

Innovation Initiatives

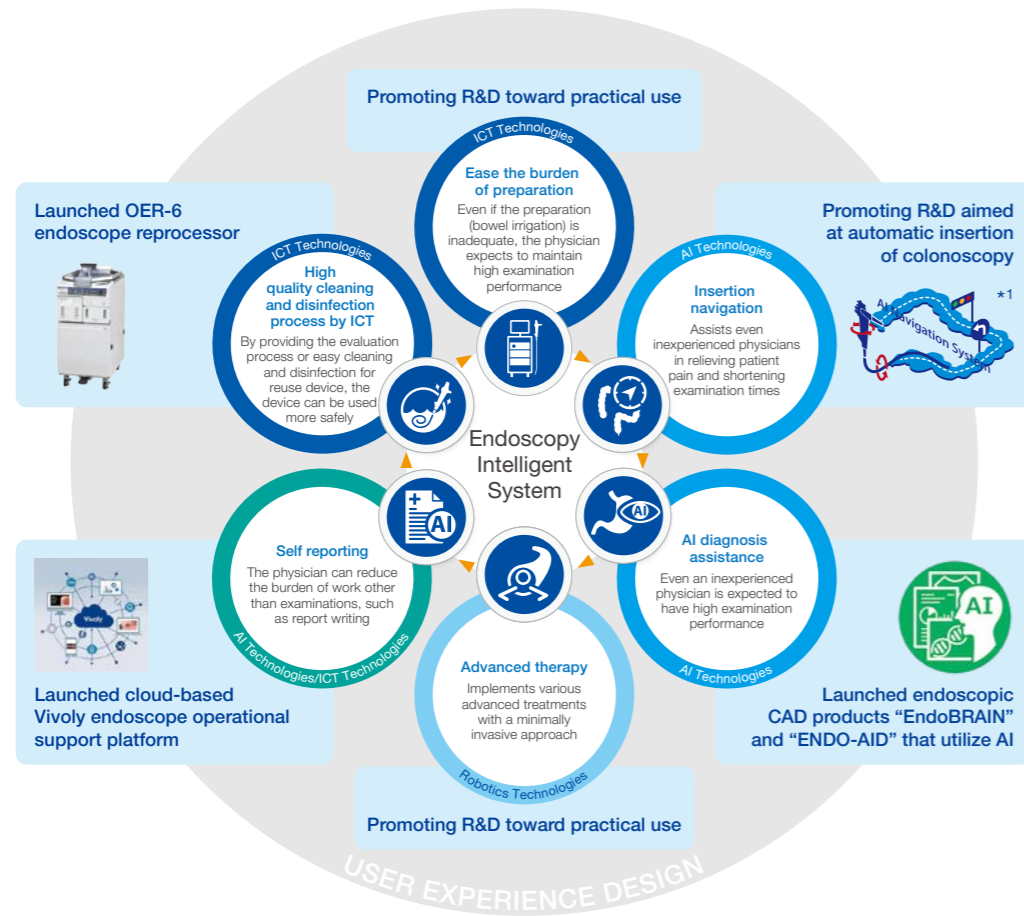
# Medical

- Challenges**
- Global shortage of endoscopists
  - Standardization of endoscopy examinations/procedures
  - Growing demand for data integration and utilization

**Realization of Endoscopy Intelligent System**

One of the challenges facing endoscopic medicine is the high reliance on physicians' skills. In addition to the variations in the quality of medical care that come about due to experience and skill, it is also giving rise to the issue of a global shortage of endoscopists. Since endoscopes are devices that can be inserted inside the body, their use also requires that safety be ensured. In recent years as well, there has been a demand for the integration of medical data, data collaboration between hospitals, and for the sharing of a variety of information, not only of endoscopic images but also of maintenance and cleaning/disinfection history.

In view of its leadership in endoscopy, Olympus is changing its focus on endoscopic procedures from individual steps, such as diagnosis and treatment, to overall workflow to meet the challenges of endoscopic medicine and the needs of healthcare professionals. We would like to propose the optimum solutions between the examination preparation and cleaning/disinfection sequence of the workflow. In addition to already selling products that support some workflows, we are also advancing R&D toward practical use. We will bring about innovation in endoscopic medicine while utilizing a variety of technologies, such as AI, ICT, and robotics.



\*1 Through the R&D of technology for AI guided flexible endoscope insertion control, we aim to shorten the examination time, reduce the patients' pain and training time of the physicians, which will contribute to provision of advanced medical care through the data utilization.  
 → Participation in the Cabinet Office "Cross-ministerial Strategic Innovation Promotion Program (SIP): Innovative AI Hospital System"

- Challenges**
- Standardization of endoscopic surgery
  - Ensuring safety of endoscopic surgery

**The Research and Development of Advanced Information-Assisted Endoscopic Surgery System**

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. To resolve these issues, Olympus is developing the "Digital transformation for surgery: advanced Information-assisted endoscopic surgery system," which provides 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)\*2. The work will be conducted by fiscal year 2024 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 fiscal year 2025 onward.

\*2 This research is supported by AMED under Grant Number JP21he2302003.

# Scientific Solutions

- Challenges**
- Declining birth rate
  - Reducing workload in ICSI and standardization of process

**Under Joint Research toward Development of AI-Assisted Sperm Selection**

Due to changes in social structure, in recent years the need for assisted reproductive technology, such as in vitro fertilization, has been increasing for people suffering from infertility. In particular, there is a steadily increasing number of patients undergoing intra cytoplasmic sperm injection (ICSI), one of the vitro fertilizations and one which is performed under a microscope, and reducing the burden on embryologists who perform the process is becoming an issue.

In ICSI, by which a single sperm is directly injected into an oocyte to promote fertilization, the selection of the sperm to be adopted is an important factor in increasing

the fertilization rate. However, in this selection, many factors depend on the knowledge and experience of the embryologists who carry out the work. To help solve this challenge, we conducted joint research with the Department of Obstetrics and Gynecology at the Jikei University School of Medicine, which carries out fertility treatment research, and succeeded in developing an AI-assisted sperm selection system that can calculate sperm motility and morphology in real time with high accuracy. Going forward, we will carry out multiple facility evaluations and aim to establish a microscope system equipped with AI system within a few years.



Captured image showing real-time tracking of collected sperm motility and morphology



The ICSI system is based on the Olympus IX3-SLICSI inverted microscope