Practice of Minimally Invasive Treatment

—Introducing SCORE Opera, the AI-Based Image Processing Engine—

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In the field of interventions, which has been advancing and becoming more complex in recent years, there is also a vigorous effort towards minimally invasive treatments. Angiography systems are now demanded to offer sufficient image quality along with dose reduction. To address these needs, we have developed the new AI-based image processing engine SCORE Opera, and implemented it in our latest angiography system, Trinias™. Here, we present an overview of SCORE Opera, primarily comparing it with our previous image processing engine, SCORE PRO Advance.

1 Features

In SCORE PRO Advance, the motion-tracking noise reduction, which recognizes the operator's focus objects like catheters, guidewires, and blood vessels through pattern matching, has been successful in achieving both visibility of these objects and noise reduction. The new SCORE Opera introduces an additional filtering process using deep learning, a technique in AI technology. This process is combined with the conventional pattern matching to make object enhancement and noise reduction more effective. Additionally, the feature of total dynamic range control for halation suppression, a characteristic of the previous image processing, has been retained.

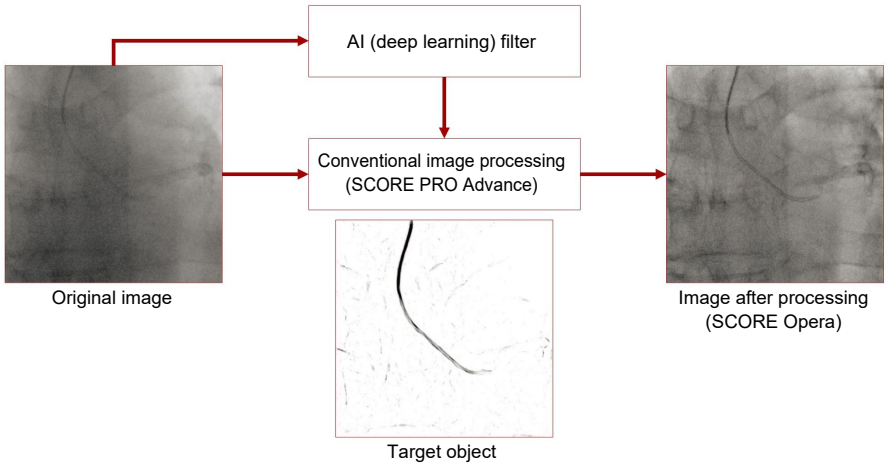

Fig. 1 Overview of SCORE Opera

2 Effects

SCORE Opera has achieved a 49% reduction in the entrance surface dose rate while maintaining the same CNR (Contrast-to-Noise Ratio) as the standard fluoroscopy mode of SCORE PRO Advance. Furthermore, it includes a fluoroscopy mode where the CNR is improved by 26% under the same entrance surface dose rate as the conventional model.

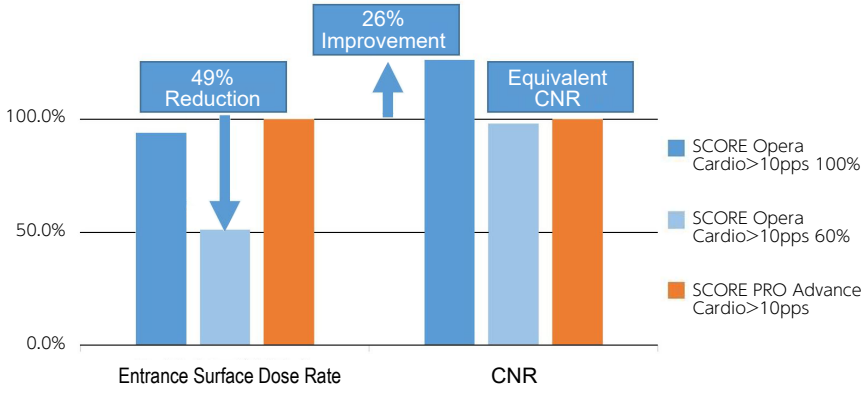

Fig. 2 Fluoroscopy Dose and Moving Phantom Evaluation

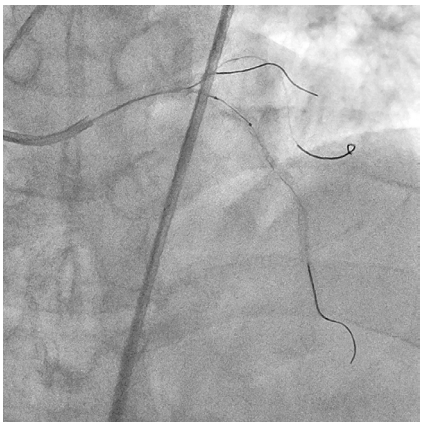

Fig. 3 SCORE Opera Clinical Fluoroscopy Image

Fig. 4 SCORE Opera Clinical Cine Image

3 Conclusion

We extend our deepest gratitude to all the facilities, physicians, and radiological technologists who have collaborated in this development. Our company remains committed to listening to the professionals involved in interventions and continues to strive for further advancements in minimally invasive treatment.

Note:

1. Using the World's First AI-Enhanced Cutting-Edge Image Processing System
   Release of New Angiography System that Supports Catheterization Procedures Performed throughout the Body for Cardiac and Other Diseases
   https://www.shimadzu.com/news/p2ddnyqpqijfraju.html
2. The CNR (Contrast-to-Noise Ratio), measured in a moving phantom experiment simulating a guidewire moving with the coronary artery.
3. Comparisons are based on the standard fluoroscopy modes Cardio 10pps and 7.5pps, measured at Patient Entrance Reference Point with a 20cm PMMA.
4. The AI technology in SCORE Opera is not the type that continuously learns on its own.
5. Trinias is a trademark of Shimadzu Corporation or its affiliated companies in Japan and/or other countries.