TECH 2000 3T MRI RESEARCH FACILITY
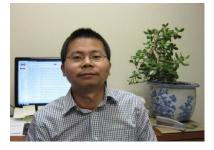
# 3T MR Research Program
## Center for MR Research

WINTER 2014 ISSUE

# 3T Research News

By Mike Flannery



Dr. Kejia Cai, PhD

On behalf of the 3T MR Research Program, please help us welcome our newest Faculty member and Center affiliate, Kejia Cai, PhD, to the 3T Center for MR Research. Dr. Cai's research focus consists of the following:

- Molecular Imaging with MRI
- CEST (Chemical Saturation Exchange Transfer) MRI
- MR Spectroscopy
- MR Imaging Biomarkers
- MR Imaging Technique Development

Dr. Cai has received multidisciplinary training in physics and medicine. After he graduated from Washington University in St. Louis with a PhD in biomedical engineering in 2009, he continued his research in MRI as a postdoctoral researcher at the University of Pennsylvania before he joined the University of Illinois at Chicago as a junior faculty member in 2013.

Dr. Cai's research has been focused on MR molecular and functional imaging with exogenous and endogenous contrasts. He is fascinated by novel imaging methods and biomarkers for early diagnosis and monitoring treatment response of various diseases including neurological disorders, cancer, cardiovascular disease, diabetes and stroke. The research goal is to apply physical concepts into medical science and to translate

MR technical advances into the clinic.
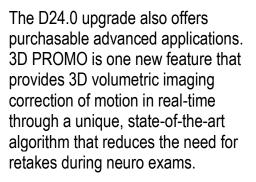
## GE MR750 Software Upgrade

From time to time, the 3T research scanner will need to undergo a software upgrade in order to keep our scanner at the cutting edge. The Harrison facility 3T GE MR750 scanner software will be upgraded from DV22.0 to DV24.0 on March 7, 2014.
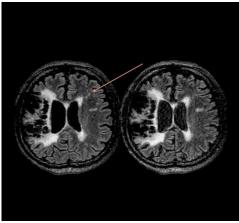
The upgrade consists of both base and optional software enhancements and applications. Increasing workflow and productivity is a main focus with this upgrade. The scan console will be upgraded with the new "Workflow 2.0" user interface and will help streamline scan procedures. Another productivity driven feature that DV24.0 offers is eXpress prescsan. This feature is a new prescan algorithm that

increases the efficiency of the calibration process and reduces prescan times by 30 percent compared to previous generation software.  This would equate to an average time savings of 4-5 minutes per study.

The included ASSET 3.0 feature will provide improved parallel imaging capabilities allowing for higher quality images in less time.

The base upgrade also includes some application features.  One such feature is GE's Real Time Field Adjustment (RTFA) technology.  This feature corrects field imperfections that result in image distortions and loss of resolution in diffusion imaging techniques.
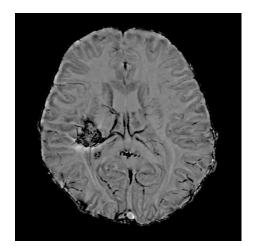
The addition of SWAN 2.0 offers a high-resolution 3D multi-echo gradient echo sequence that results in an SNR that is higher than a single echo acquisition. SWAN 2.0 generates magnitude and phase images from a single acquisition, allowing you to differentiate between microvasculature bleeds and calcified lesions.



eSWAN 2.0 Image courtesy of GE Healthcare

GE also includes Body Navigators which are designed to allow for free breathing, motion-controlled acquisitions. DWI, MRCP, T2 and T1 high-resolution images are scanned without a breath hold.

The D24.0 upgrade also offers purchasable advanced applications. 3D PROMO is one new feature that provides 3D volumetric imaging correction of motion in real-time through a unique, state-of-the-art algorithm that reduces the need for retakes during neuro exams.
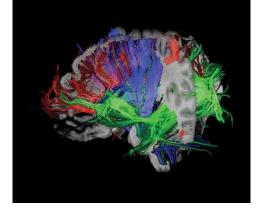


3D PROMO   Image courtesy of GE Healthcare

 Brainwave 3.0 offers a new, simplified solution for functional MRI with support for multi-design paradigms, event-related activity and extensions for diffusion tractography and report generation support.
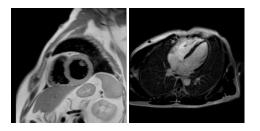


Brainwave 3.0   Image courtesy of GE Healthcare

Another optional new application offered with this upgrade is FOCUS. This application delivers a highly efficient method for increasing the resolution in Single Shot DW EPI sequences. Utilizing a multi-dimensional selective excitation, FOCUS supports zoomed, small field of view imaging of specific

organs with higher diagnostic quality, lower artifacts and faster exam times compared to conventional diffusion imaging.



FOCUS   Image courtesy of GE Healthcare

There are some optional MR cardiac imaging applications available with the new upgrade.  The first of these is called Black Blood Single Shot Fast Spin Echo.  This application utilizes single shot acquisitions and allows large volume multi-slice coverage for morphological imaging of the heart and vessels. That means Black Blood SSFSE improves patient comfort by reducing the number of breath holds, as well as reducing overall scan times.

The second cardiac application is called Phase Sensitive Inversion Recovery-Myocardial Delayed Enhancement or PS-MDE.  This application is used to reduce the sensitivity of inversion delay times for enhanced cardiac exams. The result is consistent imaging without worrying about the delay time.



Black Blood Single Shot          PS-MDE
Fast Spin Echo

Images courtesy of GE Healthcare