

# Radiation Oncology Division

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## Introduction

Radiation therapy (RT) plays an essential role in the care of patients with cancer. It is used as curative treatment for many patients with malignant disease, as integrated therapy with chemotherapy and surgery, and as palliative treatment for those in whom curative treatment is not an option. The dose of radiation delivered to the tumor must be as high as possible, while being as low as possible to surrounding normal tissues.

The focus of The Radiation Oncology Division is to develop, evaluate and expand the role of RT in cancer treatment. Establishing optimal irradiation technique, including proton treatment, is also an important goal of the division.

## Routine Activities

The Radiation Oncology Division includes five consultant physicians, ten radiation technologists, three medical physicists, one nurse, and one clerk. Conference of treatment planning and verification is held three times per week in the evening, journal club weekly, and work conference is held monthly.

Treatment has been mostly based on three-dimensional planning with isodose distributions, performed by RT-dedicated multidetector-row helical scanning CT, to conform the dose to the tumor. More than 1,100 new patients were treated annually, and more than 30 clinical trials that involve RT as a sole or a combined treatment modality, for various cancers are ongoing.

The conventional (photon-electron) treatment division is equipped with four treatment machines (a Microtron, two linear accelerators and a high dose rate brachytherapy unit), a CT-simulator, three treatment planning computer workstations, and many other devices. The proton treatment division, the first such hospital-based treatment facility in Japan, is

equipped with a cyclotron capable of generating a 235 MeV proton beam. The proton beam is delivered to three treatment rooms (two isocentrically rotational gantries and one fixed horizontal beam line). Two rotational gantry treatment rooms were routinely used.

## New Developments in 2005

1. Proton therapy was initiated in Nov. 1998 at our hospital. Proton therapy was approved as a "highly advanced medical technology" from the Japanese Government in July 2001. Until the end of 2005, we have treated almost 380 patients with the head & neck, lung, liver and prostate cancer.
2. Outcome treated with proton therapy according to initial protocols for sino-nasal cavity cancer, stage I non-small cell lung cancer, hepatocellular carcinoma, and prostate cancer was analyzed.
3. Multi-institutional phase II study for localized prostate cancer employing proton therapy is underway.
4. Proton beam on-line PET system to verify targeting accuracy is now developing. We have analyzed off-line PET imaging just after proton therapy.
5. We have initiated intensity modulated radiotherapy (IMRT) for the head and neck cancer.
6. Several clinical studies for the head & neck cancers have been conducted.
  - A) Phase I study of CDDP + S-1 for locally advanced head and neck cancer.
  - B) Late accelerated hyperfractionated RT combined with chemotherapy for locally advanced pharyngo-laryngeal cancer aiming larynx preservation.
7. Several clinical studies of chemoradiotherapy for esophageal cancer were completed. We are now conducting phase I study of chemoradiation therapy for stage II-III esophageal cancer.
8. Clinical trials for hepatobiliary and pancreatic

cancer are underway.

A) Phase II study of external beam and intracavitary RT for extra-hepatic bile duct cancer.

B) Phase III study of intraoperative RT for curatively resected pancreatic cancer.

C) Phase I study of RT+S-1 for locally advanced pancreatic cancer.

9. preoperative chemoradiotherapy for lower rectal cancer aiming of functional preservation of the anus.

10.8 Gy Single fraction RT for painful osseous metastasis.

11. Radiotherapy Quality assurance (QA) survey and audit were initiated in both Japan Radiation Oncology Group (JROG) and Japan Clinical Oncology Group (JCOG).

● T. Ogino ●

Number of Patients Treated with Radiation Therapy in recent 5-years

	2001	2002	2003	2004	2005
New Patients	875	936	1010	1124	1137
New Treatments	1066	1127	1200	1308	1384
Head & Neck	186	229	199	238	259
Lung, Mediastinum	323	329	354	350	393
Breast	160	174	202	251	294
Gastrointestinal Tract	188	224	259	282	242
Hepatobiliary & Pancreatic Regions	83	50	63	37	52
Gynecological Regions	2	7	1	2	3
Urological Regions	57	48	60	70	74
Bone & Soft Tissue	12	6	4	11	12
Hematological Diseases	45	51	41	51	39
Others	10	9	17	16	16
Primary Site	574	571	647	644	635
Recurrent, Metastatic Site	398	450	393	469	545
Prophylactic Purpose	94	106	153	195	200
Intraoperative RT	6	1	6	6	5
Brachytherapy	8	4	5	1	1
Proton Therapy	59	64	69	76	75

RT: Radiation Therapy