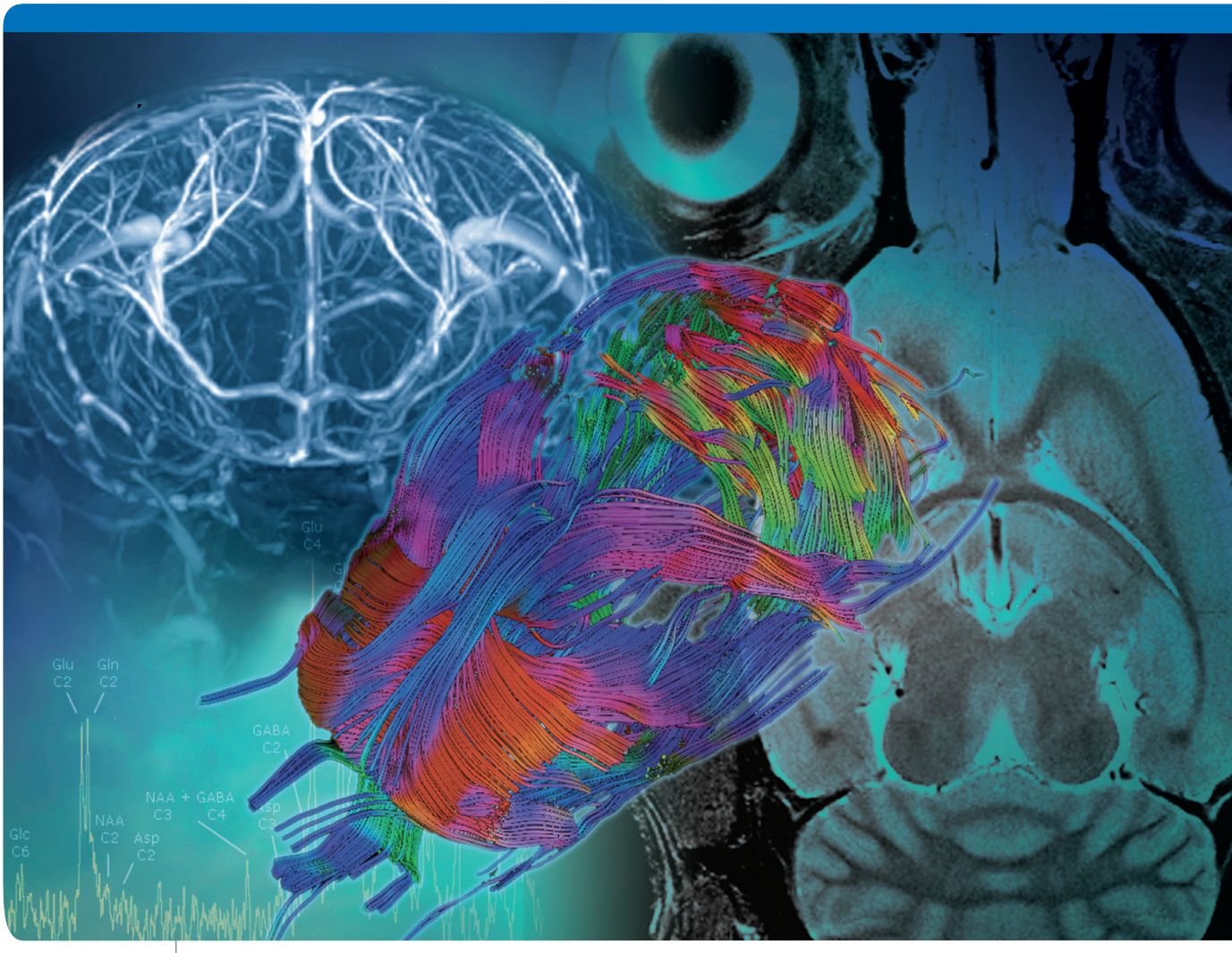


MRI CryoProbe

- Unrivaled Sensitivity in Preclinical MRI

With Unrivaled Sensitivity
The Difference Becomes Clear

For the ultimate image; for the best in resolution; for unmatched performance in MRI; Bruker's series of MRI CryoProbes clarify the difference.

Featuring very low temperature, closed-cycle cooled RF-coils and preamplifiers, MRI CryoProbes deliver an increase in signal-to-noise ratio (SNR) of a factor of 2.5 over standard room temperature ^{1}H RF-coils in routine *in vivo* MRI applications at 9.4 T.

Pioneering Performance

As the world's primary innovator in magnetic resonance, Bruker first developed CryoProbe technology more than 15 years ago. Today more than 1200 CryoProbes are installed worldwide, providing unparalleled performance by reliably delivering amazing increases in SNR. The increased sensitivity means shorter measurement times which multiplies throughput while reducing animal stress.

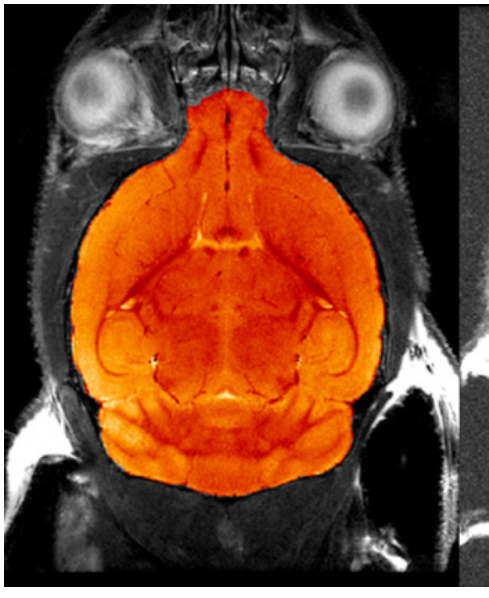
Unique Technology for Outstanding Results

Our MRI CryoProbe technology uses cryogenically cooled RF-coils and pre-amplifiers cooled by a closed cycle refrigeration system. As a consequence the coil performance is improved and the noise contribution of the associated electronics is strongly reduced.

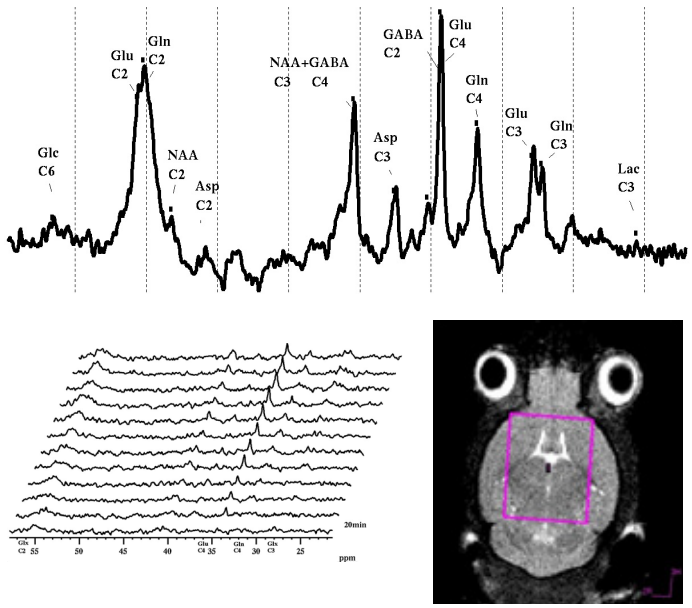
Animal handling and supervision of the MRI CryoProbe is very similar to standard room temperature RF-coils. MRI CryoProbe cooling can be accomplished outside the magnet ensuring optimum usage of the scanner time

MRI CryoCoils provide tremendous benefits compared to standard room-temperature RF-coils:

- Increase in signal-to-noise ratio by up to a factor of 5
- Higher resolution *in vivo* up to 20 µm
- Shorter measurement times
- Access to new applications not possible with room temperature RF-coils (high resolution, fMRI, etc.)
- Shorter durations of anesthesia
- Shorter measurements directly enables lower costs per sample and higher productivity



Widest Range of Applications



Dynamic ^{13}C-MRS of the Mouse Brain

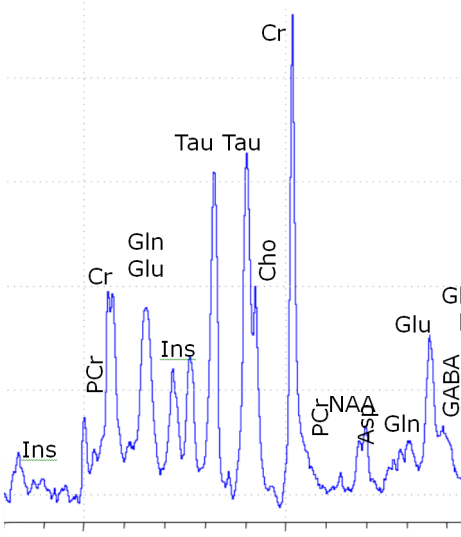
Localized ^{13}C{^{1}H} spectroscopy (ISIS) over time of mouse brain after oraly administrated [1-^{13}C] Glucose. Phantom measurements show that the signal-to-noise increase is by more than a factor of 5 in ^{13}C at 9.4 T.
Courtesy: H. Terasawa, Kumamoto University, Kumamoto, Japan.

Mouse Coronary Artery Imaging

Maximum intensity projection of a full mouse cardiac cycle visualizes the coronary arteries of a mouse heart in vivo.

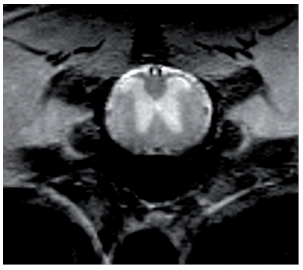
Comparison of ^{1}H four channel phased array receive-only MRI Cryo-Probe with room temperature phased-array coil

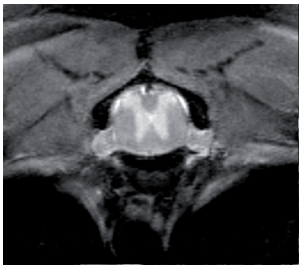
Due to the enormous signal gain a dramatic scan time reduction is possible while maintaining the resolution. In comparison with a room temperature four channel phased array (right image) coil, typically, a signal-to-noise gain of 2.6 can be reached with the four channel phased array MRI CryoProbe (left image).



^{1}H MRS in Mouse Hippocampus: 2.7

Localized ^{1}H spectroscopy in mouse brain
Courtesy: M. Santin, R. Paquin et al., ICM-

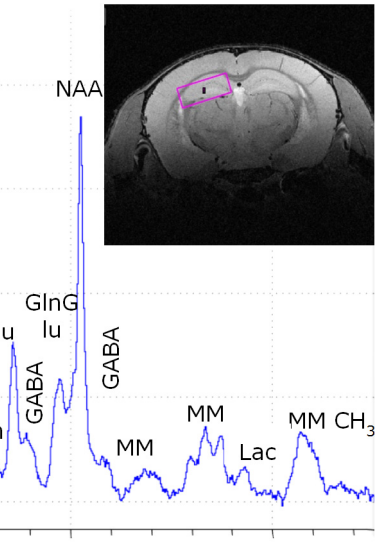




Mouse Spine Imaging

High-resolution (46 x 46 µm in-plane) mouse spine imaging using TurboRARE, acquired in less than 7 minutes at 9.4 T.

Excellent differentiation of gray and white matter and visualization of fine anatomical details, such as root ganglions, vessels, and cerebrospinal fluid.



2.7µl voxel in vivo

rain at 11.7 T in a 2.7µl voxel.
CM-CENIR, Paris, France.

The MRI CryoProbe Family

^{1}H Four channel phased array receive-only MRI CryoProbe for 12 cm gradients and larger

Thanks to the enormous signal gain, a dramatic scan time reduction is possible while keeping the resolution very high. In comparison with a room temperature, a four channel phased array coil can typically provide a signal-to-noise-gain of 2.6.

The four channel phased array coils are available at 7 T, 9.4 T and 11.7 T and can be developed at 4.7 T upon request.

^{1}H Quadrature transmit/receive MRI CryoProbe for 6 cm gradients

Especially designed for the 11 cm mouse scanners, this MRI CryoProbe can be used also in all BioSpec with a 6 cm gradient insert. Available as a commercial product at 11.7 T and 15.2 T.

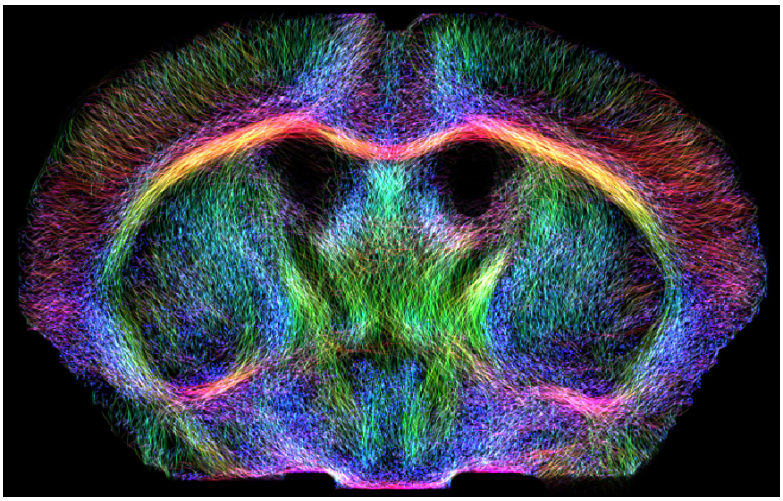
X-nuclei MRI CryoProbe with combined ^{1}H room temperature RF-coil

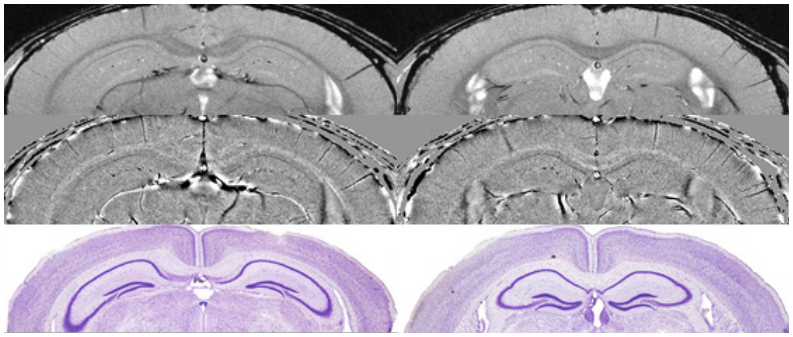
The signal-to-noise gain benefits from lower NMR frequencies: the lower the frequency of the nuclei the higher the SNR gain. Therefore signal-to-noise gains of a factor of 5 are possible in ^{13}C measurements.

Available as commercial products at 7 T and 9.4 T, the other frequencies can be developed upon request.

DTI Fibers

Brain connectivity studies in small animals are challenging but achievable using state-of-the-art MRI technologies, such as a 7T BioSpec and MRI Cryo-Probe technology for the acquisition. High-resolution DT-MRI and fiber trakking of the living mouse brain provides details of the fine cytoarchitecture of the nervous tissue and delineates the fiber tracts organization.
Courtesy: L.-A. Harsan, D. von Elverfeldt et al., University Medical Center Freiburg, Freiburg, Germany.

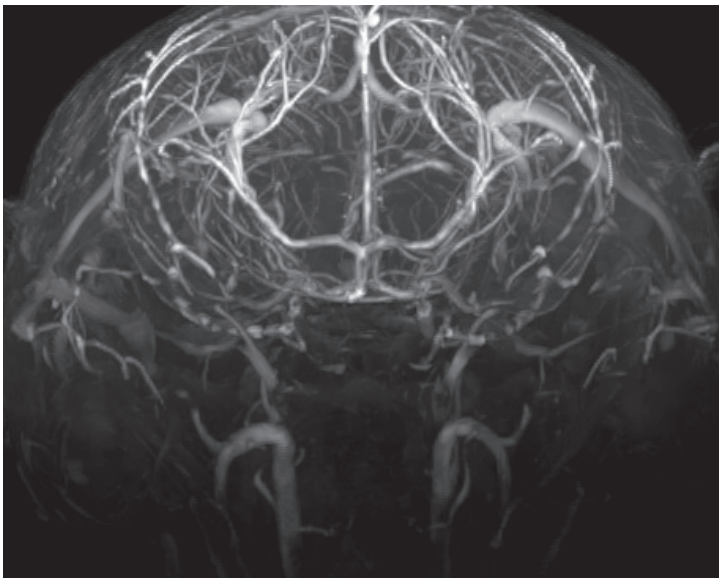




In Vivo Mouse Brain with 19.5 µm Resolution at 15.2 Tesla

Comparison of micro-structures in the mouse brain measured at 15.2 T by using high resolution SWI with histological Nissle staining (below).

Unmatched Results



Angiography

Time-Of-Flight angiography with no contrast agent at high spatial resolution showing excellent contrast enabling the identification of fine vascular structures.

"This increased SNR can be invested in either reducing the acquisition time by a factor 6.25 at constant SNR or, as in the examples shown, in enhancing image quality, i.e. increase the CNR to improve the definition of anatomical structures, and/or to increase the spatial resolution in structural imaging ad angiography."

Prof. Dr. Markus Rudin
ETH, Zürich, Switzerland

"In conclusion, cardiac morphology, cardiac chamber quantification and cardiac function assessement using a cryogenically-cooled RF probe is feasible and affords SNR gains in the range of 3.0 to 5.0 compared to a conventional room temperature cardiac RF coil set-up."

Prof. Dr. Thoralf Niendorf
MDC, Berlin, Germany

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