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The Department of Radiology undertakes radiology service at IMSUT hospital. Our expertise includes general diagnostic radiology, neuroradiology, clinical nuclear medicine, and radiation therapy. Board-certified radiologists at the Department of Radiology conduct all examinations of CT, MRI, and nuclear medicine. Radiological reports are made by the radiologists. In addition, several clinical studies are being conducted in collaboration with other departments or institutions. We also investigate the technical aspects of molecular imaging with intact small animals for its application to preclinical studies using an optical imaging system and MRI.
The Department of Radiological Technology constitutes the hospital radiology service together with the Department of Radiology. Plain radiography, dual-energy X-ray absorptiometry, and barium studies are also available at the Department of Radiological Technology, other than CT, MRI, and radioisotope examinations. More than 10,000 patients visit our department every year. Radiologic technologists at the department make an effort to provide high-quality medical images in daily practice as well as to reasonably reduce radiation exposure of a patient during the examination.

CT lymphangiography of the thoracic duct in mice: direct mesenteric versus popliteal lymph node puncture.

Kato S, Sugawara H[1], Furuta T, Abe O[2], Akai H.
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In the present study, we aimed to evaluate the efficacy of computed tomography (CT) lymphangiography after direct mesenteric lymph node injection for thoracic duct (TD) visualization in mice. Twelve female BALB/c mice were injected with 35 μL of iodi-

nated contrast medium (iomeprol 350 mgI/mL) into the mesenteric (mesenteric group) or popliteal (popliteal group) lymph nodes. CT images were acquired before injection and 1 min, 3 min, 5 min, 10 min, and 15 min after injection using a micro-CT scanner. Contrast ratios (CRs) were measured at the cisterna chyli and three levels of the TD (diaphragm, carina, and venous angle). Two experienced radiologists qualitatively assessed images as good, fair, or poor. As a result, the mesenteric group had significantly higher mean (± standard deviation) CRs than the popliteal group for all examined regions at 1 min after injection: cisterna chyli (14.01 ± 4.77 versus 1.47 ± 1.21, $p < 0.001$), diaphragm (7.28 ± 2.50 versus 0.85 ± 0.61, $p = 0.0011$), carina (10.33 ± 3.42 versus 0.44 ± 0.40, $p < 0.001$), and venous angle (6.26 ± 2.02 versus 0.79 ± 0.75, $p < 0.001$). For the TD between the cisterna chyli and the diaphragm, 6/6 mice in the mesenteric group showed strong enhancement, whereas 5/6 mice in the popliteal group showed minimal or no enhancement. The visual scores of the mesenteric group were significantly higher than those of the popliteal group for all the evaluated regions ($p = 0.002$). To sum up, CT lymphangiography via mesenteric lymph node injection provides better imaging of the TD in mice than popliteal lymph node injection.

Pulmonary Toxicity of Ethiodized Oil in the Venous Circulation in Mice: Radiological Findings and Pathological Correlation.

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This study investigated the acute and chronic pulmonary toxicity and determine the median lethal dose (lethal dose 50% [LD50]) of intravenously administered ethiodized oil given the limited data on its systemic toxicity despite its known risk of inadvertent venous entry during lymphangiography. Twenty female BALB/c mice received tail vein injections of saline (n = 4) or ethiodized oil (Lipiodol; Guerbet, Villepinte, France) at 10 μL (n = 4), 30 μL (n = 8), or 50 μL (n = 4). Survival outcomes, computed tomography (CT) imaging findings, and histopathological features including hemosiderin deposition were evaluated. Chronic effects were assessed at 10 weeks through histopathology and hemosiderin deposition quantification. Human equivalent doses (HEDs) were calculated using body weight ratio conversion. As a result, The LD50 was determined to be 30 μL in mice, corresponding to an HED of 94.7 mL for a 60-kg human. All mice receiving 50 μL died immediately, whereas the 30-μL group showed 50% survival. CT imaging revealed dose-dependent ethiodized oil accumulation predominantly in pulmonary vasculature, with regional heterogeneity in distribution patterns. Surviving mice from the 30-μL group exhibited significantly higher hemosiderin deposition compared with the 10-μL group (P = .0054), indicating chronic microvascular damage. In conclusion, intravenous ethiodized oil induces dose-dependent pulmonary embolism with an LD50 of 30 μL in mice, and even sublethal doses cause chronic pulmonary injury, highlighting the need for clinical monitoring in cases of suspected venous exposure.

Publications

1. Kato S, Sugawara H, Furuta T, Abe O, and Akai H. CT lymphangiography of the thoracic duct in mice: direct mesenteric versus popliteal lymph node puncture. Eur Radiol Exp. 9:22. 2025
2. Kageyama H, Yoshida N, Kondo K, and Akai H. Dataset augmentation with multiple contrasts images in super-resolution processing of T1-weighted brain magnetic resonance images. Radiol Phys Technol. 18:172-185, 2025
3. Asari Y, Yasaka K, Endo K, Kanzawa J, Okimoto N, Watanabe Y, Suzuki Y, Amemiya S, Kiryu S, Abe O. Super-Resolution Deep Learning Reconstruction for T2*-Weighted Images: Improvement in Microbleed Lesion Detection and Image Quality. J Imaging Inform Med. Epub ahead of print.
4. Ishida M, Gonoi W, Nyunoya K, Abe H, Shirota G, Okimoto N, Fujimoto K, Kurokawa M, Katayama A, Takahashi-Mizuki M, Inui S, Saito K, Ushiku T, Abe O. Diagnostic Performance of a Large Language Model for Determining the Cause of Death: A Comparative Analysis of Clinical History, Postmortem Computed Tomography Findings, and Their Integration. Cureus. 17:e83721, 2025.
5. Yoshida N, Kageyama H, Akai H, Kasai S, Sasaki K, Sakurai N, Kodama N. Reducing the acquisition time for magnetic resonance imaging using super-resolution image generation and evaluating the accuracy of hippocampal volumes for diagnosing Alzheimer's disease. Front Neurol. 16: 1507722, 2025
6. Kato S, Akai H. Editorial for "Clinical Diagnostic Value of 5 T MRI for Knee Injuries: A Comparison Study With 1.5 or 3 T". J Magn Reson Imaging. Epub ahead of print.
7. Yasaka K, Asari Y, Morita Y, Kurokawa M, Tajima T, Akai H, Yoshioka N, Akahane M, Ohtomo K, Abe O, Kiryu S. Super-resolution deep learning reconstruction to evaluate lumbar spinal stenosis status on magnetic resonance myelography. Jpn J Radiol. 43:1427-1433, 2025
8. Ishida M, Katayama A, Shirota G, Okimoto N, Abe H, Nyunoya K, Fujimoto K, Kurokawa M, Taka-

hashi-Mizuki M, Inui S, Orihara S, Saito K, Ushiku T, Abe O, Gonoi W. Postmortem computed tomography assessment of intracardiac and intravascular blood clots and gravitational sedimentation: clinical and laboratory associations in 114 in-hospital deaths. Jpn J Radiol. 43:1465-1478, 2025
9. Sugawara H, Takada A, Kato S. Accuracy and reproducibility of large language model measurements of liver metastases: comparison with radiologist measurements. Jpn J Radiol. Epub ahead of print.
10. Kato S, Sugawara H, Okimoto N, Furuta T, Abe O, Ota Y, Akai H. Pulmonary Toxicity of Ethiodized Oil in the Venous Circulation in Mice: Radiological Findings and Pathological Correlation. J Vasc Interv Radiol. 36:2030-2038, 2025
11. Kanemaru N, Yasaka K, Okimoto N, Sato M, Nomura T, Morita Y, Katayama A, Kiryu S, Abe O. Efficacy of Fine-Tuned Large Language Model in CT Protocol Assignment as Clinical Decision-Supporting System. J Imaging Inform Med. 38:4336-4348, 2025