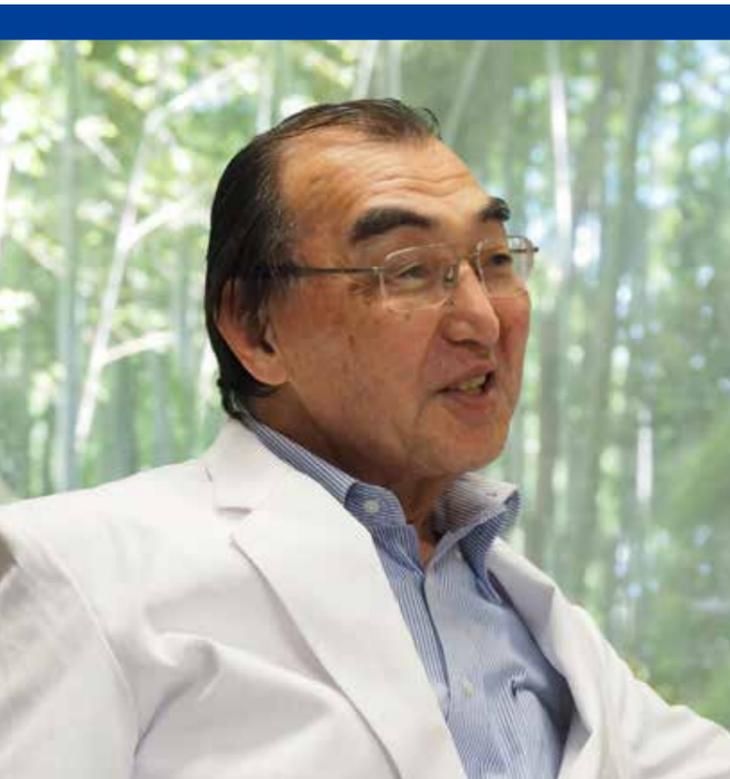


Partner and Customer Assets

Olympus views healthcare professionals, researchers, and other highly specialized people as important partners as well as customers. Working together with such partners has resulted in Endocyto, an ultra-high magnifying endoscope that is capable of performing imaging in the manner of a microscope down to the cellular level, and EndoBRAIN®, AI-assisted diagnostic support software for endoscopic images. In this section, we hear from Professor Shin-ei Kudo, Chairman of the Digestive Disease Center, Showa University Northern Yokohama Hospital about the background to research and development and how Olympus creates value with our partners and customers.



Products That Reflect the Requirements of Doctors in the Field Contribute to the Diagnosis of Many Patients

Professor Shin-ei Kudo,
Chairman of the Digestive Disease Center,
Showa University Northern Yokohama Hospital

Q The number of people affected by colorectal cancer is increasing each year worldwide and the prevention and treatment of this kind of cancer has become a significant issue. Against this backdrop, the accuracy of diagnosing colorectal cancer has risen dramatically following the development of magnifying endoscopes. Can you explain the history regarding the development of these products and the background to the research and development of the Endocyto ultra-high magnifying endoscope, which utilizes EndoBRAIN® software?

A I was engaged in research and development using magnifying endoscopes that perform at a maximum of 100 times magnification together with Olympus throughout the 1980s. This R&D came about from a desire to conduct more precise endoscopic diagnoses given the fact that my paper on depressed lesions of the colorectum, the first of its kind in the world, was largely overlooked globally and in light of the importance of real-time in-vivo observation of pit pattern classification (diagnosis from the surface microstructure of the colon). This led to the penetration of magnifying endoscopes,

and pit pattern classification became more widespread. This in turn prompted a desire to observe the cell nucleus and blood vessels in more detail. Pit patterns were to become the standard in colonoscopy diagnosis, and I believed that the in-vivo evaluation of the nuclear grade would enable the same level of diagnosis as pathological diagnosis in-vivo and get us closer to understanding the true nature of cancer.

However, even though Endocyto produces similar images to pathological images, there are still differences. As a result of meticulous one-to-one comparisons of pathological images and Endocyto images, it was decided that Endocyto in fact provided more useful insight. This culminated in the establishment of the diagnostic method known as Endocytoscopy.

Q As a result of advancing research and development on automatic diagnostic techniques using Endocyto, Olympus released EndoBRAIN® in February 2019, the first AI technology in the endoscopy field to obtain regulatory approval in Japan. Why is AI-assisted diagnostic support necessary in colonoscopies?

A When detecting lesions (polyps) in an endoscopy, it is necessary to determine whether the lesion is neoplastic or not, or needs to be treated or not. Around 30-40% of all lesions are non-neoplastic lesions, and if it isn't possible to discriminate the lesions during an examination, all of them have to be cut out, with such treatment a significant physical burden on patients as well as a financial burden on the country in terms of economic efficiency. Since it's difficult to distinguish between neoplastic and non-neoplastic lesions, if the person conducting the endoscopy is not an expert, the accuracy rate is said to be around 70-80%. Using AI-assisted diagnostic support greatly enhances this accuracy, making it possible to eliminate unnecessary treatment and tissue examination.

Q What kind of role did Olympus fulfill in the research and development of these products?

A Endocyto is a product that closely reflects our requirements. It provides us with high-magnification, high-definition images of the cell nucleus at the microscopic level and its insert-ability rivals that of ordinary endoscopes, which is a huge plus. The method of observation combining Endocyto with narrow band imaging (NBI) enables excellent visibility when used in conjunction with the LUCERA ELITE system*, made possible with the efforts of Olympus' development, as opposed to conventional digestive endoscope systems with less light intensity. Such advancements in the light source were indispensable in the research and development of Endocyto.

Moreover, the application of Olympus's sales channels has enabled the delivery of EndoBRAIN® to many physicians trained in endoscopy to the benefit of many patients.

*Mainly sold in Japan

Q How are Endocyto and EndoBRAIN® contributing to physicians, hospitals, and patients?

A Previously, around a week was required to obtain the results of pathological diagnosis. Physicians can acquire close to the same information in a just 0.4 seconds with EndoBRAIN® helping to diagnose whether it is a neoplastic or a non-neoplastic lesion. The application of EndoBRAIN® is expected to enable any physician, irrespective of differences in experience, to make this discernment with an extremely high degree of accuracy at all times, which is extremely important. That means physicians are now able to accurately distinguish between lesions that need to be treated and those that can be left alone, thereby supporting more accurate physician diagnoses.

Rather than extract tissue, wait for the results of pathological diagnosis and then decide on the treatment method like before, the results of the diagnosis can be communicated on the spot, which has the advantage of reducing the number of times the patient needs to visit the hospital. This serves to significantly cut down on medical expenses thanks to a reduction in treatment fees.

Q Going forward, what are your expectations of Olympus?

A Olympus's endoscopes account for 70% of the global market, contributing to the health of people all over the world. I am sure that a number of AI-assisted products will be released in the endoscope field in the future. I'd like Olympus to make efforts to develop models enabling AI diagnosis and aid with the proliferation of these products so that the Olympus name becomes synonymous with AI-assisted endoscopes. In addition, although the application of AI is expected to become more widespread in endoscopic examinations and support further aspects of examinations, the technology is not perfect. Training and support will be essential for physicians to understand the strong and weak points of AI and become better versed in the use of AI-assisted endoscopes. Going forward, I hope Olympus continues striving to develop products that reflect feedback from the medical field and thereby contribute to next-generation medical treatment.

Product Information

Endocyto ultra-high magnifying endoscope



The Endocyto ultra-high magnifying endoscope enables high-magnification, high-definition images at the microscopic level through the use of an optical magnification ratio up to 520 times. That makes it possible to conduct real-time

in-vivo observation at the cell level during endoscopic examinations, with expectations of more accurate diagnosis and eliminating unnecessary biopsies. The tip of Endocyto has the same diameter as conventional endoscopes, thus lessening the burden on patients during insertion.

EndoBRAIN® AI-assisted diagnostic support software for endoscopic images



EndoBRAIN® was researched and developed by Showa University Northern Yokohama Hospital, the Nagoya University Graduate School of Informatics and Cybernet

Systems Co., Ltd. with the support of AMED*. Olympus has acquired exclusive sales rights for the software in Japan from Cybernet Systems Co., Ltd. Ultra-high magnified images of the colon taken with the Olympus-made ultra-high magnifying endoscope Endocyto are analyzed using AI to automatically distinguish between neoplastic and non-neoplastic lesions in real time, thereby aiding in diagnoses made by physicians.

*AMED: Japan Agency for Medical Research and Development