Department of Radiology

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Research Activities

Division of diagnostic imaging

1. Differentiating between glioblastomas with or without mutation of the isocitrate dehydrogenase gene from imaging findings

Along with the revision of the 2016 World Health Organization classification of brain tumors, molecular genetic variables began to be used. In particular, mutation of the isocitrate dehydrogenase gene (*IDH*) is an important element in glioma classification. We examined whether the imaging findings can differentiate between glioblastomas with or without *IDH* gene mutation.

2. Imaging features of cystic neck lesions: cystic lymph node metastasis from human papillomavirus–positive oropharyngeal cancer, the 2nd branchial cyst and tuberculous lymphadenitis

Human papillomavirus and oropharyngeal cancer are frequently associated with cystic lymph node metastasis. We evaluated the differences of imaging features among cystic lymph node metastasis from human papillomavirus and oropharyngeal cancer and 2 non-malignant cystic neck lesions: the 2nd branchial cyst and tuberculous lymphadenitis.

3. Determining the clinical and characteristic computed tomographic findings of airspace enlargement with fibrosis

A total of 800 patients with chronic obstructive pulmonary disease were evaluated retrospectively with inspiratory and expiratory computed tomographic (CT) scans. Nine patients had multiple cysts that were significantly decreased in size and were probably corresponding to airspace enlargement with fibrosis.

4. Evaluation of the insufficient filling of the left atrial appendage on cardiac CT in patients with atrial fibrillation.

We compared CT images of patients with or without defects to clarify possible predictors of left atrial appendage filling defects. Persistent atrial fibrillation and left atrial appendage volume on cardiac CT images are independent predictors.

5. Ovarian seromucinous borderline tumors: usual and unusual magnetic resonance imaging findings

Magnetic resonance imaging (MRI) findings of 26 patients with 32 ovarian seromucinous borderline tumors were reviewed. Such tumors are usually a cystic tumor with a solid component, which shows high signal intensity (SI) on T_2-weighted images with a high apparent diffusion coefficient (ADC) value. However, in some cases the tumors were purely cystic or solid.

6. Breast MRI for prediction of lymphovascular invasion in patients with breast cancer and clinically negative axillary lymph nodes

The tumor ADC value, the peritumoral ADC value, and the peritumor-tumor ADC ratio were predictive findings for lymphovascular invasion in patients 55 years or younger.

7. Study of quantification of rheumatoid arthritis with dual-energy CT

We will examine the usefulness of dual-energy CT quantitative evaluation in the activity of rheumatoid arthritis compared with semiquantitative evaluation with contrast-enhanced MRI.

8. The anatomical evaluation of the findings of dual-energy CT of psoriatic arthritis using normal cadaver finger

We compared the dual-energy CT iodine mapping findings of psoriatic arthritis with high-resolution MRI imaging and the macroscopic appearance of a normal finger from a cadaver.

Division of Nuclear Medicine

Diagnostic value of ultrasonography and Tl-201/Tc-99m dual scintigraphy in differentiating between benign and malignant thyroid nodules.

To evaluate the performance of ultrasonography and Tl-201/Tc-99m dual scintigraphy in differentiating benign and malignant thyroid nodules. An ill-defined margin and microcalcification on ultrasonography were independent predictors of a malignant thyroid nodule. A persistent pattern seen on Tl-201/Tc-99m dual scintigraphy can contribute to the differential diagnosis.

Division of Interventional Radiology

Feasibility of 4-dimensional digital subtraction angiography for renal arteriovenous malformation

We retrospectively evaluated the usefulness of 4-dimensional subtraction angiography for renal arteriovenous malformation compared with that of 3-dimensional digital subtraction angiography as an initial experience.

Division of Radiation Therapy

1. To clarify the optimum fractionated radiotherapy of cancer with nonuniform radiosensitivity using the general linear quadratic model

The number of tumor cells before radiotherapy is important for local control after radiotherapy. Therefore, the number of tumor cells per unit volume was measured in cases of breast cancer for which surgery was performed. Given nonuniform radiosensitivity to the model tumors, estimate local control rate with the general linear quadratic model. https://radbiolog.jp

2. Dose finding and confirmatory trial of superselective intra-arterial infusion of cisplatin and concomitant radiotherapy for patients with locally advanced maxillary sinus cancer

We have started research for a new concept and are evaluating local control for more advanced local tumors, the normal-tissue conservation rate, and late complications.

3. The safety and effectiveness of a new enzyme-targeting radiosensitization treatment for bulky cervical cancers

A novel enzyme-targeting radiosensitizer for hypoxic tumors comprised of hydrogen peroxide and sodium hyaluronate has been developed by Yasuhiro Ogawa, Hyogo Prefectural Kakogawa Medical Center. The purpose of this study was to evaluate the safe achievement of bioradiotherapy and the effectiveness of Kochi Oxydol-Radiation Therapy for Unresectable Carcinomas, Type II (KORTUC II).

Publications

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Nakata N. Recent technical development of artificial intelligence for diagnostic medical imaging. *Jpn J Radiol.* 2019; **37:** 103-8. Epub 2019 Jan 31.

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Baba A, Okuyama Y, Ikeda K, Kozakai A, Suzuki T, Saito H, Ogane S, Yamazoe S, Yamauchi H, Ogino N, Seto Y, Kobashi Y, Mogami T, Ojiri H. Undetectability of oral tongue cancer on magnetic resonance imaging; clinical significance as a predictor to avoid unnecessary elective neck dissection in node negative patients. *Dentomaxillofac Radiol.* 2019; **48:** 20180272. Epub 2019 Jan 4.