Contributing to the Quality Consistency, Safety, and Efficiency of Endoscopic Surgery

"The Research and Development of Advanced Information-Assisted Endoscopic Surgery System" selected as a subsidized project by the Japan Agency for Medical Research and Development

Olympus, a global technology leader in designing and delivering innovative solutions for medical and surgical procedures, among other core businesses, announced today the development of the "Digital transformation for surgery: advanced information-assisted endoscopic surgery system," which provides the information that helps to ensure safe and consistent quality of surgery by translating the tacit knowledge of skilled physicians in the endoscopic surgery field into data through AI analysis. This developmental theme was selected as a subsidized project by the Japan Agency for Medical Research and Development (AMED). The work will be conducted by 2023 at the latest in collaboration with the National Cancer Center Hospital East, Oita University's Faculty of Medicine, Fukuoka Institute of Technology's Faculty of Information Engineering, and the University of Tokyo's Faculty of Engineering (Graduate School of Engineering) as research and development contributors. It aims for its practical application in 2024 onward.

Under the X INNOVATION (cross innovation) concept, Olympus will continuously promote an open innovation approach—sharing findings with academic and industry leadership where appropriate—for the realization of future surgical procedures.

The Background of the Development

The number of endoscopic surgery cases is growing, as better outcomes such as early post-surgery recovery lead to improvements in patient quality of life. On the other hand, there is an environmental gap among regions and facilities in the availability of advanced technologies and facilities, as well as skilled surgeons and medical staff. For this reason, there is a disparity in the surgical outcomes among surgeons and facilities. Eliminating this disparity is an urgent challenge. The development of an Advanced Information-assisted Endoscopic Surgery System aims to facilitate consistent quality of surgery, ensure safety, and achieve the efficient use of operating rooms.

Overview of the Information-assisted Endoscopic Surgery System

1. **The Information Rich Platform: Decision Assistance**
   Adding an information-assisted software library (Information Rich Real-time Library) created for various types of surgical and medical teams allows the endoscopic surgery system to provide visual information to the surgeons and to provide support to its medical teams.
   Depending on the progress of each surgery, risk factors such as anatomy, blood vessels, tumor position, anatomic landmark, and bleeding will be displayed using AI and other related technologies. Critical information during the surgery can be shared amongst the medical team.

2. **The Autonomous View Control: Visual Field Control Assistance**
   In accordance with the progress and operational image state estimated by the Information Rich Platform, this system will autonomously control endoscopes using AI and other related technologies, securing the visual field that makes it easier for surgeons to conduct surgery.

3. **The Active Device Control: Surgical Device Control Assistance**
   This system collects information on the treatment and access to the treatment area during surgery, along with information on surgical progress and the types and conditions of tissues, which are estimated by the Information Rich Platform. This enables the optimal strength and energy output of surgical devices to be applied to the target tissue. The assist of AI and other technologies has the potential to reduce risk and better enable safe and smooth treatment during operations.

System diagrams

Decision Assistance	Visual Field Control Assistance	Surgical Device Control Assistance
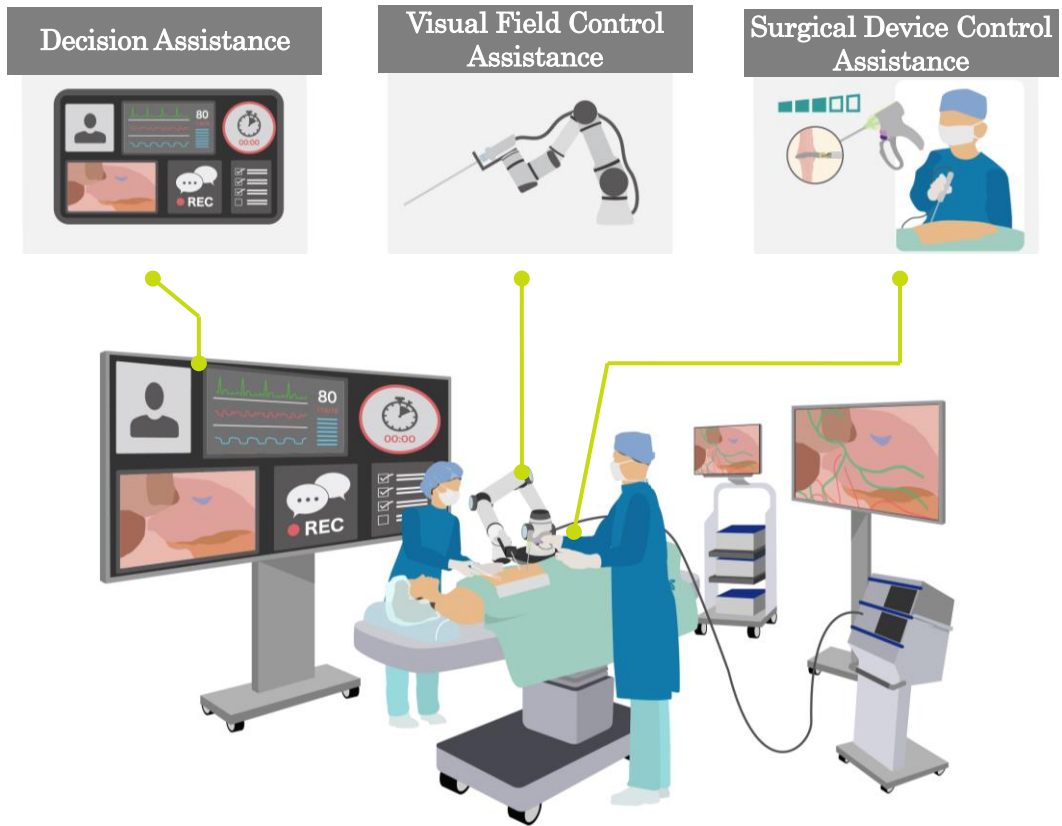
Information support examples in accordance with the surgery progress

Information support for dissection

XX Fascia

XX Artery
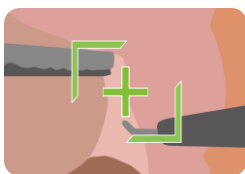
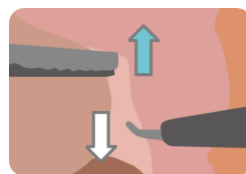Dissection annotation function　　Vessel display function　　Detection of the blood point

Information support for visual field control

Optimal viewing field control

Information support for surgical device control

XX°C

Traction direction suggestion function　　Energy device-recommended output information

Research and Development Organization

1. The Information Rich Platform: Decision Assistance

- Olympus
- National Cancer Center Hospital East (Research representative: Masaaki Ito, Department of Colorectal Cancer Surgery)
- Faculty of Medicine, Oita University (Research representative: Masafumi Inomata, professor)
- Faculty of Information Engineering, Fukuoka Institute of Technology (Research representative: Tatsushi Tokuyasu, professor)

2. Autonomous View Control: Visual Field Control Assistance

- Olympus
- National Cancer Center Hospital East

3. Active Device Control: Surgical Device Control Assistance

- Olympus
- Faculty of Engineering, University of Tokyo Graduate School of Engineering (Research representative: Ichiro Sakuma, professor)

Olympus celebrated its 100th anniversary on October 12th of this year.
We would like to thank all of our customers and stakeholders who have supported the company's development throughout the years.
We look forward to continuing the tradition of contributing to society through Making people's lives healthier, safer and more fulfilling.