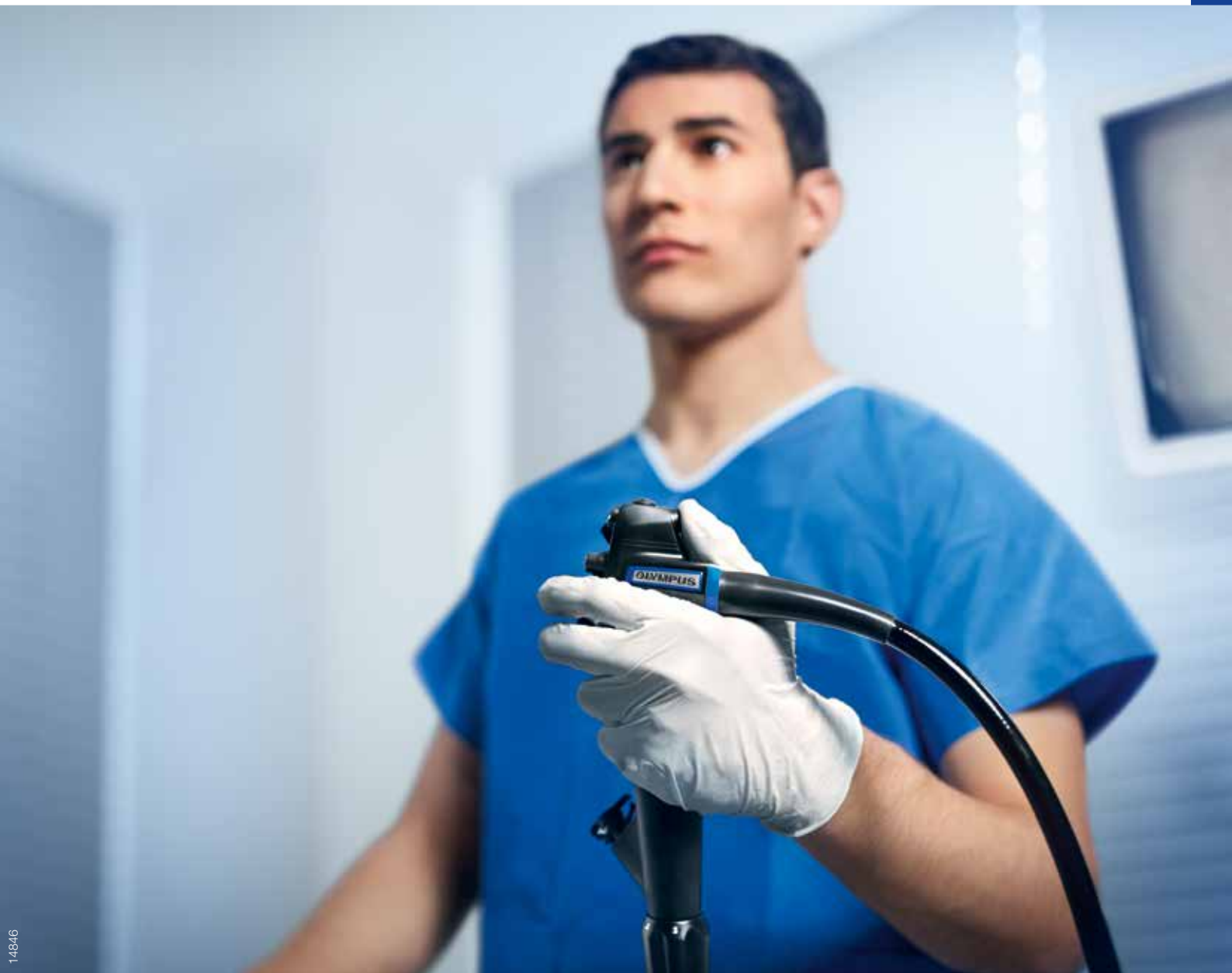


### ADR AT A GLANCE

Facts to Know about the Adenoma Detection Rate



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## INTRODUCTION

### What is ADR?

Adenoma detection rate (ADR) is defined as the percentage of average-risk patients age 50 or older who are identified to have one or more adenomatous polyps during a first-time screening colonoscopy. It therefore refers to individuals and is not to be misunderstood as the percentage of lesions identified.

A very recent study of over 224,000 patients showed that a 1% increase in ADR results in a 3% decrease in colorectal cancer risk, marking ADR as a quality indicator in colonoscopy.<sup>(1,2)</sup>

### Why is ADR Difficult to Determine?

Although ADR is recommended to monitor quality in colonoscopy, many countries are hesitant to implement a target value that must be achieved due to several reasons.

ADR is a quality indicator that is assigned to each individual endoscopist which in turn requires personal monitoring and audits.

ADR is a multivariate and highly depends on several factors including patient demographics, the equipment used, and procedural behavior of the endoscopist.

ADR documentation requires feedback from histopathology. Accordingly, additional time and effort is needed to adjust patient records.

### What is Adenoma Miss Rate?

Adenoma miss rate refers to the number of lesions that remain undetected during the first colonoscopy but are detected by a second examination. Accordingly, miss rates can only be identified in a tandem colonoscopy.

Studies with tandem colonoscopies identified adenoma miss rates of approximately 22%.<sup>(4)</sup> While 26% of diminutive lesions (<5 mm in size) are missed during index colonoscopy, only 2% of lesions >10 mm are overlooked.<sup>(4)</sup>

While the major benefits of colonoscopy are the reliable detection and immediate removal of colorectal polyps, the aspect of overlooking lesions may diminish its preventive effect for colorectal cancer CRC. However, diminutive polyps are found to exhibit adenomatous histology in only 1.7–4.4% of cases. In other words, they represent only a small risk for the patient.<sup>(5,6)</sup>

## WHICH FACTORS INFLUENCE ADR AND HOW CAN IT BE IMPROVED?

### Patient Demographics

Several studies identified that the ADR is higher in male than female patients.<sup>(7-9)</sup> It also differs in screening, surveillance, and therapeutic patient groups.<sup>(7)</sup> Accordingly, the ADR varies for each hospital depending on its patient mix.



### Procedural Aspects

In recent years, vast research has been conducted to identify procedural factors in colonoscopy that influence ADR. The results of these studies strongly emphasize the importance of well-performed colonoscopy to maximize polyp and adenoma detection rates.



Size of script indicates the incremental effect on ADR.

**Bowel-preparation quality** plays a significant role in lesion detection. A split-dose protocol improves not only patient compliance and overall bowel cleanliness but also increases ADR by up to 12%.<sup>(10)</sup>

**Cecal intubation** should be achieved in more than 90% of examinations to assure that proximal lesions are identified because, interestingly, adenomas are more prominent in the proximal colon than in the rectosigmoid colon.<sup>(11)</sup>

**Withdrawal time** is not only a quality indicator with a threshold of minimum six minutes; it is directly correlated with ADR.<sup>(12)</sup> A recent publication shows that an optimal withdrawal time at nine minutes increases ADR by 3.8%.<sup>(13)</sup>

**Scheduling of colonoscopies** may influence performance in detection especially in busy screening colonoscopy units. ADR has been shown to decrease by

5% in the afternoon if colonoscopies are conducted over a full day.<sup>(14)</sup>

**Patient-position change** is known to ease insertion but also increases ADR if applied during withdrawal. Up to a 10% increase in ADR has been reported in the literature.<sup>(15)</sup>

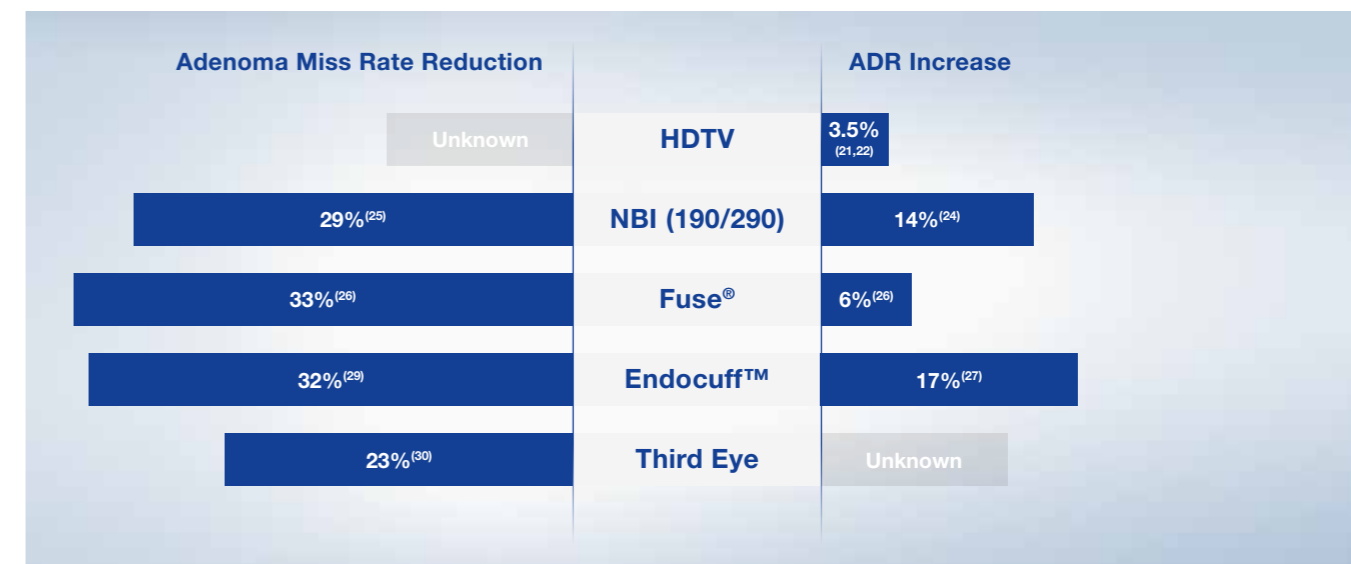
**Water-exchange colonoscopy** achieved a 10–18% increase in ADR using water with indigo carmine dye.<sup>(16,17)</sup>

**Training** combines several techniques on how to optimize insertion and colon observation. Coe et al. reported an 11% increase in ADR for doctors who underwent standardized training.<sup>(18)</sup>

**Quality monitoring** was introduced two years ago in the United States, including public reporting of performance indicators. As a consequence, ADR of screening colonoscopists has increased by 7.8%.<sup>(19)</sup>

### Endoscopy Equipment

With the advent of advanced colonoscopy equipment, ADR has continuously increased over years. A large registry with 12,134 patients in Germany illustrates the impact of new equipment on the detection of adenoma – particularly diminutive lesions.<sup>(20)</sup> A variety of studies assessed the impact of different imaging technologies and distal attachments for their impact on ADR and miss rates in the colon as shown below.



**HDTV** has been identified by a meta-analysis of 4,450 patients to increase ADR by 3.5%.<sup>(21)</sup> Based on this, the (ESGE) recommends using HDTV technology for screening colonoscopy of average-risk patients.<sup>(22)</sup>

**NBI with EVIS EXERA III** (190 series) was recently shown to improve ADR by 14% compared to HDTV white light.<sup>(24)</sup> NBI with EVIS LUCERA ELITE (290 series) proved to decrease polyp miss rates by 29% compared to white light.<sup>(25)</sup>

**Other virtual chromoendoscopy technologies** have been widely studied and found to have no impact on ADR.<sup>(23)</sup>

**The Fuse® system** was tested in a back-to-back trial versus standard forward-viewing (SFV) scopes and was found to improve ADR by 6% and the adenoma miss rate by 33%.<sup>(26)</sup>

However, a recent randomized controlled trial (RCT) identified no difference in ADR between Fuse® and standard colonoscopy.<sup>(35)</sup>

**Endocuff™** achieved promising results in an early trial identifying a 17% increase in ADR.<sup>(27)</sup> However, a recent large-scale RCT in the Netherlands showed no significant difference between Endocuff™ and standard colonoscopy.<sup>(28)</sup> In terms of miss rate, a Japanese trial using a colon model identified a reduction of polyp miss rates by 32%.<sup>(29)</sup>

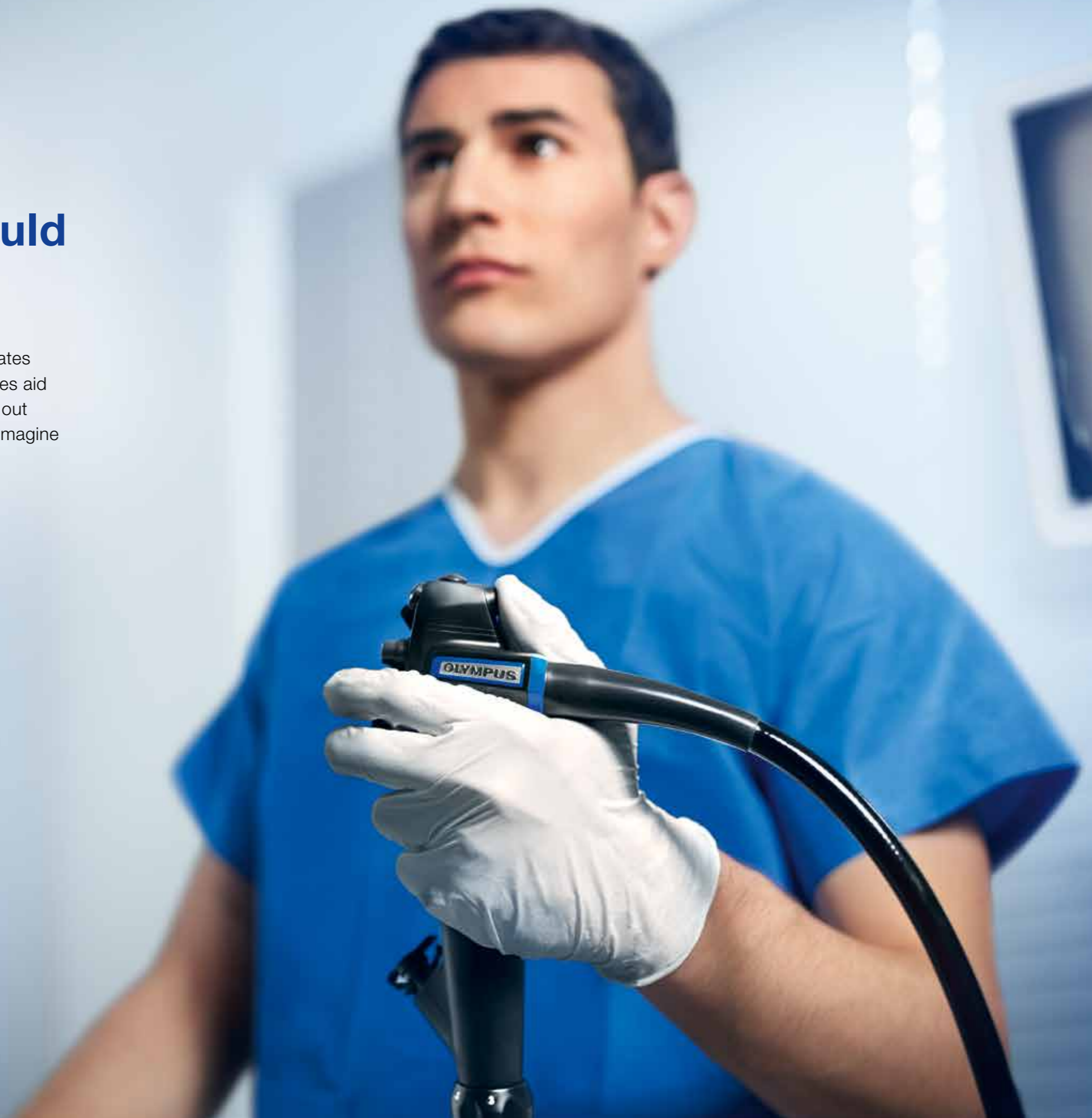
**The Third Eye** was a promising tool to improve detection. A large-scale multicenter trial identified a reduction in the adenoma miss rate by 23%.<sup>(30)</sup> However, a post hoc analysis of this trial showed that this effect could not be verified for a pure screening population.<sup>(31)</sup>

# IMAGINE...

## Your Thumb Could Maximize ADR

Is it possible to increase lesion detection rates with technology? Can Olympus technologies aid diagnosis and help to increase ADR? Find out what numerous studies have shown. And imagine the impact on CRC screening programs.

 [www.olympus.eu/proven](http://www.olympus.eu/proven)



# FUSE® VERSUS STANDARD FORWARD-VIEWING COLONOSCOPY

## How to Interpret the Lancet Oncology Paper

The multicenter study published by Gralnek et al. compared the Fuse® system with a mixture of forward-viewing endoscopes (Olympus 160, Olympus 180, and Pentax colonoscopes). The study found that the Fuse® system reduced the adenoma miss rate (per-lesion analysis) by 34% and increased ADR (per-patient analysis) by 6%.<sup>(26)</sup> The trial **did not** include EVIS EXERA III (190) colonoscopes.

There are two points we may want to consider in more detail by evaluating the study results from Gralnek et al.:

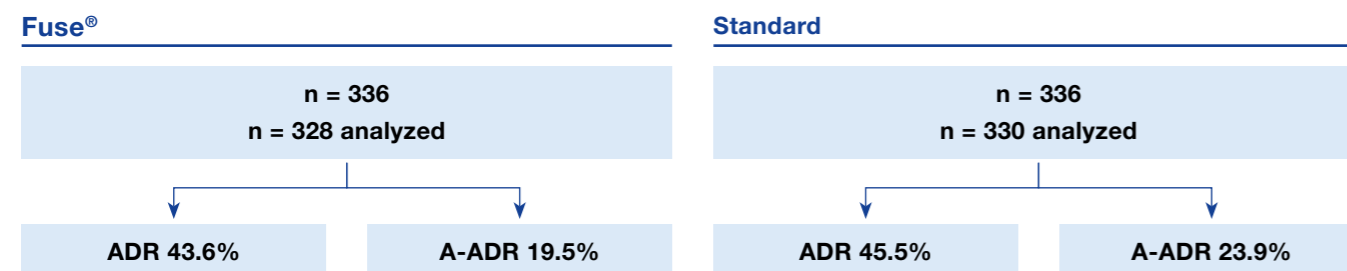
1. The mean adenoma per patient in both study arms
2. The withdrawal time in the SFV scope group

| Mean Adenoma per Patient (MAP) |     |                             |           |                               |
|--------------------------------|-----|-----------------------------|-----------|-------------------------------|
|                                |     | Fuse® Study <sup>(26)</sup> |           | Wallace Study <sup>(33)</sup> |
|                                |     | Fuse®                       | SFV Scope | SFV Scope (190)               |
| Polyps                         | PDR | N/A                         | N/A       | 74%                           |
|                                | MAP | 1.05                        | 0.57      | 1.8                           |
| Adenoma                        | ADR | 34%                         | 28%       | 50%                           |
|                                | MAP | 0.64                        | 0.33      | 1.0                           |

In the Fuse® study, the mean number of polyps and adenomas detected by first-pass white-light colonoscopy was lower than in any other study of an average-risk white population. This is unlikely to be attributed to differences in the case mix alone.<sup>(32)</sup>

## Recent Multicenter Trial Showed That Fuse® Was Not Better Than SFV Colonoscopy

A multicenter RCT from Italy analyzed the impact of Fuse® versus SFV colonoscopy on ADR, advanced ADR (A-ADR) and detection rate for sessile serrated polyps (SSPDR). The trial showed no difference between Fuse® and SFV colonoscopy in all three parameters. The lack of statistical difference between the two arms was consistent among all seven study centers. The result did not change after adjusting procedural and patient population characteristics.<sup>(35)</sup>



Hassan et al. 2016.

| Withdrawal Time |         |                             |           |
|-----------------|---------|-----------------------------|-----------|
|                 |         | Fuse® Study <sup>(26)</sup> |           |
|                 |         | Fuse®                       | SFV Scope |
| Time to Cecum   |         | 4.8 min                     | 5.1 min   |
| Withdrawal Time |         | 6.2 min                     | 5.6 min   |
|                 | P value |                             | <0.001    |

It has been known for approximately ten years that adenoma detection is correlated with withdrawal times.<sup>(34)</sup> However, there was a significantly shorter withdrawal time in the SFV endoscope arm reported ( $\Delta 0.6$  min,  $p < 0.001$ ), which may have further influenced the detection performance with standard devices.

# HOW CAN EVIS EXERA III HELP TO IMPROVE ADR?

## NBI and Dual Focus – Improve Observation

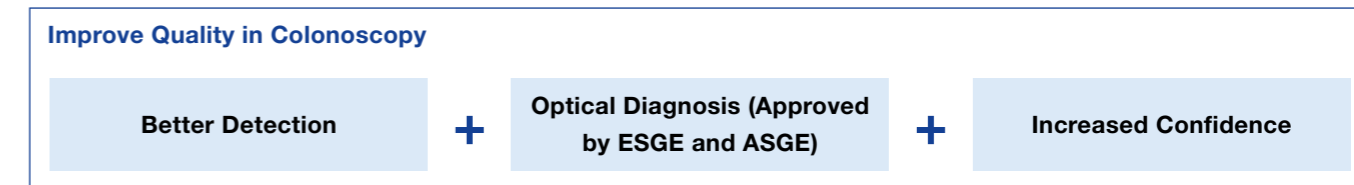
While NBI in EVIS EXERA II (180) was still too dark to improve detection, early studies with EVIS EXERA III (190) and EVIS LUCERA ELITE (290) indicate that NBI improves lesion detection in the colon.<sup>(24,25)</sup>

A single-center RCT with EVIS EXERA III showed that ADR increased by approximately 14% to 48.3% when using NBI compared to white light.<sup>(24)</sup> In a multicenter RCT, NBI with EVIS LUCERA ELITE decreased polyp miss rates by 29%.<sup>(25)</sup> Thus, both systems effectively contribute to improve detection.

| NBI versus White Light in the 190 Series |       |       |         |
|--|-------|-------|---------|
|  | NBI   | WLE   | P value |
| Polyp Detection Rate (PDR)               | 61.6% | 48.3% | 0.02    |
| Adenoma Detection Rate (ADR)             | 48.3% | 34.4% | 0.01    |
| Mean Polyps per Patient (MPP)            | 1.49  | 1.13  | 0.07    |
| Mean Adenoma per Patient (MAP)           | 0.94  | 0.76  | 0.23    |

Leung et al. 2014

Efficient reporting of polyp histology is critical to monitor ADR. Optical diagnosis may be a convenient option to streamline reporting and thus monitoring of ADR. Several large meta-analyses prove that optical diagnosis with NBI is feasible<sup>(36)</sup> and even fulfills the ASGE PIVI criteria for implementing a RESECT and LEAVE and RESECT and DISCARD strategy for diminutive colorectal polyps (<5 mm).<sup>(37)</sup> Furthermore, Dual Focus has been proven to be highly accurate in optical diagnosis and to increase the ratio of high-confidence diagnoses by 12%.<sup>(38)</sup>



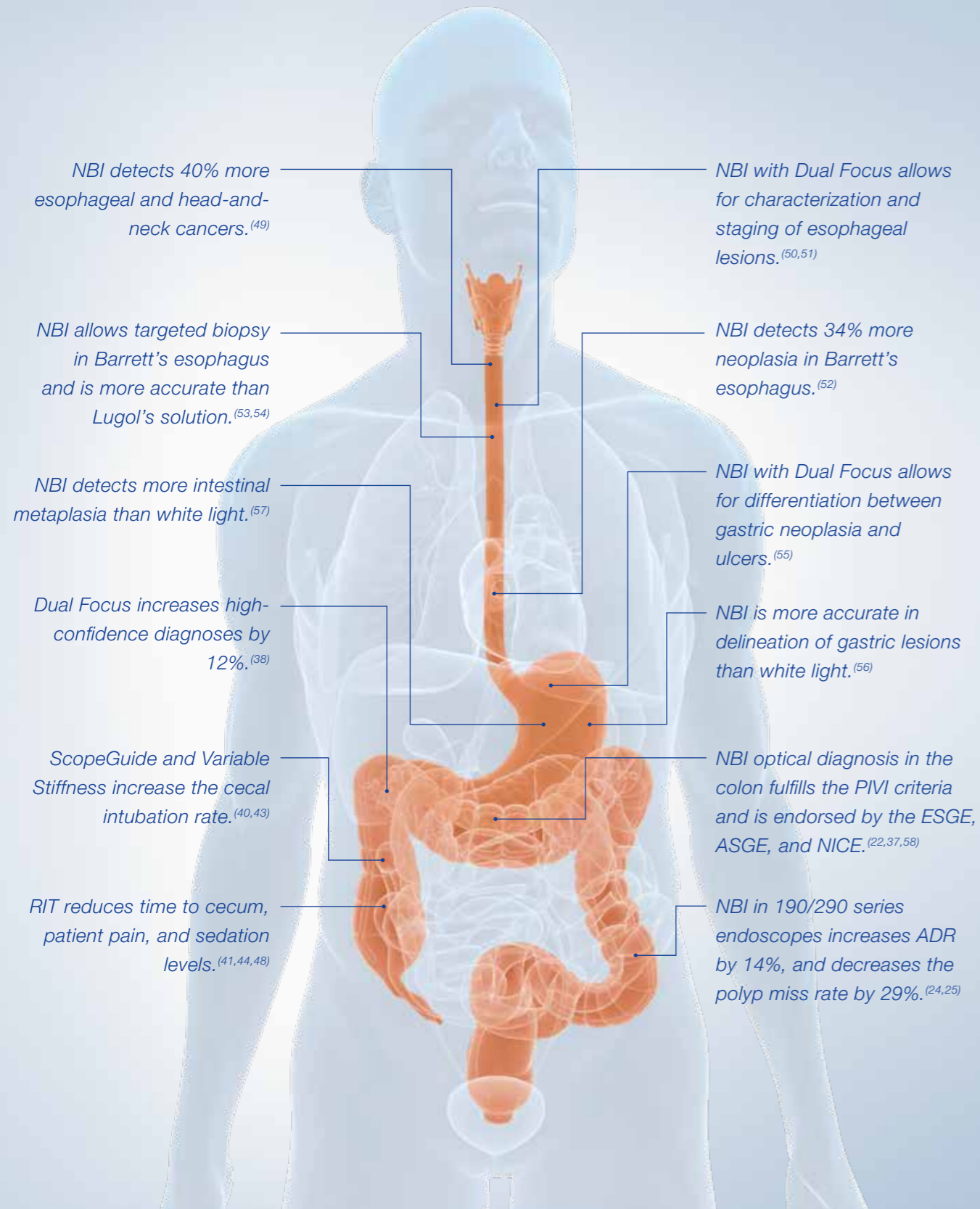
## Responsive Insertion Technology (RIT) and ScopeGuide – Improve Procedural Quality

Maximizing the cecal intubation rate (CIR) is important as cecal ADR has been quantified at 6.5%.<sup>(11)</sup> ScopeGuide can leverage CIR for experienced colonoscopists and trainees<sup>(39,40)</sup> and may thus contribute to a higher ADR.

Since withdrawal time is directly linked to ADR, insertion times are ideally short to allow a thorough withdrawal without compromising efficiency. EVIS EXERA III (190) colonoscopes featuring RIT save 20% of the cecal intubation time<sup>(41)</sup> translating into more time for withdrawal and close observation.

Moreover, a patient-position change during withdrawal has been shown to improve ADR by 9–10%.<sup>(42)</sup> However, this method is easiest to apply if the patient is not sedated. Since ScopeGuide and RIT are proven to reduce sedation levels and patient pain scores during colonoscopy and thus allow for the use of this highly effective method to improve ADR.<sup>(40,43,44)</sup>

## TWELVE CLINICAL REASONS TO CHOOSE EVIS EXERA III



## TRAINING

### Training

Training is vital to improving detection during colonoscopy. Several studies identified effects ranging between 10 and 15% in the incremental ADR achieved by proper training.<sup>(46,47)</sup>

Olympus supports professional training throughout Europe and aims to verify the effectiveness of these training schemes through consecutive testing of participants.

### Effective Colonoscopy Techniques

A high-quality colonoscopy requires a good insertion technique with minimal patient discomfort and pain, coupled with a vigilant detection strategy. This training course teaches valuable skills for performing an effective and comfortable colonoscopy by utilizing a combination of expert tuition and hands-on training using colon models with varying anatomy and ScopeGuide.

### Optical Diagnosis

NBI has been proven to be beneficial for a variety of endoscopic applications and, most importantly, the optical diagnosis of colorectal polyps. A recent ESGE guideline suggests the use of NBI for characterization of diminutive polyps to replace histology under strictly controlled conditions including proper training. This course teaches how to use NBI in clinical practice from the esophagus to the colon with actual clinical cases.

### Online Training

In addition to the classroom training for optical diagnosis, Olympus provides a range of training materials free of charge and without registration. The NBI training portal offers self-training modules as well as the EndoAtlas – a compilation of high-quality endoscopic images and case reports from renowned international experts.

[www.nbi-training.eu](http://www.nbi-training.eu)



# ADR AT A GLANCE

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