# Department of Surgery
# Division of Digestive Surgery

Katsuhiko Yanaga, *Professor*
Kazuhiko Yoshida, *Professor*
Nobuyoshi Hanyu, *Visiting Professor*
Norio Mitsumori, *Associate Professor*
Takeyuki Misawa, *Associate Professor*
Kazuo Matai, *Associate Professor*
Yoshiyuki Furukawa, *Assistant Professor*
Kouji Nakada, *Assistant Professor*
Yuichi Ishida, *Assistant Professor*
Yoshio Ishibashi, *Assistant Professor*
Hidejirou Kawahara, *Assistant Professor*
Naoto Takahashi, *Assistant Professor*
Katsunori Nishikawa, *Assistant Professor*
Hideyuki Kashiwagi, *Professor*
Susumu Kobayashi, *Professor*
Tetsuji Fujita, *Associate Professor*
Tomoyoshi Okamoto, *Associate Professor*
Nobuo Omura, *Associate Professor*
Satoru Yanagisawa, *Associate Professor*
Yuji Ishii, *Assistant Professor*
Shuzo Kono, *Assistant Professor*
Yoichi Toyama, *Assistant Professor*
Yoshiaki Kita, *Assistant Professor*
Yoshiyuki Hoya, *Assistant Professor*
Masaichi Ogawa, *Assistant Professor*
Shigeki Wakiyama, *Assistant Professor*

## General Summary

The quality of surgical care is defined as the degree to which surgical practice for individuals and populations increases the likelihood of desired health outcomes and are consistent with current professional knowledge. Yet, for much of the 20th century, the knowledge base for surgical practice was not influenced by systematic evidence, but rather by expert opinion and collective experience. Now, evidence-based medicine has been widely accepted in surgery. Randomized clinical trials are not valid sources of evidence to answer a large number of important clinical questions. Well-designed observational research can also address relevant clinical questions that cannot be answered by randomized clinical trials. Some of our studies listed below would help both surgeons and patients to make decisions and would improve the quality of health care in the surgical field.

## Research Activities

*Upper gastrointestinal surgery*

We studied the pathophysiology of esophageal functional disorders, such as esophageal achalasia and gastroesophageal reflux disease, using manometry and multichannel intraluminal impedance pHmetry. We proposed surgical indications for these esophageal functional diseases and performed surgical treatment with laparoscopic surgery. We continue to assess the viability of the gastric tube using intraoperative thermal imaging system during esophagectomy. The correlation between suitable graft construction and postoperative complications of a graft was then investigated. We started intraoperative monitoring of bilateral laryngeal recurrent nerves to prevent postoperative laryngeal recurrent nerve palsies and to predict the degree of paralysis after surgery. Basic research in esophageal cancer has led us to find molecular markers indicating prognosis. We aimed to investigate the significance of the expression of small ubiquitin-like modifier 1 in esophageal cancer as such a prognostic factor.

Early gastric cancer invading the submucosa is associated with an approximately 20% risk of lymph node metastasis, for which gastrectomy with lymph dissection is indicated. However, gastric preservation is possible by searching for sentinel lymph nodes, which are assumed to be the lymph nodes to which cancer first metastasizes. We examined the usefulness of sentinel lymph node navigation surgery with the infrared ray endoscope to develop laparoscopic operations that allow submucosal cancers of the stomach to be safely resected.

We also investigated the characteristics, such as malignant potential in the progress of gastric cancer, in relation to the sensitivity to anticancer agents.

Postgastrectomy syndrome occurs after gastrectomy performed to treat gastric diseases, most often gastric cancer. The severity of postgastrectomy syndrome is related mainly to the extent of gastric resection and the reconstruction procedures. Postgastrectomy syndrome is a clinically important problem, because it impairs quality of life. To minimize postgastrectomy syndrome our department has actively pursued function-preserving gastrectomy, reconstruction with a substitute stomach, and limited gastric resection. We have also performed postoperative gastrointestinal function tests to evaluate various gastrectomy procedures and to obtain useful information for the diagnosis or treatment of postgastrectomy syndrome.

*Colorectal surgery*

To improve the quality of laparoscopic operations, we are evaluating the usefulness and reliability of the Virtual Reality Surgical Simulator for laparoscopic colectomy. A comparative study of stress between open and laparoscopic surgery is under way.

In chemotherapy, we are participating in national multicenter trials to obtain new evidence. Moreover, we are developing a new regimen (S-1, oxaliplatin plus cetuximab, SOX+C) in collaboration with the Division of Oncology/Hematology, Department of Internal Medicine.

There have been no breakthroughs in basic research on various antibodies in relation to cancer. However, the efficacy of indoleamine 2,3-dioxygenase (the enzyme that causes cancer immunotolerance) as a factor predicting the recurrence of early colorectal cancer has been reported. Furthermore, in collaboration with the Department of Urology, we are developing methods to identify cancer-associated proteins (colorectal, esophageal, gastric, pancreatic, and liver cancers) by means of proteomics.

Sclerotherapy with aluminum potassium sulfate and tannic acid has been used to augment the treatment of anorectal diseases. Functional analysis of anorectal function using stationary 3-dimensional manometry has been introduced in Japan, and a systemic treatment strategy for anorectal diseases is expected to be developed.

*Hepatobiliary and pancreatic surgery*

Our main research activities are as follows.

1. Living donor liver transplantation (LDLT) and regenerative medicine
2. Treatment for hepatocellular carcinoma and control of recurrence
3. Chemotherapy for pancreatic and biliary cancers
4. Expansion of surgical indications for multiple hepatic tumors

5. Laparoscopic surgery for the liver, biliary tree, pancreas, and spleen
6. Navigation surgery for hepatobiliary and pancreatic surgery
7. Nutritional therapy for cancer patients
8. Surgical site infection control in surgical patients
9. Effect of preoperative treatment with eltrombopag and splenectomy for idiopathic thrombocytopenic purpura

The first LDLT was successfully performed for a patient with postnecrotic cirrhosis and hepatocellular carcinoma on February 9, 2007. Our ninth LDLT was performed for a patient with primary biliary cirrhosis on September 17, 2010. All 9 recipients were discharged on postoperative days 15 to 46 in good condition, and all donors were discharged on postoperative days 9 to 13 and returned to their preoperative status. We are also planning to extend the indications of LDLT to acute hepatic failure and ABO-incompatible cases. We have performed translational research on combination chemotherapy with gemcitabine and a protease inhibitor, FUT-175, which is associated with both nuclear factor κ-B inhibition and apoptosis induction in pancreatic cancer cell lines. Navigation surgery for liver resection is ongoing as an Advanced Medical Treatment from February 1, 2011, and biliary and pancreatic navigation surgery is performed with the Institute for High Dimensional Medical Imaging Research Center. Other continuing clinical and experimental trials involve treatment of hepatic tumor, laparoscopic surgery, nutritional therapy, resection site infection, and eltrombopag as a pretreatment for laparoscopic splenectomy for idiopathic thrombocytopenic purpura.

## Publications


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