



Cut Out the Fat and Water in Seconds

Raising the bar on contrast-enhanced abdominal imaging

The ability to produce clear, detailed abdominal MR images has made tremendous strides over the last few years. Image quality is vital toward making a correct diagnosis, yet up until now, poor spatial resolution, motion artifacts, inhomogeneous fat suppression and long acquisition times have been clinical obstacles for abdominal imaging.

To help improve image quality, reduce “on-the-table-time” and repeat scans, and ultimately enhance patient care, GE Healthcare introduced LAVA-Flex, a dual-echo acquisition technique that raises the bar on existing sequences to provide consistent, detailed, 3D abdominal images in one breath-hold.

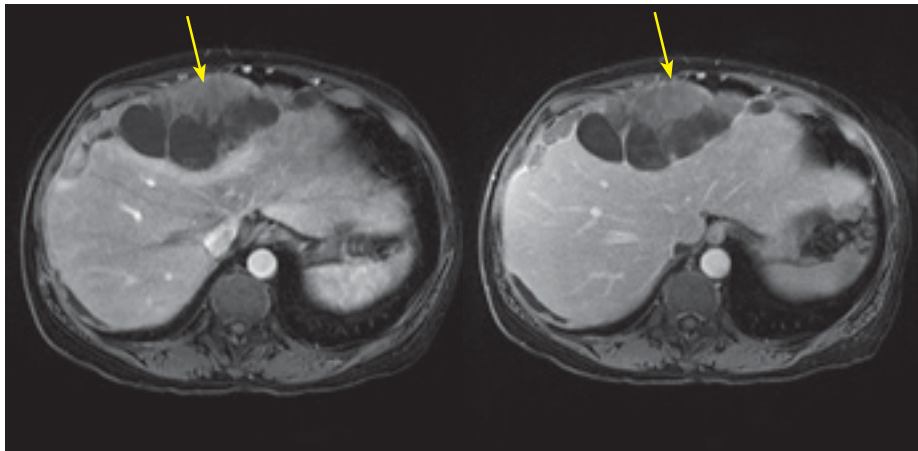
According to Russell N. Low, MD, Medical Director, Sharp and Children’s MRI Center, San Diego, LAVA-Flex with water reconstruction takes current 3D post-contrast imaging one step further, producing superior images quickly and accurately.

“Key aspects of LAVA-Flex are superior fat suppression, greater reduction of artifacts, increased signal-to-noise (SNR) and homogeneity, resulting in overall superior image quality,” he says. “The images it produces are spectacular and the quality is consistently superior to existing techniques.”

Benefits

The abdomen presents one of the most challenging anatomic areas to image. Current contrast-enhanced techniques combine chemical fat suppression with multi-phase 3D gradient-echo imaging. Incomplete or inhomogeneous fat suppression is often evident in large field of view (FOV) abdominal and pelvic imaging. Unsuppressed fat can easily obscure or mimic pathology.

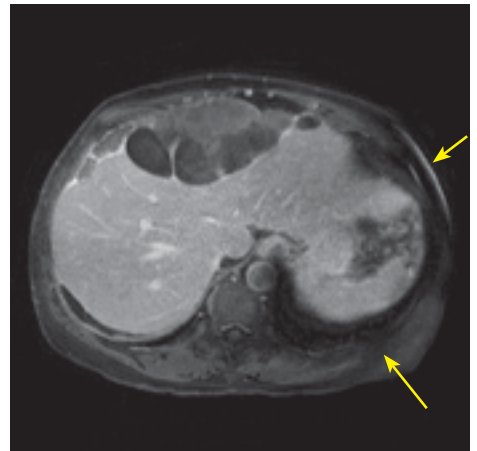
Ovarian Lesions



Arterial phase LAVA-Flex

Portal venous phase LAVA-Flex

Ovarian Lesions



Previous generation technique

“The bottom line is that LAVA-Flex is the new standard for post-contrast abdominal imaging in the industry. Image quality is absolutely paramount.”

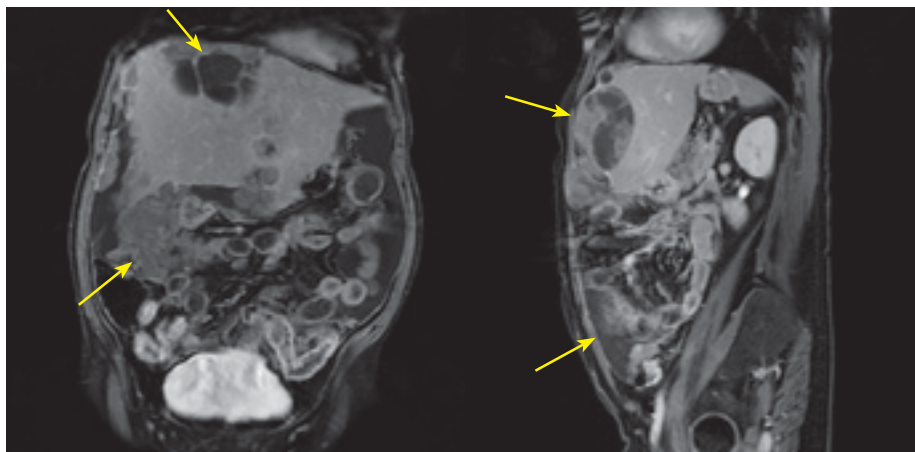
Dr. Russell N. Low

Unlike current methods, LAVA-Flex is a dual-echo acquisition method, producing in-phase and opposed-phase images in one breath hold. LAVA-Flex reconstructs pure fat and water images within seconds by applying a two-point Dixon method to the in-phase and opposed-phase images. In less than one minute, four images (in-phase, opposed-phase, fat and water) are generated. The LAVA-Flex water and fat images show nearly perfect separation of the fat and water signal overcoming the challenges of fat suppression in abdominal imaging.

“LAVA-Flex is superior almost everywhere in the body for post-contrast imaging, including the neck, chest, abdomen and pelvis,” says Dr. Low. “It is particularly beneficial to image anatomy that proves challenging for fat suppression, including large FOV imaging or other problematic anatomic areas such as the neck and brachial plexus. At our center, LAVA-Flex has become our standard fat suppressed 3D sequence for contrast-enhanced imaging.”

Another benefit of LAVA-Flex is its ability to reduce artifacts that interfere with image quality and can make the diagnosis and treatment of disease more difficult. Current 3D post-contrast techniques use physically based parallel imaging methods that require a precise coil sensitivity map. The success of these methods is reliant on accurately calibrating coil sensitivity, which can be difficult to achieve. Image artifacts caused by inaccuracies in coil sensitivity calibration or by motion between the calibration scan and the image acquisition can reduce overall image quality.

Ovarian Lesions



Coronal LAVA-Flex

Sagittal LAVA-Flex



Dr. Russell N. Low

Russell N. Low, MD, is Medical Director at Sharp and Children’s MRI Center in San Diego and since 1991 has practiced with San Diego Imaging Medical Group. He received his medical degree from the University of California, San Diego, with honors and participated in the NIH Research Training Program. Dr. Low interned at St. Mary’s Hospital and Medical Center in San Francisco and completed his residency in diagnostic radiology at the University of California, San Francisco and his fellowship in MRI/CT/Ultrasound at Stanford University Medical Center. He has authored numerous articles, several book chapters and is a frequent speaker at symposiums and conferences, including RSNA and ISMRM.



About the Facility

Sharp HealthCare is a not-for-profit integrated regional health care delivery system based in San Diego, California. Sharp includes four acute care hospitals, three specialty hospitals and three medical groups, plus a full spectrum of other facilities and services. Sharp was named a recipient of the 2007 Malcolm Baldrige National Quality Award and was the first health care system to be named a gold-level award recipient by the California Council for Excellence (CCE) for the California Awards for Performance Excellence (CAPE) program, the state-level affiliate of the Baldrige Award, in 2006.

Sharp and Children’s MRI Center, LLC was founded in 1986 by Sharp Memorial Hospital, Rady Children’s Hospital and San Diego Imaging Medical Group to provide comprehensive diagnostic imaging for children and adults.

The MRI Center is dedicated to providing the highest levels of service to our patients in a relaxed, caring, and supportive environment. We are one of the few diagnostic imaging centers in the San Diego area to offer the comfort of anesthesia for both infants and children. And, unlike open or standing MRI devices, our conventional imaging technology provides first-time high quality image results.

LAVA-Flex features ARC™ (Autocalibrating Reconstruction for Cartesian imaging), GE's data-driven parallel imaging reconstruction technique. Unlike physically based parallel imaging methods, ARC uses a full 3D kernel to synthesize missing target data and uses information along all three dimensions for improved reconstruction accuracy with fewer calibration lines. The end result is significantly faster MR data acquisition, superior image quality, and the reduction of calibration and parallel imaging artifacts. It also significantly reduces motion artifacts.

Because ARC is auto-calibrating and requires no coil sensitivity map, it enables smaller field-of-view (FOV) prescriptions and reduces opportunities for error. It also means potentially faster patient throughput, shorter scan times and fewer repeat scans due to error or poor image quality.

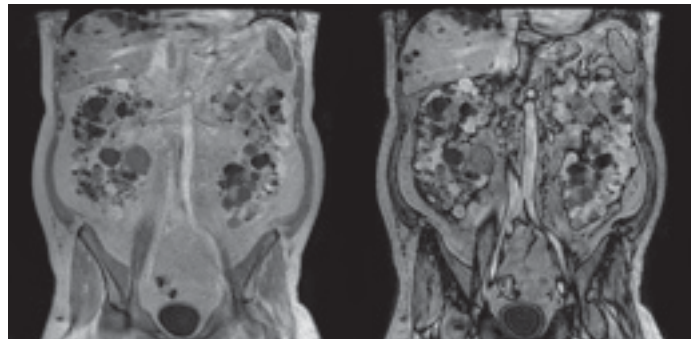
"The images we've seen with LAVA-Flex have been outstanding and are much better than those obtained from standard methods," says Dr. Low. "We've looked at a number of artifacts and compared standard fat suppressed 3D images obtained from previous generation techniques with those from LAVA-Flex. In the vast majority of abdominal cases, LAVA-Flex water images had superior overall quality, with reduced susceptibility and phase artifacts, better anatomical detail and sharper detail."

LAVA-Flex also provides improved (SNR) and produces more homogenous images.

Looking to the future, Dr. Low notes that there is a whole potential for exploration using the in-phase, opposed-phase, fat and water images produced by LAVA-Flex. "For example, we could explore how these images might enable us to look at fat within tumors or organs. This will ultimately add a higher degree of clinical confidence when it comes to diagnosing and treating diseases.

"The bottom line is that LAVA-Flex is the new standard for post-contrast abdominal imaging in the industry" says Dr. Low. "Image quality is absolutely paramount. The better the images the better the chances for correct diagnosis. Otherwise, the potential to miss something is real. Superior images can lead to a higher degree of clinical confidence and have a positive impact on patient care." ■

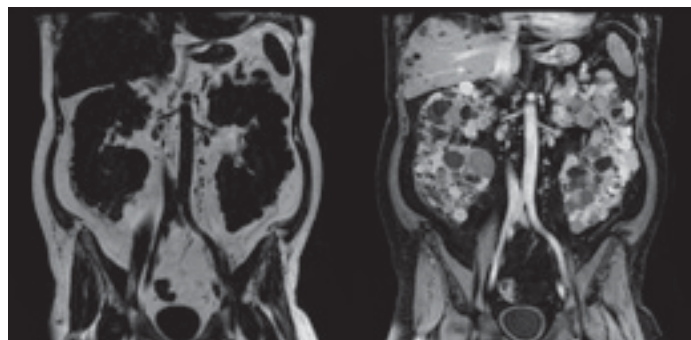
Polycystic Kidney and Liver Disease



In-phase

Opposed-phase

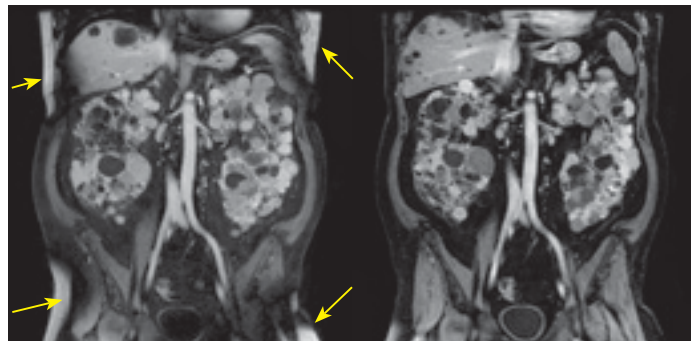
Polycystic Kidney and Liver Disease



LAVA-Flex fat

LAVA-Flex water

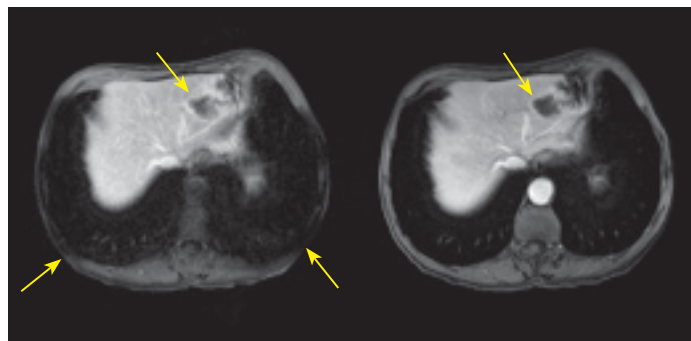
Polycystic Kidney and Liver Disease



Previous generation technique

LAVA-Flex water

Pancreatic Lesions with Liver Disease



Previous generation technique

LAVA-Flex