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Introduction to the EVIS X1™ Endoscopy System

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Introduction

Endoscopy is an indispensable diagnostic and therapeutic tool that facilitates direct visualization of the gastrointestinal (GI) tract and allows the clinician to identify abnormalities, collect biopsies, remove polyps, dilate strictures, screen for cancer, and monitor the progression of diseases such as inflammatory bowel disease or Barrett's esophagus (BE).^{1,2} Despite various advances in endoscopy, key challenges remain for the clinician, including missed adenomas, suboptimal visibility of lesions during characterization and treatment, bleeding as a leading cause of mortality in GI procedures,^{3,4} and the ability to maintain focus and controlling fatigue during endoscopic procedures.¹ With the recent introduction of the Olympus® EVIS X1™ endoscopy system, clinicians may benefit from the availability of several easy-to-use technologies aimed to revolutionize how clinicians detect, characterize, and treat GI disorders.

EVIS X1 Endoscopy System

The EVIS X1 endoscopy system features the CV-1500 video system center and the OEV321UH 4K ultra high-definition LCD monitor, as well as 2 compatible endoscopes: the GIF-1100 gastroscope and the CF-HQ1100DL/I colonoscope. Together, the components of the EVIS X1 endoscopy system provide diagnostic and therapeutic innovations alongside proven technologies to streamline and improve endoscopic procedures and scope handling.⁵ "This system has a better image quality overall," said Oliver Pech, MD, PhD, the head of Gastroenterology and Interventional Endoscopy at St. John of God Hospital, in Regensburg, Germany.

"We have a nice display on the processor and it's easy to handle. Combined with the endoscopes, we have excellent image quality. It's very intuitive and was quite easy to transition to the EVIS X1 endoscopy system."

Dr Pech had been using the previous iteration of Olympus' endoscopy system portfolio—the EVIS EXERA™ III 190 series—which uses white light and a filter to produce Narrow Band Imaging™ (NBI™) technology to enhance the visibility of vessels and other tissue on the mucosal surface.⁶ With the EVIS X1 endoscopy system, Dr Pech recognizes the advancement of having high-quality imaging that allows him to visualize structures and the mucosal lining in the GI tract and detect potential abnormalities. "For me, the largest difference with the EVIS X1 endoscopy system is with the endoscopes, which make a difference in image quality allowing you to see subtle tiny structures," he said. Dr Pech has been using the EVIS X1 endoscopy system for more than 2 years for 10 to 12 procedures per day, excluding endoscopic ultrasound and endoscopic retrograde cholangiopancreatography.

With the CV-1500 video system center, the EVIS X1 endoscopy system builds on the technologies of the previous system and provides an all-in-one box featuring a central touch panel and a 5-LED light source. Unlike the xenon lamp used in the previous generation, LEDs have a longer life span than a xenon lamp and consume less energy.⁷ With the CV-1500 video system center, the 5 LEDs can be combined to produce various observation modes. Additionally, the CV-1500 video system supports NBI technology by powering specific LEDs and using the NBI technology filter.⁸

The EVIS X1 endoscopy system features 3 technologies that were not available in the previous system—Brightness Adjustment Imaging with Maintenance of Contrast (BAI-MAC™) technology, Texture and Color Enhancement Imaging (TXI™) technology, and Red Dichromatic Imaging (RDI™) technology—designed to enhance the visibility of deep blood vessels and bleeding sources.⁶ "I intend to use the EVIS X1 endoscopy system and endoscopes for every new patient we have with an early Barrett's cancer diagnosis because we can have high image quality and high visualization of those lesions," Dr Pech said. "Also in the colon, when I know that a

patient has a large polyp, for example, it's nice to use the EVIS X1 endoscopy system to investigate the polyp. If there are any suspicions for cancer or deeper infiltrations, this is where I usually use it."

BAI-MAC Technology

During an endoscopy, the ability to visualize the complete image can be hindered by the lack of brightness, particularly when looking at a large cavity or an organ with protruded areas. In this situation, clinicians would need to adjust the scope, which could incur more time, and increase the brightness on the image, potentially introducing halation in the near field and reducing the image detail. Using BAI-MAC technology, the brightness can be corrected in the dark portions of the image while maintaining the brightness in the near field without repositioning the scope or introducing halation.⁹

TXI Technology

Increasing the adenoma detection rate (ADR) is crucial in preventing cancer. A 1% increase in the ADR results in a 3% decrease in the risk for interval cancer and a 5% decrease in the risk of fatal interval colorectal cancer.¹⁰ However, suboptimal visibility of lesions during characterization and treatment affects the clinician's ability to detect lesions; 26% of adenomas are missed during procedures.¹¹ Enhanced visibility is essential in characterizing and treating lesions more efficiently.

TXI technology is designed to improve the detection of lesions and may reduce miss rates by optimizing the color, texture, and brightness of the mucosal surface image during endoscopic screening, increasing the visibility of potentially suspicious lesions (Figure 1).⁶ By applying post-processing technologies to white light imaging that improves the color, structure, and brightness, TXI technology enhances the ability to detect potentially cancerous tissue.⁶ Indeed, TXI technology may reduce miss rates for inflammation and early mucosal changes, allowing clinicians to confirm lesions and determine the appropriate course of action in treating the patient.⁶ Use of TXI technology to detect polyps better is supported by a recent randomized controlled trial that showed a 13.6% increase in ADR when compared with white light.¹² "I use TXI technology when I have a patient with early BE," Dr Pech said. "I usually use white light and NBI and TXI technologies for these patients. It's not for every patient; it depends on the case. NBI and TXI technologies can highlight subtle lesions, for example, in BE. Occasionally, I use TXI technology when I'm looking for subtle lesions, or when I investigate the stomach or the colon when you're looking for early cancer. In the colon, it can show polyps better."

RDI Technology

Bleeding is a leading cause of mortality during endoscopy, accounting for 2% to 10% of deaths.^{3,4} Clear visualization of the bleeding point supports precise and effective hemostasis, but identifying the location of a bleeding point during endoscopy can be challenging. RDI technology is designed to enhance the visibility of bleeding points within the mucosa and the visibility of deep blood vessels during endoscopy treatment (Figure 2).⁶ Using RDI technology, high concentrations of blood and deep vessels appear distinct. Compared with the surrounding pooling blood, the bleeding point has high blood concentration; it appears yellow and more visible. Using RDI technology, clinicians can identify bleeding points and it may help to achieve quick and easy hemostasis.¹³

One of the challenges of working in the submucosal space is being able to visualize deep blood vessels before making an incision during an endoscopic submucosal dissection (ESD) or endoscopic mucosal resection (EMR). Visualization is also important to support tunneling procedures such as peroral endoscopic myotomy. RDI technology may assist clinicians in identifying these deep blood vessels, potentially enhancing the endoscopist's confidence



Figure 1. TXI technology optimizes the image of the mucosal surface to improve lesion visibility.

TXI, Texture and Color Enhancement Imaging; **WLI**, white light imaging.

Based on reference 6.

and visibility while performing therapeutic procedures. “[RDI technology] is helpful when you’re performing, for example, an endoscopic resection for a polyp. If there is bleeding when you are performing an EMR for a polyp, RDI technology helps you find the bleeding vessel,” Dr Pech said. “Everything turns yellow and then you can see the bleeding vessel, where it’s pulsating. You can localize it and then act to stop the bleeding. That’s why you use it, but it’s fortunately not very often that you have to use it—only in some cases for an ESD or a resection.”

With RDI technology, clinicians can anticipate the need for a hemostasis device if it’s not possible to avoid the vessel, potentially reducing the procedure time for emergency bleeding and endoscopic resection.⁶ Furthermore, RDI technology may help reduce stress on the clinicians during such procedures.⁶

Ergonomics and Personalization

The EVIS X1 endoscopy system is designed to support the endoscopist and streamline endoscopic procedures. The ErgoGrip control section of the EVIS X1 scope improves user comfort, and scope handling, helping clinicians feel less fatigue during procedures and

allowing the focus to be on supporting overall patient outcomes.¹⁴ Indeed, the EVIS X1 scope control section is 10% lighter than the EVIS EXERA™ III scope control section, and its rounded handle and easy-to-reach angulation control knobs and scope switches accommodate users with small hands.¹⁴ “Ergonomics are very important, especially when you do the job for many, many years,” Dr Pech said. “[The EVIS X1 scope] is comfortable to use in daily practice. In our endoscopy unit, we have a mixture of EVIS X1 endoscopes with the ErgoGrip and endoscopes from the 190 series. I don’t request a specific endoscope, so I often recognize which endoscope I got after I started the procedure. Immediately, I can tell from 2 factors that I have an endoscope from the EVIS X1 series without looking at the scope: (1) the image quality and (2) the feeling of the endoscope in my hand is more comfortable.”

Clinicians also benefit from the MyCV mode, which offers the ability to assign one scope switch or one customized button on the touch panel to turn multiple functions on and off at once.

Future Considerations in Endoscopy

The EVIS X1 endoscopy system combines a suite of features designed to support visualization and maneuverability, while optimizing efficiency during endoscopic procedures. In addition to subtle changes in the GI tract, “this system could also be used for intestinal metaplasia in the stomach, early cancer in the stomach, or in the duodenum for adenomas or celiac disease,” Dr Pech said. “Every time you want to have a close look at the mucosal surface, it is ideal to use the best system possible, which in my opinion is the EVIS X1 endoscopy system.”

Clinicians can take advantage of the enhanced imaging, ease of use, and practical tools provided by the EVIS X1 endoscopy system to support better diagnostic and therapeutic processes. “I think the EVIS X1 endoscopy system is very comfortable and easy to use, and it has more features and an enhanced image quality compared to the previous system,” Dr Pech said. “The endoscopist always wants to have the best image quality possible, and that would be, for me, the argument to switch to the EVIS X1 endoscopy system.” Looking toward the future, Dr Pech anticipates finding more applications for the system’s endoscopic technologies to improve outcomes for patients. “I think we, as endoscopists, are getting more and more invasive, and expect that the future of endoscopy will be more interventional,” he said. “I anticipate that we will have more and more artificial intelligence for use during diagnostic endoscopy, helping us to diagnose subtle lesions, and to diagnose or find polyps and characterize them. I don’t know how long it will take, but that will be [part of] the future of endoscopy.”

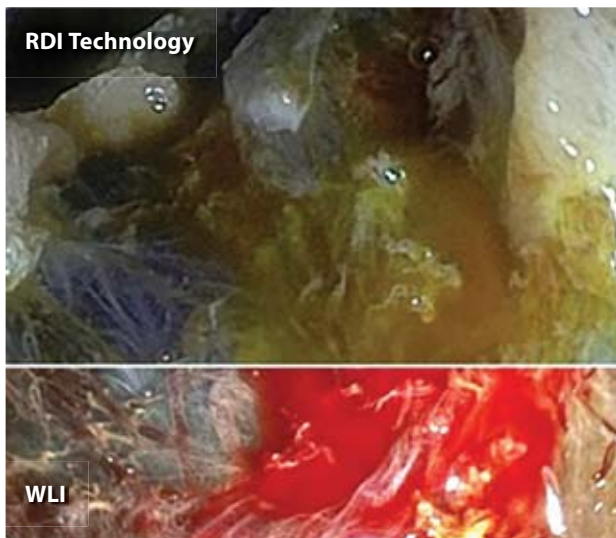


Figure 2. RDI technology enhances the visibility of bleeding points and deep blood vessels.

RDI, Red Dichromatic Imaging; **WLI**, white light imaging.
Based on reference 6.

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Disclosure: Dr Pech is on the speakers bureau of and has received honoraria from Boston Scientific, Falk, Luvos, Medtronic, and Olympus.

Disclaimers: The EVIS X1™ endoscopy system is not designed for cardiac applications. Other combinations of equipment may cause ventricular fibrillation or seriously affect the cardiac function of the patient. Improper use of endoscopes may result in patient injury, infection, bleeding, and/or perforation. Complete indications, contraindications, warnings, and cautions are available in the Instructions for Use (IFU). NBI™, BAI-MAC™, TXI™, and RDI™ technologies are not intended to replace histopathological sampling as a means of diagnosis.

The positions and statements made herein by Dr Pech are based on his experiences, thoughts, and opinions. As with any product, results may vary and the techniques, instruments, and settings can vary from facility to facility. The content hereof should not be considered as a substitute for carefully reading all applicable labeling, including the IFU. Please thoroughly review the relevant user manual(s) for instructions, risks, warnings, and cautions. Techniques, instruments, and setting can vary from facility to facility. It is the clinician's decision and responsibility in each clinical situation to decide which products, modes, medications, applications, and settings to use.