Diagnostic Radiology

Introduction

The Division of Diagnostic Radiology is committed to improving health through excellence in image oriented patient care and research.

Our Division performs more than 62,000 inpatient and outpatient procedures annually.

The division also conducts clinical scientific research as well as basic scientific ones. And the results translate directly into better patient care.

Routine Activities

Our division has four helical CT scanners including two multi-slice CT scanners, two 1.5T MRI systems, two interventional radiology (IVR) CT systems, two gamma cameras with the capacity for single photon emission CT (SPECT), two digital radiographic (DR) systems for fluoroscopy, two mammography and four computed radiographic (CR) systems. IVR-CT system means digital subtraction angiography with helical CT. One IVR-CT system is equipped with multi-slice CT installing 16 detectors. Positron emission tomography (PET) scanner and baby cyclotron had been introduced in 2000, and tumor imaging by 18F-FDG (fluorodeoxyglucose) has been performed. These all-digital image systems enhance the efficacy of routine examination.

This division has seven consulting radiologists and fourteen technologists. As part of routine work, every effort is made to produce an integrated report covering all examinations, such as plain radiographic examinations (chest, abdomen, head, neck, breast, bone and other structures), contrast radiological procedures (digestive, urinary and respiratory tracts), CT, MRI, RI, PET, angiography and interventional radiology (IVR), mainly transarterial embolization (TAE).

High Resolution (the size of 1 pixel is 50$f\hat{E}$) Fuji Computed Radiography Mammography system (HR FCR-MMG) was renewed. HR FCR-MMG is superior to the usual FCR-MMG (one pixel is 100 $f\hat{E}$) in detecting micro-calcifications associated with breast cancer, and provided favorable outcomes in overall detection of breast cancer.

The number of cases examined in 2003 is shown in the table below. We have noted that the main diagnostic modalities for several cancers have been shifting from plain film to CT and MRI.

Several conferences are routinely held in our division, including teleradiologic, pre- and post-operative conferences.

Research Activities

Our division has been developing a system of multi-slice helical CT with the support of the Comprehensive 10-year Strategy for Cancer Control and the new 10-year Strategy for Cancer Control. The prospective study of detecting small tumors in biliary tract and liver using multi-slice helical CT is ongoing.

Multi-slice helical CT is also applicable to screening of lung cancers. A feasibility study is now ongoing in cooperation with the thoracic oncology groups at the National Cancer Center Hospital (NCCH) and the Anti-Lung Cancer Association.

Using an exclusive optical fiber line between the Tsukiji and Kashiwa campuses, regular and optional image conferences have been held.

By extension of this network, these conferences have been opened to other cancer centers, as well as other national hospitals.

By using the recent advancement of computer graphics, our division has achieved great success in obtaining three-dimensional displays of the internal body, based on imaging data from multi-slice helical CT and MRI. This is useful for planning surgery or radiotherapy, for doctors training, and for patient education.

We put high resolution and high speed body MR imaging to practical use by SENSE (sensitivity encoding) method. This new technique brought not only shortening of imaging acquisition time but also increase in number of imaging through one breath hold. Diffusion Imaging is well known to MRI sequence for early detection of brain infarction. Then we have studied to apply it to detecting small cancer in breast, rectum, pancreas and liver. Especially the detection rate of hepatic metastasis from colorectal cancer using diffusion imaging is higher than using super paramagnetic iron oxide contrast agent.

A new computer-aided diagnosis (CAD) system using FCR (Fuji Computed Radiography) mammograms was introduced to study computerized detection for breast cancerous mass and micro-calcifications. Sensitivity to breast cancerous mass and micro-calcifications were 91% and 96%, respectively. False-positive rates were 0.4 and 0.3 per image, respectively.

Also another CAD system for lung cancer using multi-slice helical CT images is being developed. These CAD systems promise to have a great influence on cancer diagnosis as well as on patient care in the near future.

FDG-PET imaging is useful to detect metastasis and recurrence that are not detected by CT in patient with high level of tumor marker, and also to detect mediastinal lymph node metastasis on preoperative staging for lung cancer.

New Developments

All computed radiographic (CR) systems were renewed as the high resolution system.

● S. Nawano ●

Number of Cases Examined	
Plain X-ray examination	32,346
Mammography	1,735
Fluoroscopic Imaging (GI-series, etc.)	3,381
CT	16,829
MRI	4,553
RI	2,208
PET	1,225
Angiography	547
Total	62,824