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NMR-CT, CLINICAL EVALUATION 1. Research Project and Fundamental Strategy. N.Fukuda, Y.Tateno, H.Ikehira, T.A.Iinuma, M.Endo. National Institute of Radiological Sciences, Chiba.

We organized the cooperative research project for the evaluation of clinical utility of nuclear magnetic resonance imaging using Mark-J developed by Asahi Kasei Co. collaborated with Aberdeen University of Scotland.

The main theme of our project would be,

- 1. Establishment of the standard image of normal organs.
2. Accumulation of the image for pathological cases.
3. Biophysical aspect of the proton spin relaxation in vivo.
4. engineering aspect of the relation time.
5. Establishment of data base for the spin-lattice relaxation time(T1) of normal and pathological organs in vivo.

The biophysical basis for differences in the relaxation times of water-proton in normal and pathological whole tissue in vivo is extremely complicated by contribution from connective tissue, vascular fluids, tissue water content, lipid hydrogen signals and the ionic environment as well as by the approximate property of the method of the computation of the relaxation time.

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NMR-CT CLINICAL EVALUATION (2ND REPORT) CLINICAL APPLICATION. H.Ikehira, Y.Tateno, N.Fukuda, T.Iinuma, M.Endo. N.I.R.S. Chiba.

NMR-CT clinical trial of N.I.R.S. using MARK-J made by Asahi Chemical Co., began in early June of this year. Over 150 cases were examined including normal volunteers by the end of last August.

This system has 0.1 Tesla vertical static magnetic field, and is able to produce four kinds of images, namely SR (Saturation Recovery) image, IR(Inversion Recovery) image, D(Differential) image and calculated T1 image.

As we can also get direct sagittal and direct coronal images, they are very useful to find abnormal lesion. These images are not able to be taken completely with other imaging system today.

It is very useful to detect abnormal lesion, especially edematous lesion. With IR image, it is very difficult to differentiate tumour tissue from edematous tissue. However, it will be possible to differentiate tissue characterization by using calculated T1 image. Another usefulness of NMR images is to apply for follow-up survey of clinical course.

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NMR-CT IN CENTRAL NERVOUS SYSTEM DISEASES. K.YOSHIKAWA, K.TSUCHIYA, T.MACHIDA, T.ARAKI, J.NISHIKAWA, K.MACHIDA, M.IIO. Department of Radiology, Tokyo University, Tokyo. H.KAWAGUCHI, A.FUJITA, H.MANO, Y.YOSHIDA, M.KIRI. Shimazu Corp., Kyoto.

NMR-CT were performed on the patients with CNS diseases and its capabilities for evaluation of extensive or differential diagnosis were assessed.

NMR imager incorporated 0.15 Tesla resistive magnet coil and its imaging method was spin-warp method (2D Fourier transformation method). Our imaging technics were spin echo(echo delay= 13ms) and inversion recovery(recovery interval=400ms) sequences. NMR images were principally compared with X-CT(GE 8800) images performed almost at the same time.

For our limited experiences, in spite of the lower spatial resolution, NMR-CT was useful in diagnosing CNS, particularly infra-tentorial and spinal diseases. Sagittal plane images provided more precise anatomical informations particularly about the midline structures. From T1 calculating images we could have any informations for differential diagnosis or components of fluid of the lesions. Further correlative investigations, however, were needed between clinical and histopathological diagnosis.

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NMR-CT for Liver Tumor

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We have applied NMR-CT to 10 liver tumor, namely 6 hepatomas (pre-embolization 2, post embolization 4), 2 cholangiomas and 2 liver metastases. All patients were also studied by XCT, time interval of both modalities was one week.

In inversion-recovery images, we could differentiate tumors from normal liver parenchyma, but in saturation recovery images, we could not differentiate them.

To evaluate the detectability of liver tumor we divided the detectability into three categories, and applied it to each studies.

The results are as follows.

Table with 4 columns: Category, NMR-CT, pre-contrast XCT, Post-cont. XCT. Rows: possible, equivocal, none.

The study population is too small to draw a conclusion, however, NMR-CT is at present almost equal to pre-contrast XCT, but inferior to post-contrast XCT in detection of liver tumor.