In Commemoration of the Designation as a Comprehensive Special Zone for Local Revitalization

Shizuoka Cancer Conference 2011

Technological Developments in Cancer Treatment and State of the Art Medical and Caregiving Robotics

The Prime Minister with the Lieutenant Governor of Shizuoka Prefecture at the Ceremony for the Presentation of Letters Designating Comprehensive Special Zones

March 20, 2012 (Tuesday)

Shizuoka Cancer Center Research Institute

Sponsored by Shizuoka Prefecture and the Shizuoka Cancer Center

Purpose of the Program

Shizuoka Prefecture, with the Shizuoka Cancer Center at its core, is making strides towards becoming a center for research and development of innovative oncological diagnostic equipment and medical supplies, These activities allow for dramatic advancements in oncological treatment, while at the same time the formation of an industrial cluster of local businesses that provide medical devices and components. Recently, the "Shizuoka Prefecture Comprehensive Special Zone for State-of-the-Art Medical Care" Shizuoka Prefecture established has been designated as one of Japan's comprehensive special zones for local revitalization.

As such, the theme of this year's Shizuoka Cancer Conference 2011 is "Technological Developments in Cancer Treatment and State of the Art Medical and Caregiving Robotics". We have invited domestic and foreign surgeons who are providing cutting edge oncological treatments with the da Vinci Surgical System and researchers engaged in the technological development of medical and caregiving robots, who will give lectures on the current state and future prospects of the health and medical industry. Furthermore, physicians from the Shizuoka Cancer Center will introduce its initiatives in research and development and the provision of state of the art medical care.

Ken Yamaguchi
President, Shizuoka Cancer Center

Program

Shizuoka Cancer Conference 2011

March 20, 2012 (Tuesday)
Shiosai Hall, Shizuoka Cancer Center Research Institute

Theme: "Technological Developments in Cancer Treatment and State of the Art Medical and Caregiving Robotics"

10:00	Opening Address	Lieutenant Governor of Shizuoka Prefecture	Yoichiro Iwase
10:10	Congratulatory Address	Executive Director, "HOPE" Cancer-Free Mongolia National Foundation	Erdene Elbegdorj
10:20	Introduction of the Conference	Director, Shizuoka Prefecture, President, Shizuoka Cancer Center	Ken Yamaguchi
10:40	The Shizuoka Prefecture Comprehensive Special Zone for State-of-the-Art Medical Care	Division Director Research and Development Management Division, Commerce and Industry Bureau, Economy and Industry Department, Shizuoka Prefectural Government	Mitsuhisa Kozakura
10:45	Session I: The da Vinci Surgical Support Robot at the Front Lines of Medicine		
10:55	Lecture 1 Approaches to Gastric and Colon Cancer Treatment at the Shizuoka Cancer Center	Masanori Terashima, Chief, Division of Gastric Surgery, Shizuoka Cancer Center Yusuke Kinugasa, Chief, Colon and Rectal Surgery, Shizuoka Cancer Center	
11:15	Lecture 2 The Current State and the Future of Gastric and Colon Cancer Treatment at Yonsei University College of Medicine	Woo Jin Hyung, Associate Professor, Department of Surgery, Yonsei University, College of Medicine Byung Soh Min, Assistant Professor, Department of Surgery, Yonsei University, College of Medicine	
12:05	Lecture 3 The front line of robotic surgery for gastrointestinal cancer	Ichiro Uyama, Professor, Department of Surgery, Upper GI Division, Fujita Health University	
12:30	Lecture 4 Current status of robot assisted radical prostatectomy in patients with early prostate cancers	Makoto Ohori, Professor at Dept. of Urology, Tokyo Medical University	
12:55	Comprehensive Discussion I		
13:10	Lunch	Note: Those who wish can view the proton beam treatment facility during this time	
14:10	Special Lecture Utilizing cutting-edge photonics for high definition imagesin a practical implementation of remote medicine	Tetsuya Toma, Deputy Director, Keio Photonics Research Institute	
14:40	Session II: Technological Developments in State of the Art Medical and Caregiving Robotics ①		
14:45	Lecture 5 Development of an Imaging Diagnostics Support Robot	Masahiro Endo, Director, Department of Diagnostic Radiology, Shizuoka Cancer Center	
15:10	Lecture 6 Application of hyperspectral imager to medical devices	Takayuki Sota, Professor, Faculty of Science and Engineering, Waseda University	
15:35	Break		
15:50	Session II: Technological Developments in State of the Art Medical and Caregiving Robotics ②		
15:55	Lecture 7 The way to the future by a robot technology of haptic communication	Wataru Yamanouchi, Global COE Program Research Assistant, Keio University School of Integrated Design Engineering	
16:20	Lecture 8 Development of a Nursing-care Assistant Robot RIBA-II	Shijie GUO, Team Leader, Tokai Rubber Industries Ltd.; The Institute of Physical and Chemical Research (RIKEN)	
16:45	Comprehensive Discussion II		
17:00	Closing Address		

Speaker profiles / Overview of the lectures

Session I: The da Vinci Surgical Support Robot at the Front Lines of Medicine

Lecture 1 Approaches to Gastric and Colon Cancer Treatment at the Shizuoka Cancer Center

Speaker Masanori Terashima — Chief, Division of Gastric Surgery, Shizuoka Cancer Center

Curriculum Vitae

1983	Graduated from Iwate Medical University
1994-1995	Research Fellow in Medicine, Division of Cancer Pharmacology Dana-Farber Cancer Institute, MA
2002-2008	Associate Professor, Department of Surgery 1, Fukushima Medical University
2006-	Visiting Professor, Iwate Medical University
2008-	Chief, Division of Gastric Surgery, Shizuoka Cancer Center

Although laparoscopic gastrectomy (LAG) has been increasingly employed, LAG is still defined as an investigational treatment according to Japanese Gastric Cancer Treatment Guidelines 2010 due to lack of solid evidence regarding safety and long-term outcome. It is very important to establish evidence via clinical trial in the initial phase of introducing new treatment modality. In order not to make same mistake for robotic surgery, we planned to perform a phase II trial to evaluate the feasibility of robot assisted distal gastrectomy (RADG). Primary endpoint is the incidence of post-operative intra-abdominal infectious complications (anastomotic leakage, pancreas related infection, and intra-abdominal abscess) and secondary endpoints are overall survival, relapse free survival, completion rate of robot assisted surgery and the incidence of adverse event. Planned sample size is 23 and accrual period is one year. This is the first phase II trial for RADG. After finishing this trial we will move to multi-institutional randomized phase II trial to establish the safety and efficacy of RDG.
In conjunction with these clinical trials, we have a plan to perform development research of robotic surgery in part of the Pharma Valley Project.
We hope Shizuoka Cancer Center will serve as one of the leading institute for robotic surgery in the future.

Speaker Yusuke Kinugasa — Chief, Colon and Rectal Surgery, Shizuoka Cancer Center

Curriculum Vitae

1998	M.D. Tokyo Medical and Dental University
2007	Ph.D. Graduate School, Tokyo Medical and Dental University
2001-2004	Resident, Department of Surgery, Tokyo Medical and Dental University
2005-2006	Resident, Department of Colorectal Surgery, National Cancer Center
2006	Staff, Colon and Rectal Surgery, Shizuoka Cancer Center Hospital
2010.4-present	Chief, Colon and Rectal Surgery, Shizuoka Cancer Center

Rectal cancer surgery is a technically demanding procedure because the surgical field of rectal cancer surgery has specific anatomical characteristics. The surgical field of rectal dissection is surrounded by a narrow pelvis. The rectal dissection plane between the fascia propria of the rectum and the parietal pelvic fascia is the surgical plane of total mesorectal excision(TME)which is the standard technique of rectal cancer surgery in the world. On the other hand, D3 (TME plus pelvic side lymph node dissection) is the standard procedure in Japan, and it is required further extensive technique. TME is indication of the laparoscopic surgery and D3 is performed by the open surgery in Shizuoka Cancer Center Hospital presently. We started robotic rectal cancer surgery in Dec.2011. Robotic technology seems to be adapted for not only TME but also D3,

Lecture 2 The Current State and the Future of Gastric and Colon Cancer Treatment at Yonsei University College of Medicine

Speaker Woo Jin Hyung — Associate Professor, Department of Surgery, Yonsei University College of Medicine

Curriculum Vitae

1986-1988	Yonsei University, Premedicine Program
1988-1993	Yonsei University, College of Medicine, Seoul, Korea; MD
2001-2003	Yonsei University, Graduate School; BS
2001.5-2003.3	Instructor, Department of Surgery, Yonsei University, College of Medicine
2003.3-2004.2	Full-time Instructor, Department of Surgery, Yonsei University
2003-2006	Korea University, Graduate School, Seoul, Korea; PhD
2004.3-2008.2	Assistant Professor, Department of Surgery, Yonsei University
2008.3- present	Associate Professor, Department of Surgery, Yonsei University
2011.3- present	Director, Robot & MIS Center, Severance Hospital, Yonsei University Health System

Conventional laparoscopic surgery for gastric cancer does not gain wide popularity sufficiently because particularly D2 lymph node dissection is difficult. It is known that some specific technical disadvantages of conventional laparoscopic surgery makes D2 lymph node dissection difficult. Recently, rapid developments in the technology were adopted in the field of surgery. In this context, robot surgery was introduced as a new minimally invasive method. Herein, current status of robotic surgery for gastric cancer is described in brief.
In many retrospective studies performed in Korea, robotic gastrectomy was compared with laparoscopic and open gastrectomy, no difference was determined between open, laparoscopic and robotic groups for complication. Estimated blood loss and duration of hospitalization was found to be less and duration of operation longer in robotic group. However, it was concluded that the surgeons could perform D2 lymphadenectomy easily with robot.
In their series of 60 patients performed 20 robotic gastrectomy with first and last 20 laparoscopic gastrectomy, we found that experienced laparoscopic surgeons may be readily adapted to robotic gastrectomy. In a study comparing learning curves of conventional laparoscopic and robotic surgeries, it was shown that learning curve of laparoscopic surgery was more perpendicular and robot-assisted surgery could be readily adapted. It is stated that surgical manipulation ability is gained more rapidly in robotic surgery system due to easy maneuverability and productivity may be obtained in a shorter period. It was also demonstrated that robotic surgery reduced the learning curve in complex minimally invasive surgeries. Required case number for stabilizing the duration of operation in robotic distal gastrectomy was reported to be 10.
In conclusion, robotic gastric cancer surgery is a complex operation which can be performed safely with the expected advantages of minimally invasive surgery. Studies of short-term outcomes demonstrate less blood loss, less pain and shorter hospital stay for robotic gastrectomy when compared to laparoscopic gastric cancer operations. As surgeons become more adept at robotic gastrectomies and the clinical and oncologic outcomes remain favorable; robotic surgery may offer a sound alternative to traditional open or conventional laparoscopic gastric cancer operations.

Speaker Byung Soh Min

Assistant Professor,
Department of Surgery, Yonsei University, College of Medicine

Curriculum Vitae

1994-1998	M.D. College of Medicine, Yonsei University, Seoul, Korea
1999.3-2003.2	Resident, Department of Surgery, Yonsei University Severance Hospital, Seoul, Korea
2002-2008	M.S. Graduate School, Yonsei University
2004-2006	General Surgeon in Chief, Ministry of National Defense, Seoul, Korea
2006-2008	Fellow in Division of Colon & Rectal Surgery, Yonsei University, College of Medicine, Seoul, Korea
2008- present	Assistant Professor, Department of Surgery, Yonsei University, College of Medicine, Seoul, Korea

The robotic colorectal surgery at Yonsei started from 2006. Since then our efforts to develop and utilize robotic technique have grown as such now our experience in robotic colorectal surgery approaches 1000 cases. Colorectal cancer, especially rectal cancer has been our indication for robotic surgery. We have developed a robust technique,"dual docking technique" for the resection of rectal cancer fully utilizing technological advantages of robotic system. We have indulged ourselves into training and propagating the robotic technique. Researching the evidence for robotic technique has been our main interest since the beginning and our recent results show encouraging data.

Lecture 3 The front line of robotic surgery for gastrointestinal cancer

Speaker Ichiro Uyama

Professor, Department of Surgery, Upper GI Division, Fujita Health University

Curriculum Vitae

1985.4	Department of Surgery, Keio University School of Medicine
1986.5	Medical Staff, Department of Surgery, Nerima Hospital
1987.5	Medical Staff, Federation of National Public Service Personnel Mutual Aid Associations Kyosai Tachikawa Hospital
1988.5	Assistant Professor, Department of Surgery, Keio University School of Medicine
1991.5	Director, Department of Surgery, Nerima Hospital
1997.5	Instructor, Department of Surgery, School of Medicine, Fujita Health University
2002.4	Associate Professor,Department of Surgery, School of Medicine, Fujita Health University
2006.5- present	Professor, Department of Surgery, School of Medicine, Fujita Health University

Endoscopic surgery is being widely adopted as a minimally invasive application in gastrointestinal diseases. However, current endoscopic surgery has problems such as being performed under 2-dimensional imaging, having a lack of joint function, or having unstable imaging. As such, endoscopic surgery with robotic support via an endoscopic surgical support robot (the da Vinci S Surgical System; henceforth "da Vinci") is gaining worldwide attention. Since in January of 2009 we introduced robotic surgery to the field of gastrointestinal surgery for malignant diseases, we would like to focus on video imaging to share our clinical experiences and some of the problems we have encountered. Between January 2009 and now, we have performed robotic surgery on a total of 161 patients: 103 gastric cancer patients, 25 esophageal cancer patients, and 33 hepatobiliary and pancreatic cancer patients. The advantages of da Vinci include its operation under 3-D imaging, a joint function with 7 degrees of freedom, tremor reduction via a filtering function, a motion scaling feature, and stable imaging, all of which enable fine, safe lymph node excision and reconstructive surgery. However, though the device has been approved under the Pharmaceutical Affairs Law, it has yet to obtain approval as an advanced medical technology, so it can only be used in surgical interventions paid for privately. Its purchase price is also high, and it is somewhat expensive to maintain. In addition, it is a product manufactured in the United States, so it is currently difficult to obtain the opinions of Japanese surgeons about the device's improvements. We feel that in the future, in order to popularize robotic surgery in Japan, there is an urgent need to develop a robot that is made in Japan.

Lecture 4 Current status of robot assisted radical prostatectomy in patients with early prostate cancers

Speaker Makoto Ohori

Professor, Department. of Urology, Tokyo Medical University

Curriculum Vitae

1986	Graduated from Iwate Medical University
1986-1990	Residency in Urology at Kitasato University Hospital
1990-1994	Research Fellow & Assistant Professor at Baylor College of Medicine
1999-2003	Deputy Director, Prostate Diagnostic Center at Memorial Sloan-Kettering Cancer Center
2004	Associate Professor, Dept. of Urology, Tokyo Medical University
2007	Professor, Dept. of Urology, Tokyo Medical University
2008-present	Director, Prostate Center

Prostate cancer is one of the most frequent cancers in the world and it has been markedly increased in Japan. There are several treatment options for early prostate cancer such as operation, radiation (external radiation/brachytherapy), hormonal therapy and active surveillance. While operation is still gold standard treatment, there are several complications such as urinary incontinence and erectile dysfunction that affect on the quality of life. With an advent of robotic surgery, it was expected to reduce these complications. In fact, our preliminary outcome indicated the early recover from both urinary incontinence and erectile dysfunction compared to the conventional open surgery. Also, a robotic surgery provides less bleeding during operation and less pain after surgery. Reflecting these outcomes, it has just been approved by the Japanese government that robotic surgery is covered by national health insurance from this April. We believe that majority of prostatectomy will be done by robotic surgery in near future and this should result in the more smiles for many patients with prostate cancer.

Special Lecture Utilizing cutting-edge photonics for high definition images in a practical implementation of remote medicine

Speaker Tetsuya Toma

Deputy Director, Keio Photonics Research Institute

Curriculum Vitae

1988.3	Department of Applied Chemistry, Faculty of Science and Technology, Keio University; MS Advanced Product Development Specialist, Optical Systems Division, 3M Company
2007.9	Associate Professor, Graduate School of System Design and Management, Keio University Deputy Director, Keio Photonics Research Institute Director for Education, Project Management Institution Japan Chapter

Materials technology is changing the future of Japanese medical care. Research at the Keio Photonics Research Institute (KPRI) into new plastic materials that manipulate light has led to the development of the world's fastest optical communication technologies and new kinds of high-resolution large screen displays. In this lecture, we will present an overview of the research and development into this sort of materials technology, and demonstrate some examples of how KPRI is deploying these technologies into the medical world.

Speaker profiles / Overview of the lectures

Session II: Technological Developments in State of the Art Medical and Caregiving Robotics

Lecture 5 Development of an Imaging Diagnostics Support Robot

Speaker Masahiro Endo Director, Department of Diagnostic Radiology, Shizuoka Cancer Center

Curriculum Vitae

Graduated from University of Tsukuba, School of Medicine
Completed the Doctoral Course in Kobe University Graduate School of Medicine
Department of Radiology, Kobe University Medical School Hospital
Department of Radiology, Hyogo Medical Center for Adults
Department of Diagnostic Radiology, Shizuoka Cancer Center

Our hospital and Fujifilm Corporation have carried out joint research towards putting a newly conceptualized diagnostics support system into practical application as a profitable use of past case data. Our development of an Imaging Diagnostics Support Robot system that allows for the automatic presentation of previous similar cases and the semi-automatic creation of imaging diagnostics report forms is currently underway. This system has been realized via a unification of the expertise of the imaging diagnostics physicians and the extensive case data at our hospital and Fujifilm Corporation's image analysis technology. We are currently developing the system for practical implementation in lung cancer CT cases. We intend to present an overview of this system and its current developmental status.

Lecture 6 Application of hyperspectral imager to medical devices

Speaker Takayuki Sota Professor, Faculty of Science and Engineering, Waseda University

Curriculum Vitae

1980	B. Eng., from Waseda University
1982	M. Eng., from Waseda University
1985	Dr. Eng. from Waseda University.
1984.4-1986.3	Research Associate of Faculty of Science and Engineering, Waseda University
1986.4-1988.3	Lecturer of College of Technology, Shizuoka University
1986.4-1990.3	Lecturer, Faculty of Science and Engineering, Waseda University
1990.4-1997.3	Associate Professor, Faculty of Science and Engineering, Waseda University
1997	Professor, Faculty of Science and Engineering, Waseda University

Hyperspectral imager (HSI) has been originally developed in the field of remote sensing. We talk about applications of HSI to medical devices. A noninvasive diagnostics supporting system for melanoma is reviewed in somewhat detail, which has been developed under a joint research between Shizuoka Cancer Center and Waseda University, and, then, our recent challenge attaching HSI to an endoscope or a fundus camera is also briefly reported.

Lecture 7 The way to the future by a robot technology of haptic communication

Speaker Wataru Yamanouchi Global COE Program Research Assistant, Keio University School of Integrated Design Engineering

Curriculum Vitae

2007.3	Electrical, Electronics and Information Engineering Course, Faculty of Technology, Nagaoka University of Technology; BS
2009.3	Faculty of Electrical, Electronics and Information Engineering, Graduate School of Technology, Nagaoka University of Technology; MS
2012.1	School of Integrated Design Engineering, Faculty of Science and Technology, Keio University; Enrollment in Doctoral Course

Recently, haptic information has attracted attention as the third type of multimedia information. Many haptic transmission methods are developed in Keio University. Especially, applications of the real-world haptic technology to robot systems are proposed. The haptic technology is applied to many systems.

Lecture 8 Development of a Nursing-care Assistant Robot RIBA-II

Speaker Shijie GUO Team Leader,Tokai Rubber Industries Ltd.; The Institute of Physical and Chemical Research (RIKEN)

Curriculum Vitae

Shijie GUO received his Dr. Eng. degree from Tokyo Institute of Technology in 1992. He is currently the leader of the Robot Implementation Research Team at RIKEN-TRI Collaboration Center for Human-Interactive Robot Research. His research interests include rubber-based soft sensors and soft actuators, nursing-care/welfare equipments, vibration control, etc. He is a member of JSME.

With a record-low birthrate and a rapidly-growing elderly population, Japan faces a severe demographic challenge, compounded by a chronic lack of nursing care staff. Among nursing care tasks, patient transfer is one of the most physically strenuous tasks. To free caregivers from such heavy physical work and to compensate for the lack of nursing care staff, we have developed a new robot named RIBA-II, an improved version of an earlier robot RIBA (Robot for Interactive Body Assistance). The robot, which was designed to come in direct contact with patients and conduct transfer tasks such as lifting and moving a patient from a bed or the floor to a wheelchair and back, has the ability to lift up a human up to 80kg. The purpose of the robot is not only relieving caregivers from heavy physical work but also to replace the transfer task conducted by two caregivers by one robot and one caregiver.

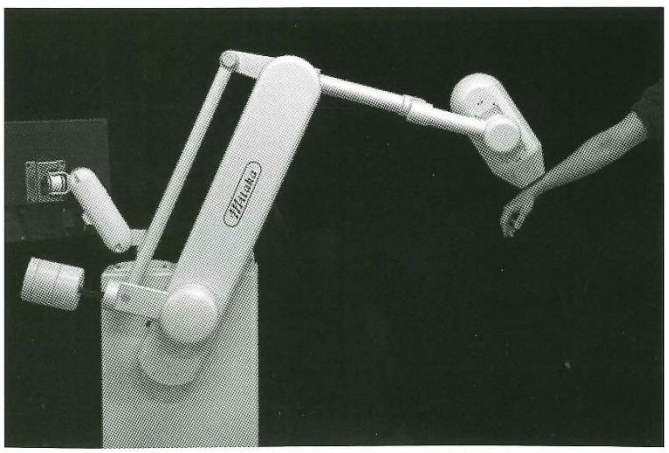
Lecture 1: Introduction of robot assisted gastrectomy at Shizuoka Cancer Center

The da Vinci S System at the Shizuoka Cancer Center

Special Lecture:
Utilizing cutting-edge photonics for high definition images in a practical implementation of remote medicine

Lecture 5: Development of an Imaging Diagnostics Support Robot

Lecture 6: Application of hyperspectral imager to medical devices



Non-invasive equipment for melanoma diagnosis

Lecture 8: Development of a Nursing-care Assistant Robot