Imaging Advances in Bronchoscopy Through the Combination of High-Definition Bronchoscopes and New Image Processing Systems

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Imaging Advances in Bronchoscopy Through the Combination of High-Definition Bronchoscopes and New Image Processing Systems

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Study Design: Case-Based Technical Note

Objective

This case-based technical note aimed to compare the changes in lesion appearance across different imaging modes using case-based images, with white light observation serving as the standard.

Patient Characteristics

- The study is a technical note based on a series of five representative cases and does not involve a cohort of patients with defined characteristics.

Device

- CV-1500 (EVIS X1™ endoscopy system) with image enhancement endoscopy (IEE) including Brightness Adjustment Imaging with Maintenance Contrast (BAI-MAC™) technology, Texture and Color Enhancement Imaging (TXI™) technology, and Red Dichromatic Imaging (RDI™) technology

- BF-H1200 (diagnostic – Outer diameter 4.9 mm; 2.2 mm working channel)

- BF-1TH1200 (therapeutic – Outer diameter 5.8 mm; 3.0 mm working channel)

Assessment

- The appearance of lesions and image quality with different imaging modes (RDI, TXI, BAI-MAC).

# Main Outcome: Red Dichromatic Imaging for Optimal Site Selection

Red Dichromatic Imaging (RDI™) technology aided the investigators in identifying local blood flow for optimal site selection, reducing bleeding risk.

- RDI-1 identified superficial blood vessels associated with the lesion (B; yellow arrow)
- RDI-3 detected a deep vessel (C)
- This information guided site selection to a low-perfusion area (B; white arrow), and RDI-1 was then used to detect bleeding points (E)

**Site Selection with the Support of RDI**
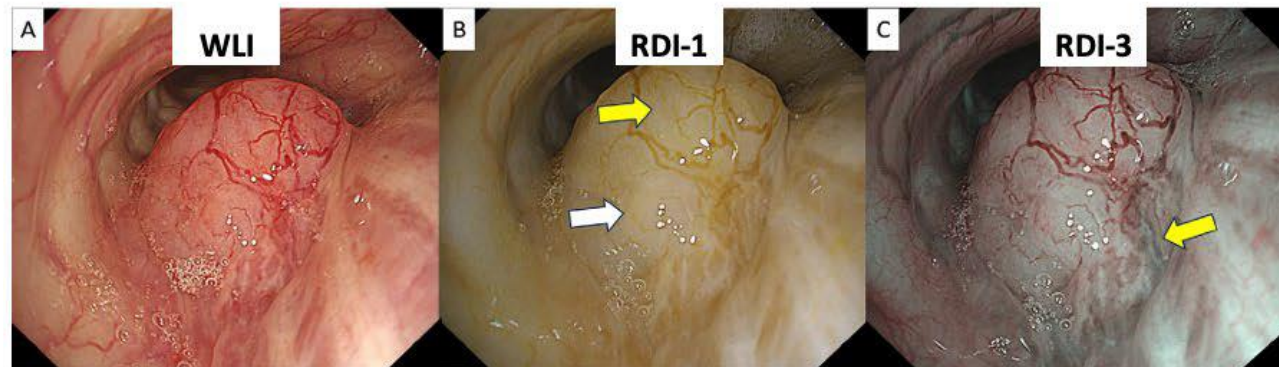
Detection of Bleeding Points
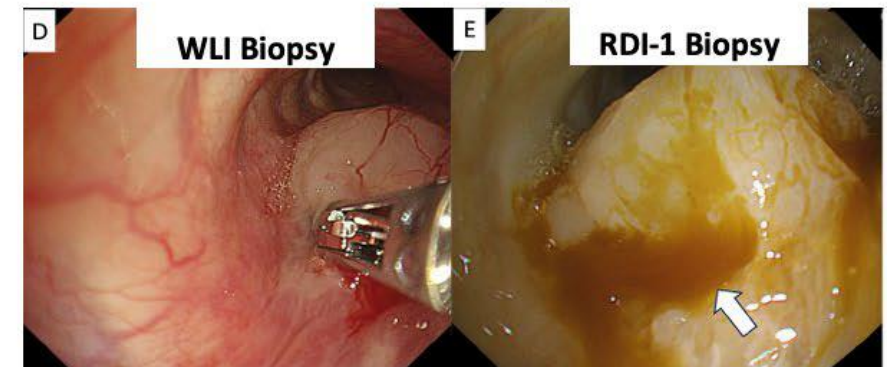
Disclaimer: RDI technology is not intended to replace histopathological sampling as a means of diagnosis.

# Further Outcomes: Texture and Color Enhancement Imaging (TXI™) technology

Texture and Color Enhancement Imaging (TXI) provided stronger image contrast, enabling the distinction of epithelial redness, edema, and skip lesions with local necrosis.

- Improved the visibility of subepithelial blood vessels (A vs. B)
- Blood vessels were easily distinguishable and recognized more three-dimensionally (C vs. D)

Tracheal Invasion of esophagus cancer
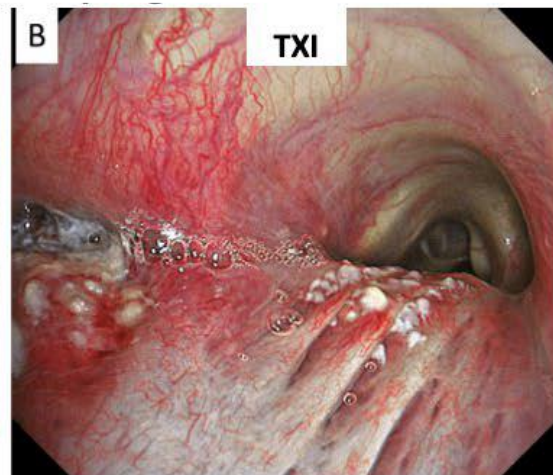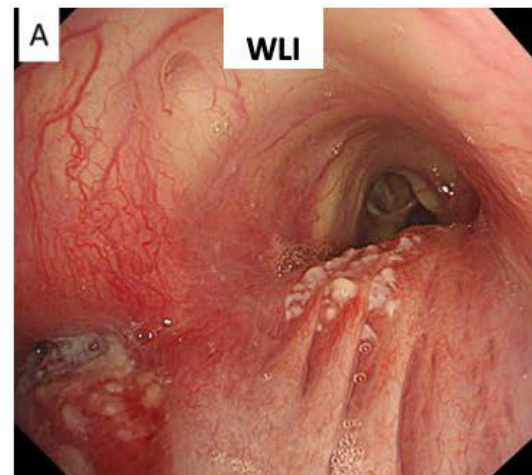
Close up images of the same case
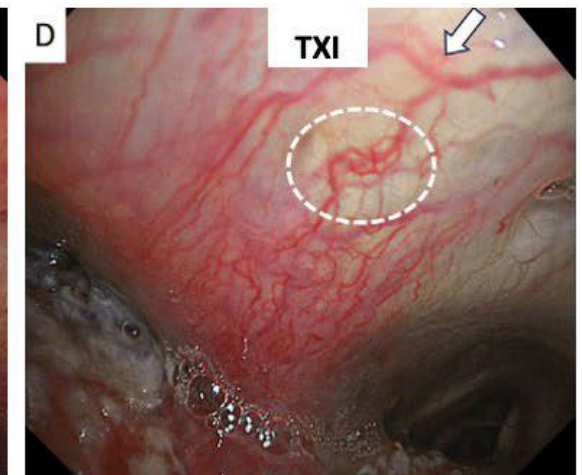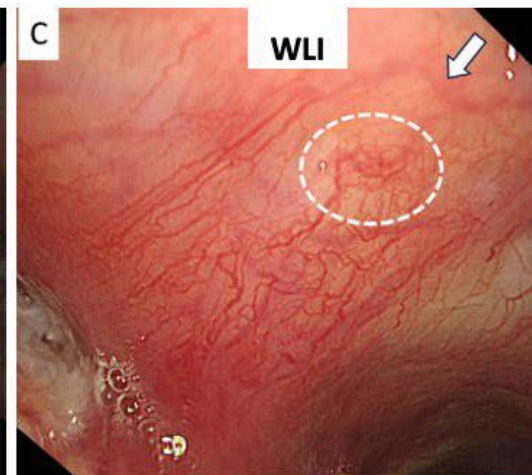
Further Outcomes: Brightness Adjustment Imaging With Maintenance of Contrast (BAI-MAC™) technology

Brightness Adjustment Imaging With Maintenance of Contrast (BAI-MAC) enhanced distal brightness while preserving proximal brightness and thereby supports navigation throughout the lung.

- With the use of the BAI-MAC function, the tracheal carina is clearly visible from above the trachea (A).
- In peripheral bronchial branches, BAI-MAC aids in correctly accessing the next bronchus (B).

BAI-MAC Function in the Trachea
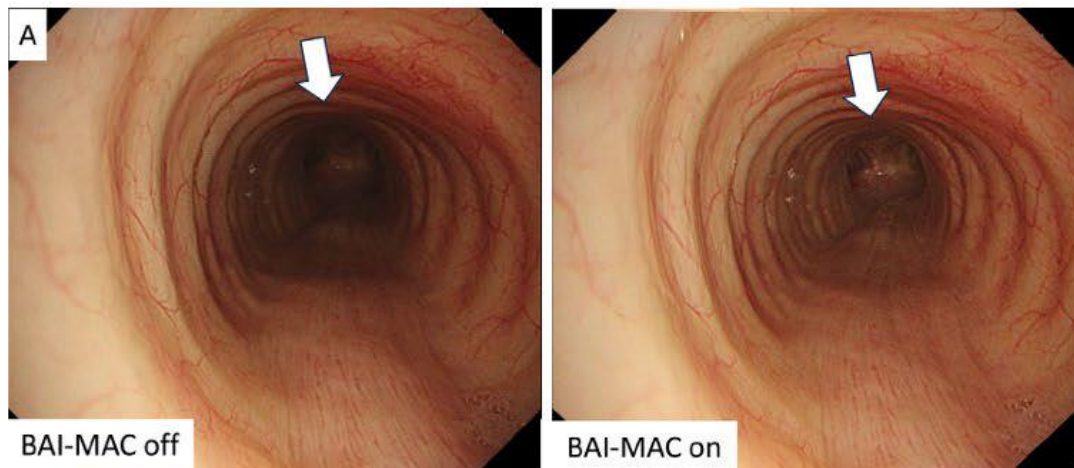
BAI-MAC Function in the Peripheral Bronchi
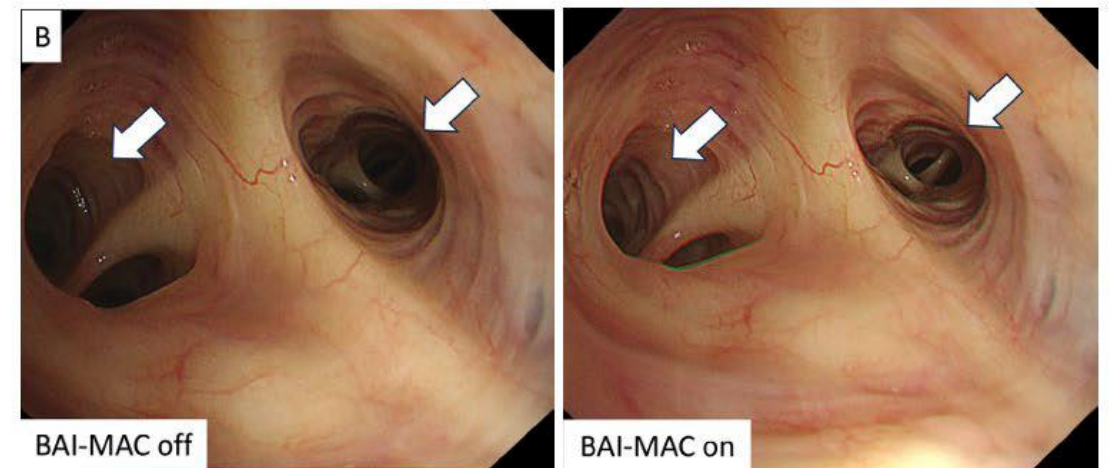
Disclaimer: BAI-MAC technology is not intended to replace histopathological sampling as a means of diagnosis.

Safety of the CV-1500 and scopes was not assessed within the case series.

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Study Conclusions

High-definition bronchoscopes with advanced image processing allow for a more thorough and objective image evaluation that can enhance diagnostic accuracy, prevent complications, and reduce examination times.

The integration of high-definition bronchoscopy with advanced image processing (RDI™, TXI™ and BAI-MAC™ technologies) shows potential for enhancing clinical knowledge and refining diagnostic strategies.

- The challenge of bronchoscopy for diagnosing malignant tumors is to sample viable cancer cells and avoid bleeding, a common side effect of bronchoscopy.

- RDI technology can assist in selecting optimal biopsy sites by identifying necrotic areas and regions with a high risk of bleeding, thus balancing the need to avoid bleeding while obtaining viable cancer cells.

- TXI technology provides a precise contrast on superficial blood vessels, even allowing the estimation of the depth of blood vessels.

Strengths & Limitations as discussed by the authors

Strengths

- Have not been discussed by the authors

Limitations

- **Limited Case Studies:** The study is limited to five representative cases demonstrating the usefulness of high-definition image quality at a single institution.

- **Limited Number of Lesions:** The number of lesions observed under direct vision was limited, and imaging with various modes was not possible in all cases undergoing bronchoscopy due to bleeding and sedation effects.

- **Conflict of Interest:** There is potential bias from the endoscopic device development company, although they were not involved in the study design and interpretation.

Definitions & Abbreviations

RDI™ technology	Red Dichromatic Imaging
TXI™ technology	Texture and Color Enhancement Imaging
BAI-MAC™ technology	Brightness Adjustment Imaging With Maintenance of Contrast
IEE	Image Enhancement Endoscopy

This Study Overview is intended for educational and informational purposes only. It provides an objective summary of data from a single publication. It does not constitute a comprehensive literature review and should not be interpreted as a substitute for evaluating the full body of evidence on the topic. For complete methodology, results, and context, please refer to the original publication.

Link to Publication

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