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.
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.

NMR-CT for Liver Tumor


We have applied NMR-CT to 10 liver tumors, 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.

Pre-contrast Post-contrast
NMR-CT XCT XCT cont. XCT
possible: 7/10 6/8 10/10
equivocal: 1/10 1/8 0/10
none: 2/10 1/8 0/10

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.