

## DEAR COLLEAGUE:

We hope to seeing you at ISMRM (booth E17).

Exciting advancements continue in our preclinical and research MRI coils.

In this newsletter we are sharing impressive images from a unique MRI coil for mouse body or rat brain which was delivered to Weizmann Institute last spring. The coil was used to study pregnant mice. This  $^1\text{H}$ - $^{19}\text{F}$  coil is tunable from  $^1\text{H}$  to  $^{19}\text{F}$  while the X channel is multinuclear with changeable tuning inserts. The coil was tuned to  $^1\text{H}$  and  $^2\text{H}$  for the pregnant mice studies. The high field strength, **15.2 T**, and tight spacing (59 mm OD with two coils and a 36 mm ID) made this dual-frequency  $^1\text{H}$ -F/X coil quite challenging.

We also present impressive rat spinal cord images from the from the Laboratory of Dr. Prodip Bose; Malcom Randall VA Medical Center, Gainesville, FL. In-vivo images of an injured rat spinal cord were recorded with a 7 T Doty quadrature  $^1\text{H}$  coil with a 56x56 mm homogeneous region. Following treatment with magnetic stimulation, the ex-vivo spinal cord was imaged using a unique 7 T Doty 5 mm slotted resonator coil, configured for the same standard horizontal MRI magnet.

You can see more details below in this newsletter and come by **ISMRM booth E17** to find out more.

Hope to see you soon.

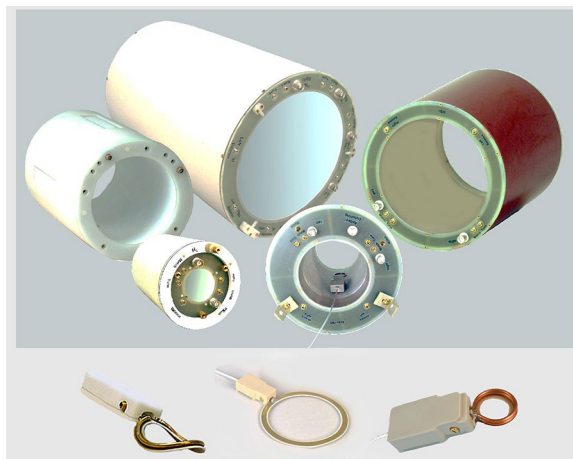
*David and Judy Doty*

## In This Issue

**MRI  $^1\text{H}$  and  $^2\text{H}$  results from a 15.2 T (650 MHz) Mouse Coil with H-F/X tuning. The X channel is multinuclear.**

**MRI in-vivo  $^1\text{H}$  rat spinal cord images from a Doty 7 T volume Coil 56x56 mm and ex-vivo images using a unique Doty 5 mm slotted resonator.**

***Doty Scientific provides a wide range  $^1\text{H}$  or dual-frequency of volume coils and surface coils for mouse, rat, rabbit, and primate. Some special Doty coils are used for food studies or plant studies.***



## $^1\text{H}$ and $^2\text{H}$ Results from a MRI 15.2 T Mouse Coil with H-F/X tuning. The X channel is multinuclear.

**$^1\text{H}$  and  $^2\text{H}$  Imaging on a Dual-Frequency  $^1\text{H}$ - $^{19}\text{F}$ /X Mouse Volume Coil** - for a 15.2 T scanner with a 6 cm bore. The high frequency (650 MHz  $^1\text{H}$ ) and multinuclear X channel enable imaging on low gamma nuclides with remarkable S/N. A 36 mm ID x 35 mm FOV allows surface coil receive, when desired. The high frequency channel,  $^1\text{H}$ - $^{19}\text{F}$ , is tunable from  $^1\text{H}$  to  $^{19}\text{F}$ . The multi-X channel includes low-gamma nuclei:  $^{23}\text{Na}$ ,  $^{13}\text{C}$ ,  $^2\text{H}$ ,  $^{17}\text{O}$ ,  $^{15}\text{N}$ , and  $^{14}\text{N}$ .



Inner multi-X Coil

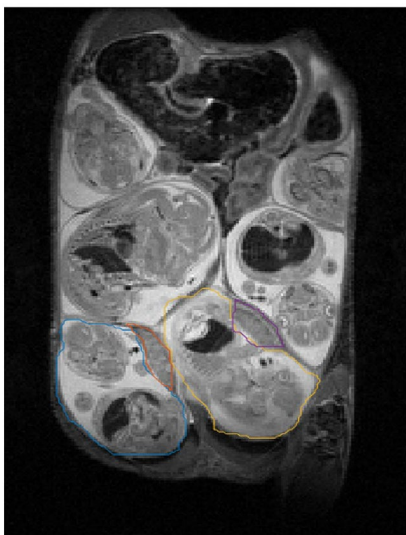


Outer  $^1\text{H}$ - $^{19}\text{F}$  Coil

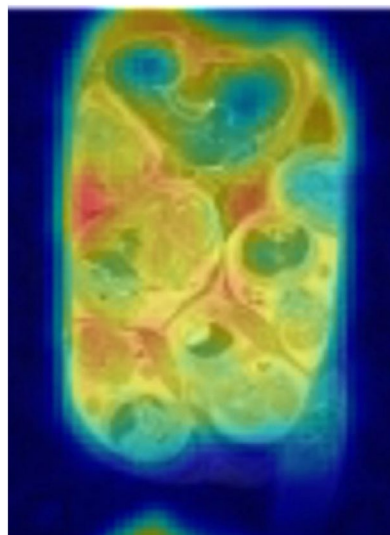


Finished Coil, 15.2 T, H-F/X

**MRI  $^1\text{H}$  and  $^2\text{H}$  results** on a pregnant mouse (E16.5) were recorded in  $\sim 2$  minute intervals following injection of saline  $\text{D}_2\text{O}$ , providing water transport information across the placentas and into individual fetal organs at a level never before seen.



$^1\text{H}$  MRI of the ROI in Figure 5. RARE acquisition, Matrix: 256x256. Thick: 1 mm. Circled in blue and yellow are two fetuses; orange and purple indicate placentas.



$^2\text{H}$  MRI showing differential uptakes in a pregnant mouse  $\sim 18$  minutes after  $\text{D}_2\text{O}$  injection. 3D-bSSFP; TR: 2.206 ms; Matrix: 32x32x16.

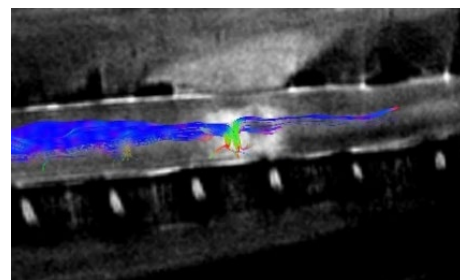
*"The probe works very nicely – and it's really a relief to be able to target the full pregnant animal on  $^1\text{H}$  and  $^2\text{H}$  without having to search positions fetus-by-fetus with a surface coil." – Lucio*

*Images from Weizmann Institute of Science, Rehovot, Israel.*

## In-Vivo and Ex-Vivo Images of an Injured Rat Spinal Cord with Unique, High Sensitivity Coils.



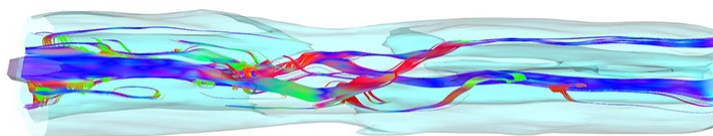
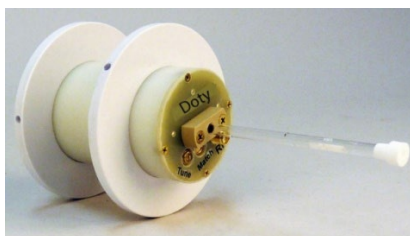
First, the **in-vivo** DTI of rat spinal cord was imaged on a DOTY  $^1\text{H}$ , 7 T quadrature coil with 56 mm ID clearbore and 56 mm homogenous window length. The rat was awake or mildly anesthetized.



**In-vivo** 7 T  $^1\text{H}$  images showing contused spinal cord injury. Excellent volume coil sensitivity made it possible to generate high resolution DTI images in vivo, with weekly scanning to monitor treatment progress.

Following treatment with magnetic stimulation and weekly monitoring, the spinal cord was excised and imaged in the **patented** Doty slotted resonator for a 5 mm sample tube shown below.

**Ex-vivo** 7 T microscopy was imaged using the  $^1\text{H}$  slotted resonator (right) in the same horizontal-bore magnet.



**Ex-vivo** DTI of rat spinal cord (above), acquired with DOTY 5 mm slotted resonator, 7 T. In-plane resolution of 0.12 mm. Showing spared locomotor descending tracts around the injury after treatment with magnetic stimulation.

*Images from the Laboratory of Dr. Prodip Bose; Malcom Randall VA Medical Center, Gainesville, Florida, USA.*