

# Screening with **ENDO-AID CADe**



## Dr. David G Hewett

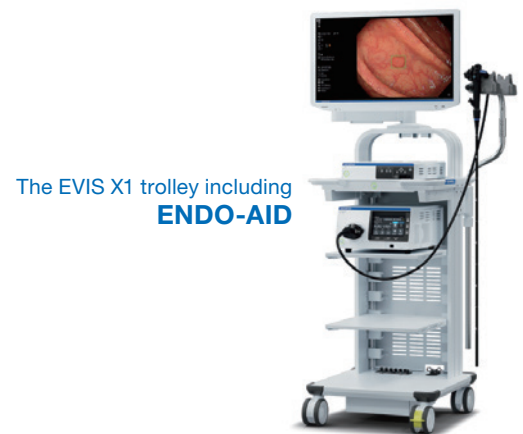
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## Introduction

The number of patients globally with colorectal cancer is increasing every year. The number of newly diagnosed patients with colorectal cancer increased from approximately 1.02 million worldwide in 2002, to approximately 1.8 million in 2018, making colorectal cancer prevention and treatment an urgent health challenge. However, colorectal cancer can be curable if detected early, using a fecal occult blood test or colonoscopy. In addition, early detection may allow the cancer to be removed by a minimally invasive procedure during a colonoscopy.

Recently, Dr. David Hewett, an associate professor at the University of Queensland and a gastroenterologist at Colonoscopy Clinic in Brisbane, Australia, used the Olympus CADe (computer-aided detection) platform ENDO-AID, equipped with an artificial intelligence (AI) detection-support application, for colonoscopy for several months on a trial basis. This new AI platform enables a real-time display of automatically detected suspicious lesions and works in combination with the recently introduced EVIS X1, Olympus' most advanced endoscopy system to date. Dr. Hewett talks about the current status of colonoscopy, improvements achieved with the use of ENDO-AID, its usefulness and the future of ENDO-AID.



The EVIS X1 trolley including  
**ENDO-AID**

**ENDO-AID**  
[Endoscopy CAD System OIP-1]



# 1. Current Challenges in Colonoscopy

## Importance of Colonoscopy

Screening colonoscopy allows detection and removal of precancerous lesions and reduces the risk of colorectal cancer.<sup>1,2</sup>

However, one of the challenges in colorectal cancer screening is that the performance characteristics of colonoscopy are not fixed. The effectiveness of colonoscopy is influenced by multiple factors, classified into four categories: (a) patient factors, such as tumor biology or bowel preparation; (b) equipment or technical factors; (c) system factors, such as financial or other incentives; and finally, and perhaps most significant, (d) individual endoscopist factors.<sup>3</sup> The skill and effort of the endoscopist determines the extent of lesion detection at colonoscopy and therefore the level of cancer prevention.

The adenoma detection rate (ADR) is the principal reportable quality measure of colonoscopy. Corley et al. reported in the *New England Journal of Medicine* in 2014 that ADR ranges from 7.4% to 52.5%, and that a 1% increase in

ADR was associated with a 3% decrease in the risk of interval colorectal cancer and a 5% decrease in the risk of a fatal interval colorectal cancer.<sup>4</sup> In the United States, the recommended performance threshold in colonoscopy guidelines is an overall ADR of 25% and sex-specific ADR of 30% for men and 20% for women.<sup>5</sup>

Like many other countries, colonoscopy resources in public and private hospitals in Australia are under pressure to meet the demands of the Australian National Bowel Cancer Screening Program. The Australian Colonoscopy Clinical Care Standard was developed and introduced to describe the safe, appropriate, high-quality use of colonoscopy.<sup>6</sup> It requires colonoscopists to participate in the Australian Colonoscopy Recertification Program,<sup>7</sup> to address concerns about variation between endoscopist performance. The Recertification Program requires endoscopists to meet minimum performance thresholds for adenoma and serrated lesion detection and for cecal intubation.

## Achieving High-Level Adenoma Detection

Colonoscopists performing high-quality colonoscopy require two quite distinct skills: mucosal exposure (looking or searching) and lesion recognition (seeing or recognizing). Both are essential to high-level adenoma detection. Mucosal exposure requires a systematic and meticulous approach to searching for polyps by looking behind folds and flexures, and exposing hidden areas of the colonic mucosa. Lesion recognition requires skills in pattern recognition and recognition of disruption to normal colorectal mucosal appearances, including the contour of folds, and mucosal

surface and vascular patterns.

High-level detection also requires high-quality bowel preparation, and this often requires intraprocedural work by the colonoscopist to clean or wash the colonic wall. In one study, the mean time spent washing/suctioning during colonoscopy was 4.1 minutes, and ranged from 2 to 9 minutes depending upon the baseline preparation grade.<sup>8</sup> This indicates that to achieve high-level adenoma detection, colonoscopists should expect to spend at least 2 to 3 minutes on mucosal washing per colonoscopy.

# 2. Roles of AI in Colonoscopy

## AI Improves the Quality of Colonoscopy

At least six randomized controlled trials have reported that AI improves adenoma detection with an approximately 10% absolute increase in ADR, primarily through increased detection of diminutive adenomas.<sup>9-14</sup> AI can assist endoscopists in performing a quality colonoscopy by increasing their adenoma detection. AI could also

help reduce the variation between endoscopists in the recognition of subtle and hard-to-detect lesions. However, mucosal exposure is still required for AI to detect lesions within the visual field, and so the endoscopist must continue to systematically and meticulously expose hidden folds and flexures within the colon.

## AI May Reduce Endoscopist Fatigue

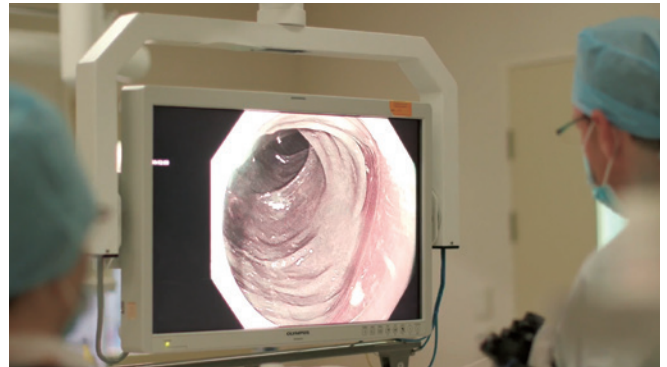
Several studies have shown variation in adenoma detection by the time of the day in which the colonoscopy is performed.<sup>15,16</sup> It is thought that endoscopist fatigue negatively impacts adenoma detection in this context,

although it appears to be endoscopist-dependent. We therefore could expect AI to reduce the impact of endoscopist fatigue on adenoma detection.

# 3. Usefulness of ENDO-AID/EVIS X1

## Seamless Workflow

I have used ENDO-AID routinely for all my screening and surveillance colonoscopies in the last few months, and found it seamlessly integrates with my colonoscopy practice. It is a simple, push-button technology that requires little setup. The detection technology presents itself on the standard endoscopic screen, without the need for a second monitor. When polyps are detected by ENDO-AID, a flashing green square or flag appears, analogous to facial recognition on a smartphone.



## Increasing Detection (Fig. 1-5)

Endoscopists typically focus on the center of the screen during mucosal inspection. However, ENDO-AID detects polyps throughout the visual field, and in my experience, often finds polyps in the periphery of the visual field before I see them. This could be one mechanism by which AI improves adenoma detection, and we could expect ENDO-AID to reduce the miss rate for polyps at colonoscopy by providing extra detection capacity to support the endoscopist.

In my experience, ENDO-AID assists primarily in the detection of diminutive adenomas (Fig. 1). I have also found it helpful for the detection of sessile serrated lesions (Fig. 2, 5). False positives certainly occur with ENDO-AID; however, in my experience, these have not been too distracting. If no polyp is present, the green flag or flashing square typically disappears quite quickly once you direct the view to the location of the false positive or wash the mucosa.

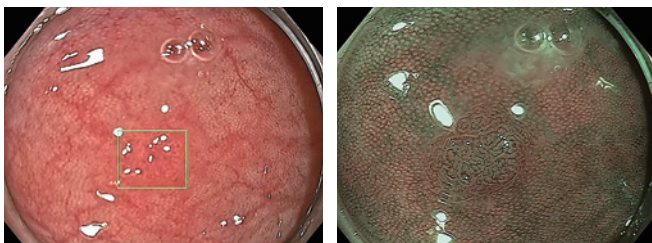


Fig. 1. Diminutive adenoma

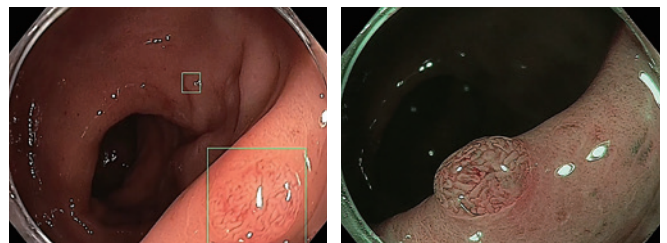


Fig. 4. Rectal adenoma

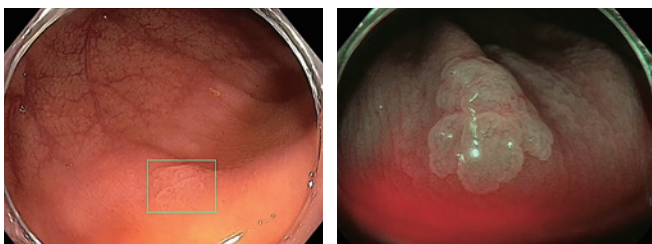


Fig. 2. Serrated

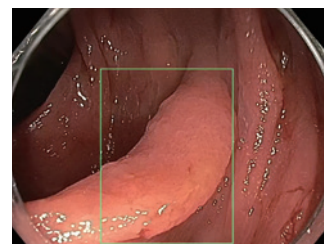


Fig. 5. Large sessile serrated lesion

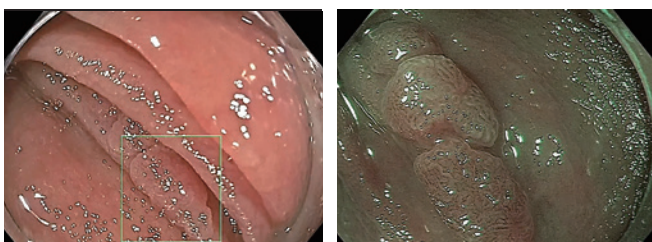


Fig. 3. Large adenoma

## Improving Efficiency

In my experience, there is potential for ENDO-AID to help improve the efficiency of examination. This may actually reduce the time taken to inspect the colonic mucosa and allow the withdrawal time to be shortened, although prospective study of this hypothesis is required. Although my

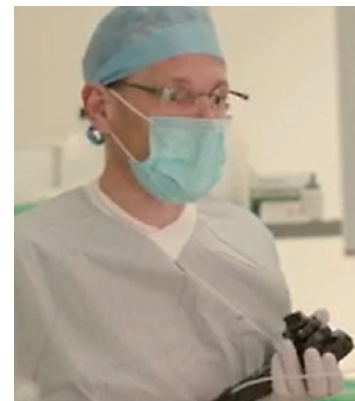
baseline levels of adenoma and serrated lesion detection are very high, I found that ENDO-AID provided an additional level of comfort and security during mucosal inspection, giving me added confidence that I could detect all adenomas and sessile serrated lesions and minimize my miss rate.

## TXI and Target Mode

ENDO-AID can be used in white light imaging and also with the new detection mode, TXI (texture and color enhancement imaging). I used TXI routinely for inspection, and once a lesion had been detected, switched to NBI (narrow band imaging) for confirmation and optical diagnosis.

ENDO-AID can be operated in two modes: target and normal mode. In target mode, findings are marked by a green square directly on the visual field in front of the

endoscopist, while in normal mode, the green square or flag appears on a small sub-screen to the left of the endoscopic image. I preferred to apply ENDO-AID in the target mode so that my visual attention was immediately drawn to the green square within the endoscopic view.



# 4. Future of ENDO-AID/EVIS X1

## Potential Future Application of ENDO-AID/EVIS X1

ENDO-AID/EVIS X1 offers substantial potential benefits for colonoscopy. It is currently applied for detection, however, research is underway to use ENDO-AID/EVIS X1 for optical diagnosis of colorectal polyps (computer-aided diagnosis). Furthermore, the application of ENDO-AID/EVIS X1 could

assist in quality measurement, procedural analytics, and report generation.

I look forward to applying ENDO-AID/EVIS X1 during my routine colonoscopy practice and achieving further improvements in colonoscopy performance based on AI.

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As medical knowledge is constantly growing, technical modifications or changes of the product design, product specifications, accessories and service offerings may be required.

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