and the third to measure porosity. These proton radiography will be clinically useful for monitoring of proton therapy or proton computed tomography.

FM cyclotron of Institute of Nuclear Science, The University of Tokyo, was used as the following conditions; proton energy of 52 MeV, beam size of $3 \times 7\,cm^2$ or diameter of 15 cm, max. range of 23 mm in paraffin, primary proton beam or scattered beam by a bloc of iron or aluminum, several kinds of non-screen film with seven layers sandwich of Al foil (1 or 2 mm) and film.

Proton radiographs to use marginal range showed sharp edges which were similar to relief photographs with low contrast at the inner part, but it was unsufficient to image the bone. Proton radiographs with continuous energy spectra scattered by a bloc of iron showed high contrast of the air way such as the trachea, the pharynx, the air in bowels and the meatus in the temporal bones. Several films were obtained from sandwich technique of film and Al foil; the first one showed proton radiographs by multiple scattering, the second or third one showed the area over Bragg's peak of the transmitted weakend proton, and the next one showed greater area without proton reaching. The superimposed four proton radiographs were similar to an isodensity curve photograph in proportion to the thickness or atomic composition of an object.

In Vivo X-ray Fluorescent Analysis of Iodine Concentration in the Thyroid

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A simple apparatus was made for the in vivo X-ray fluorescent analysis of stable iodine in the thyroid. The apparatus consists of disc type ^{241}Am source of 300 mCi and pure Ge detector of $50\,mm^2 \times 5$ mm. Diverging collimators were designed both for the source and the detector to achieve a full view of the thyroid lobe. The detectable concentration was 0.2 mg iodine/g tissue assuming the coefficient of variance of 30% and the counting time of 5 minutes. It allows to determine the iodine concentration within a suitable time unless the concentration is extremely low.

Measurement was performed for autopsied normal 10 thyroids and the results were consistent with those by neutron activation analysis. Iodine concentration ranged 0.3–1.2 mg/g (mean 0.6 mg/g) and compared well with the data in literatures. Comparing with other techniques which enable to know the bulk iodine concentration, like in vivo neutron activation analysis and X-ray fluorescent scanning, this technique is simple and does not need reactor or strong exciting sources.

Diagnostic Significance of Combined Use of Radionuclide Scintigraphy and Ultrasonography

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Diagnostic usefulness of combined use of two non-invasive imaging, i.e. radionuclide scintigraphy and ultrasonography were investigated. LFOV gamma camera (Searl) and multi-purpose ultrasonic device (Aloka SSD-60B) were the instruments used. Radionuclide scan was performed first. Using persistentscope and anatomical marker, contour of a organ and the site of space occupying lesion, if any, were marked on the patient body surface and a poraloid image. Following radionuclide