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Denka Company Limited  
Tohoku University

## **Social Adoption of an Invasive Endoscopic Procedure Simulator** — Medical Rising STAR® project, an industry-academia collaboration between Denka and Tohoku University —

### < Points >

- Denka has developed a simulator model of endoscopic hemostasis<sup>1</sup> based on the results of research conducted jointly with Tohoku University.
- Ulcer and blood vessel models made of a proprietary soft material realistically replicate a texture, similar to that of human intestine.
- Training for novice and expert endoscopists alike, using actual endoscopes and treatment tools (devices) without endangering patients.

### < Overview >

Denka Company Limited (Head Office: Chuo-ku, Tokyo; President: Toshio Imai; hereinafter “Denka”), in collaboration with Associate Professor Takeshi Kanno, and Professor Atsushi Masamune of the Division of Gastroenterology, Tohoku University School of Medicine, and Research Associate Yutaro Arata of Tohoku University Clinical Skills Laboratory, has launched the “Medical Rising STAR®”<sup>2</sup> project. Based on the results of the joint research, Denka will develop a simulator for learning endoscopic hemostasis (clip method and cauterization method with hemostatic grasper) using an actual endoscope and treatment tools as the first phase of the project, and commence the trial sale on May 1, 2023 in Japan.

### < Details >

Associate Professor Kanno and his colleagues had previously found that bleeding ulcers increased a sharp 2.2-fold year on year in Miyagi Prefecture after the Great East Japan Earthquake in 2011, especially in patients requiring urgent treatment within one month of the disaster. (Kanno T. et al. J Gastroenterol 2012. DOI: 10.1007/s00535-012-0681-1). Even after a catastrophe with limited medical resources, emergency endoscopic treatment needed to be successful. However, there are limited opportunities for beginners to learn endoscopic hemostasis, the crucial technique of

endoscopic treatment, except in treatment situations, and it is vital that as many endoscopists as possible master advanced techniques by utilizing simulators.

Gastrointestinal bleeding could previously only be replicated using living animals such as porcine stomachs, but now it can be replicated passing a pseudo-vessel through an ulcer model made of a special soft material developed by Denka and affixing it to a stomach lumen model made with reference to human 3D data (Figure 1).

This simulator enables medical students and residents to learn the flow of endoscopic hemostatic procedures in a calm environment at universities and medical facilities, using actual endoscopes and treatment tools (devices). It can also be used by skilled personnel to practice and maintain skills in highly difficult sites, and is expected to contribute to improving and maintaining skills without putting patients at risk.

Starting with this model, a lineup will be developed, which will be called Medical Rising STAR®. The first entry, an endoscopic hemostasis simulator, will be available for trial sale from Denka on May 1, 2023 (fully made-to-order).

Hemorrhagic complications are possible in many invasive endoscopic procedures (e.g., cancer resection and endoscopic sphincterotomy). We will use the results of this research to develop a simulator model that can replicate various endoscopic procedures including hemorrhagic complications, and apply the results in the way that benefits the real world.

As a result of this R&D, a video paper was published in the February issue of Video GIE.

Title: Novel simulator of endoscopic hemostasis with actual endoscope and devices

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Figure 1

### Features

- Replication of spurting bleeding (Forrest Ia) by syringe manipulation.
- The difficulty level can be adjusted according to the position of the application.
- Practicable with four bleeding vessels per ulcer.
- Bleeding vessel can be selected by switching three-way stopcock.

Video of development history and assembly instruction:

[https://www.youtube.com/playlist?list=PLYyDSR\\_h1X0yyqqgRpVUd6erdvJKoXqIA](https://www.youtube.com/playlist?list=PLYyDSR_h1X0yyqqgRpVUd6erdvJKoXqIA)

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### Description of Terms

1: When bleeding occurs from ulcers, cancer, or inflammation in the digestive tract, which extends from the esophagus to the stomach, duodenum, small intestine, and large intestine, hemostasis using endoscopes such as gastroscopy and colonoscopy is the first choice for treatment because of its low patient burden. Typical hemostatic methods include mechanical hemostasis with clips, cauterization hemostasis with hemostatic grasper applying electrocautery, and method with local injection of ethanol or epinephrine.

2: “STAR” for Medical Rising STAR stands for “Simulator Training model for Advanced high Risk endoscopic therapy. Medical Rising STAR is a registered trademark of Denka Company Limited in Japan.

### **Denka’s Efforts in Industry-Academia Collaboration**

Denka has positioned healthcare as a focus area in its “Mission 2030” management plan, and aims to improve the quality of life of people around the world in the three areas of prevention, diagnosis, and treatment. We are pursuing open innovation with a number of research institutions, and the Medical Rising STAR, which was jointly developed through industry-academia collaboration with Tohoku University, is positioned as a product that can contribute to the development of medical technology in Japan and abroad in the area of treatment. We will continue to promote industry-academia collaboration with the aim of implementing the university’s cutting-edge research into the medical field.

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