-cancerous lesion) or CRC is increased. Colonoscopy is the standard diagnostic method for two reasons. The first is that is the only imaging technique able to remove polyps in the same endoscopic intervention, causing less discomfort to the patient. The second is that, if a cancer is diagnosed, biopsies are obtained to confirm it and a surgical operation is prescribed to ensure the complete removal of the malignant cells. However, colonoscopy is not perfect and may miss some lesions and requires preparation that is very uncomfortable for patients. In recent times, a significant number of technologies have appeared for the early detection of CRC, the liquid biopsy standing out among all of them. Liquid biopsy allows, through a simple blood draw, to know if a patient has CRC, even in its most preliminary stages [3]. However, the liquid biopsy does not replace colonoscopy since, if CRC is suspected, what is recommended in clinical practice is to proceed with a colonoscopic examination.

But why is colonoscopy not a 100% reliable method? Experts estimate that, on average, 22% of polyps are missed at colonoscopy [4]. The reasons are multiple, for example, the colonoscope camera has a very limited range of vision –180°–, some polyps can "hide" behind the multiple folds of the colon or be "overshadowed" by remains of faeces if the patient is not well prepared or even if the endoscopist does not identify them [5]. In fact, there are several studies that correlate the endoscopist's hours of experience with their Adenoma Detection Rate (ADR) that is the most important parameter related with CRC prevention [6]. Other studies have reported how this ADR can vary for the same endoscopist as the day progresses and he accumulates more fatigue. Because of all these factors, today, 8% of colorectal CRC are interval cancers, that is, cancers that are diagnosed after a negative colonoscopy [7]. To

improve colonoscopy, a battery of very diverse technologies has been developed in recent years with the aim of visualize more colonic mucosa. These new tools range from mechanical devices that help flatten the colonic mucosa to prevent polyps from being hidden, to artificial intelligence systems that automatically trigger a signal to alert the endoscopist [8]. However, all these technologies only can diagnose what is seen in the screen. A very innovative approach is microwave vision technology, known as microwave imaging. Through the emission and reception of microwaves, as if it were a radar, the dielectric properties of materials can be known, such as conductivity and permittivity [9]. Our group has been working on this system during the last 5 years and has confirm the initial hypothesis that if there is a lesion with abnormal growth in the mucosa, there will be a difference between the dielectric properties of the lesion and the healthy mucosa that can be detected by microwaves. Once the initial hypothesis had been validated, a device consisting of a set of miniaturized antennas was built as an accessory device to be mounted at the tip of the colonoscope. Up to know, it has been tested in preclinical studies using phantoms and *ex-vivo* tissue showing very promising results [10,11]. Soon this technical innovation will be tested on patients.

Conflict of Interest and Acknowledgement

The authors of this article, in addition to their academic affiliations, are part of the university spin off MiWEndo Solutions, S.L.. This work was supported by the Spanish Ministerio de Economía, Industria y Competitividad, DTS 17/00090 and CERCA Programme/Generalitat de Catalunya. Glòria Fernández Esparrach had a personal grant from Instituto de Salud Carlos III (PI17/00894). Alejandra Garrido acknowledges the financial support from DIN2019-010857/AEI/10.13039/501100011033. Roberto Sont, Marta Guardiola, and Ignasi Belda acknowledge the financial support from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 960251.

References

1. Colorectal cancer: Statistics. Cancer, NET.
2. Müller AD, Sonnenberg A (1995) Prevention of colorectal cancer by flexible endoscopy and polypectomy. A case-control study of 32,702 veterans, Ann Intern Med 123(12): 904-910.
3. Zhu YT, Yang Q, Wu X, Yang J, Hao X, et al. (2020) Diagnostic performance of various liquid biopsy methods in detecting colorectal cancer: A meta-analysis. Cancer Med 9(16): 5699-5707.
4. Van Rijn JC, Reitsma JB, Stoker J, Bossuyt PM, Van Deventer SJ, et al. (2006) Polyp miss rate determined by tandem colonoscopy: A systematic review. Am J Gastroenterol 101(2): 343-350.
5. East JE, Saunders BP, Burling D, Darren B, Steve H, et al. (2007) Surface visualization at CT colonography simulated colonoscopy: Effect of varying field of view and retrograde view. Am J Gastroenterol 102(11): 2529-2535.
6. Singh H, Nugent Z, Demers AA, Bernstein CN (2010) Rate and predictors of early/missed colorectal cancers after colonoscopy in Manitoba: A population-based study. Am J Gastroenterol 105(12): 2588-2596.
7. Samadder NJ, Curtin K, Tuohy TM, Lisa P, Boucher K, et al. (2014) Characteristics of missed or interval colorectal cancer and patient survival: A population-based study. Gastroenterology 146(4): 950-960.
8. Konda V, Chauhan SS, Abu Dayyeh BK, Hwang JH, Komanduri S, et al. (2015) Endoscopes and devices to improve colon polyp detection. Gastrointest Endosc 81(5): 1122-1129.
9. Guardiola M, Buitrago S, Fernández-Esparrach G (2018) Dielectric properties of colon polyps, cancer, and normal mucosa: *Ex vivo* measurements from 0.5 to 20 GHz. Med Phys 28: 3768-3782.
10. Garrido A, Sont R, Dghoughi W (2021) Phantom validation of polyp automatic detection using microwave endoscopy for colorectal cancer prevention and early detection, Prepr.
11. Fernández-Esparrach G, Garrido A, Sont R, Dghoughi W, Marcoval S, et al. (2022) Microwave-based colonoscopy: Preclinical evaluation in an *Ex Vivo* human colon model. Gastroenterol Res Pract 28: 9522737.