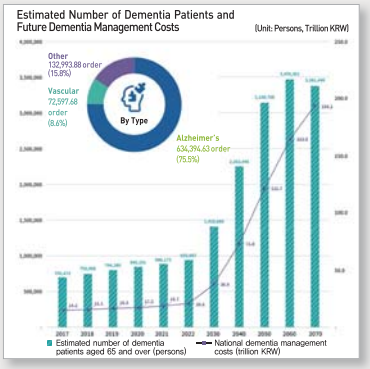
Trends in the Clinical Application of Magnetic Resonance Imaging (MRI)

- Magnetic Resonance Imaging (MRI) is an indispensable imaging tool in an aging society, particularly for degenerative brain diseases, dementia, cancer, and other conditions
- The higher the magnetic field strength, the clearer the anatomical structures and functional, metabolic images are generated
- In the case of (ultra) high magnetic fields and MRI, problems with image quality deterioration occur due to technical limitations of HW/SW (disease diagnosis errors).



[Image] Central Dementia Center, Dementia Status in South Korea

Earth	1.5T	3T	7T
			
0.5 Gauss	15,000 Gauss	30,000 Gauss	70,000 Gauss
Magnetic Resonance Frequency 1Tesla = 42.58MHz	63.87MHz	127.74MHz	298.06MHz
Resolution(㎜)	1.0㎜	0.8㎜	0.2㎜
Genome Shadow (Cons) Less Moderate Many	적음	보통	많음
Price	1.5 billion	3 trillion	10 billion

1 Tesla = 10,000 Gauss

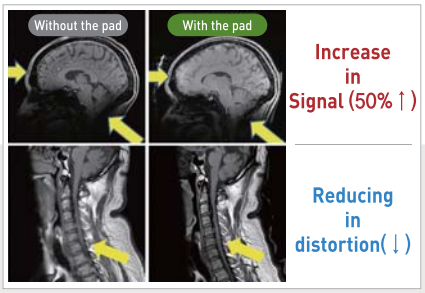
[Image] Potential expansion of early diagnosis of brain diseases (dementia, Parkinson's disease, etc.) and cancer using (ultra) high-field MRI

Solutions to magnetic resonance imaging (MRI) problems

- The use of high dielectric constant pads resolves the distortion issue of the resonance frequency (RF) field generated during MRI imaging
- By improving the image quality of conventional clinical MRI, valuable information for disease diagnosis and treatment monitoring can be provided
- Ergonomic design ensures comfortable wearability

Dielectric Pad Example
(for Brain, Prototype)

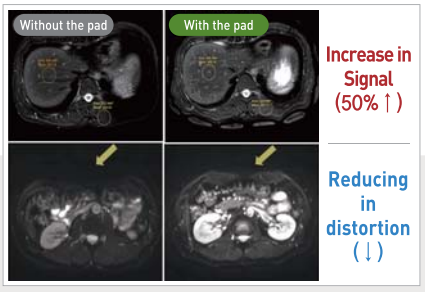
After wearing 1.5T/7T Imaging Scan(at Korea Medical Foundation Screening Center)



- **Possible improvement in scan time reduction (5 minutes saved per person) ··· quality of care**
- **Reduced social care costs**(21 individuals per day, increased to 14 individuals per day (during scans, additional income of 1 million won))

Dielectric Pad Example
(for the abdomen, Prototype)

After wearing 1.5T/7T Imaging Scan(at Korea Medical Foundation Screening Center)



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MR Image Analysis Data

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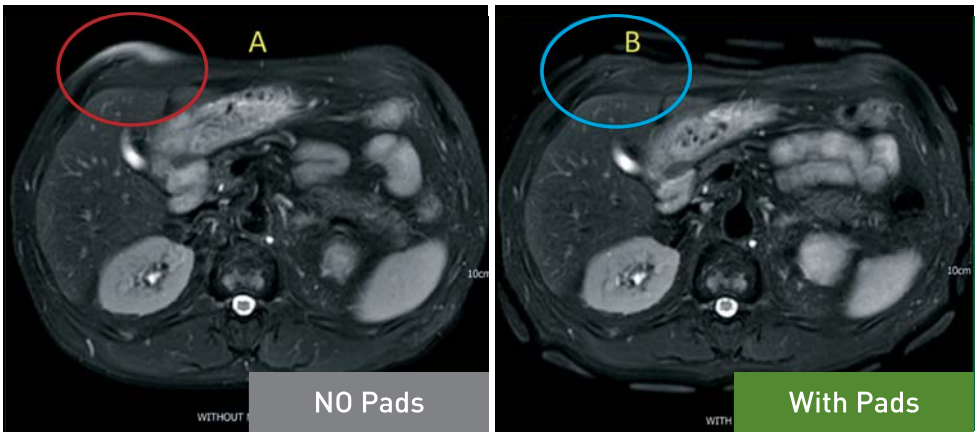
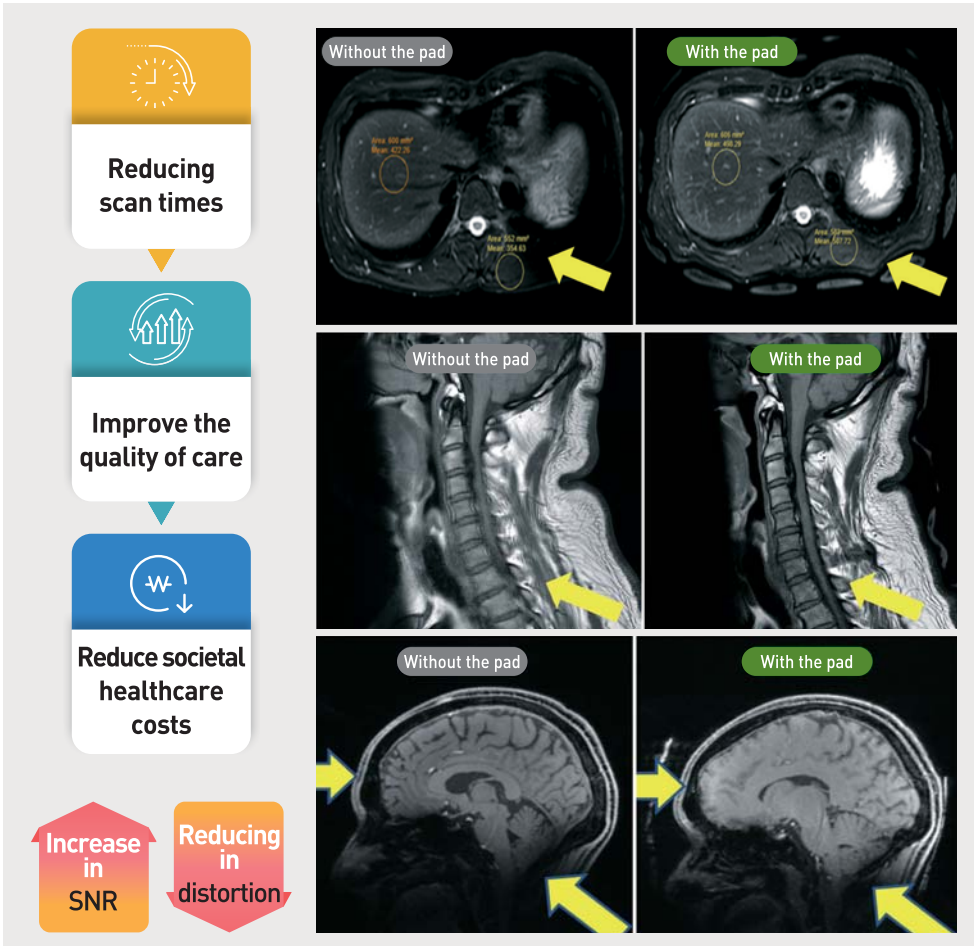
(Reviewed by Korean Medical Foundation Physicians)

- In the abdominal MRI fat-suppressed T2-weighted images of the same patient, when not wearing the MR PAD (A), signal is partially misrepresented due to partial fat suppression in the subcutaneous fat (red circle), while when wearing the MR PAD and imaging with the same sequence of MRI (B), homogeneous fat suppression images can be obtained from all subcutaneous fat (blue circle). Therefore, using the MR PAD can obtain better images showing more uniform fat suppression





MTECH LAB
Medical Technology Laboratory

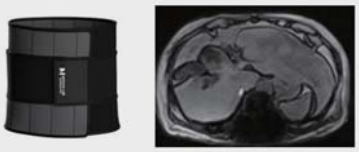
MRI-specific high dielectric wearable pads

- Medical equipment providing improved MR images, clinically validated
- Clinically proven to provide clear medical images, all pad sizes tailored to (large, medium, small)

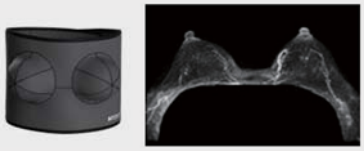
Head

Neck

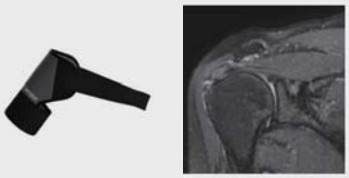
Abdomen



Breast

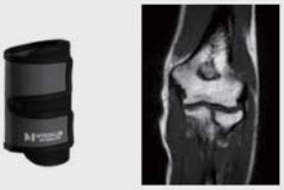


Shoulder

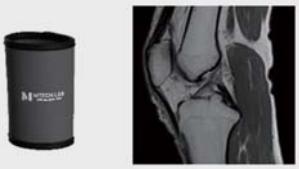


Spine

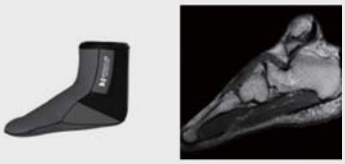
Elbow



Knee



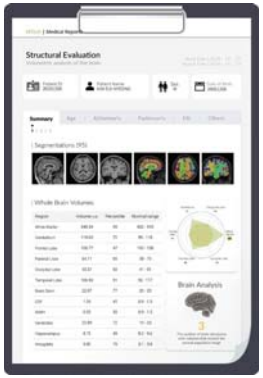
Ankle



Brachial plexus

Wrist

AI-based medical brain disease analysis service



AI-based Medical Image Analysis Solution

Our company has developed an innovative solution that enhances the quality of MR images and reduces diagnosis time by implementing an AI-powered image analysis platform. This medical AI platform is particularly effective in the early diagnosis of dementia, a condition that is increasing in prevalence due to the rapidly aging population. By providing fast results and expanding the possibilities for medical research, it offers significant benefits to medical professionals and researchers.

MRI Analysis Service

01 MRI operational hospital

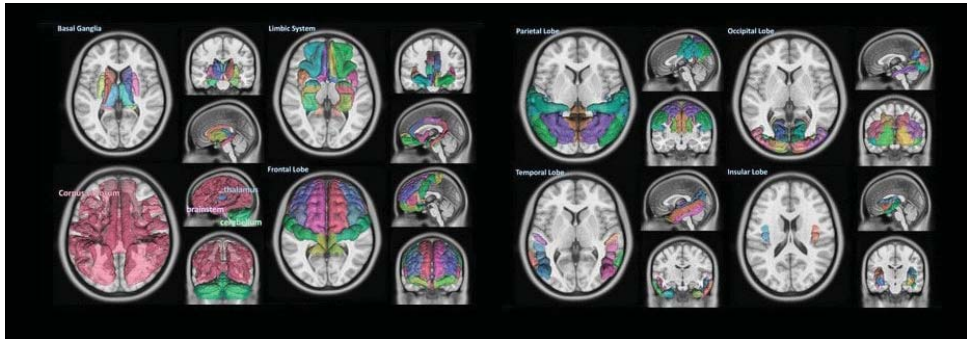


Figure. Segmentation of several areas of brain in Parkinson's disease. The areas composed of segmented structures of a PD patient recruited in this study are basal ganglia, limbic system, cerebellum, thalamus, brain stem, corpus callosum, frontal lobe, parietal lobe, occipital lobe, temporal lobe, and insular lobe, which are overlaid on top of MNI templates

Source: https://www.mdpi.com/2076-3425/12/2/227

02 Functional MRI

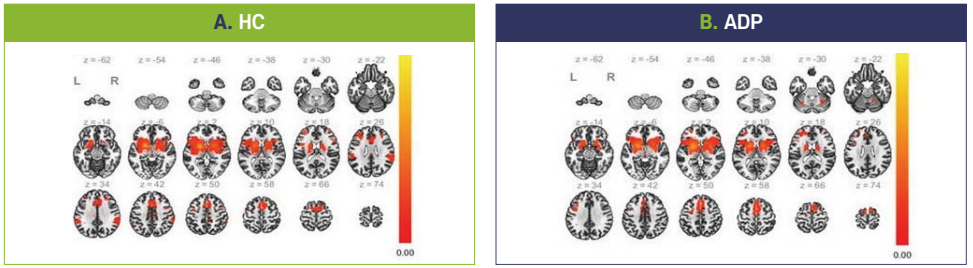
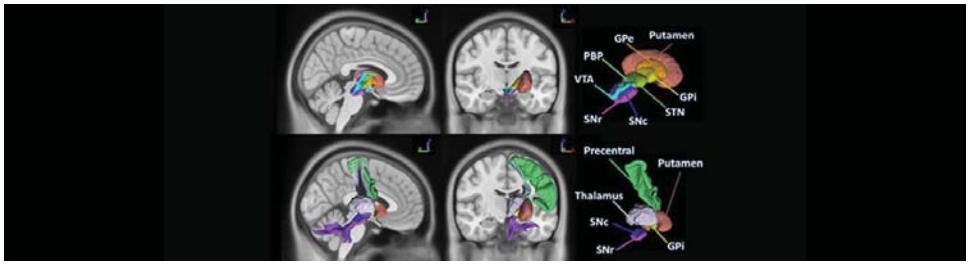


Figure. Positive connectivity network linked with altered white matter volumes in the globus pallidus in healthy controls (A) and alcohol-dependent patients (ADPs) (B). (One-sample t-test, voxel threshold uncorr. $p < 0.001$, and cluster threshold p-FDR<0.05.) L, left; R, right; FDR, false discovery rate.

Source: https://www.mdpi.com/2076-3425/13/6/942

03 Diffusion MRI



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04 Magnetic Resonance Spectroscopy

Figure. LCModel spectral fitting results with (a) and without (b) in-house basis sets. Fitting residue, VOI with sagittal T2 image, in vivo, fitted, individual spectra, and baseline are represented with names.

Source: https://www.mdpi.com/2218-1989/13/3/368