



Signa[†] HDxt 3T Optima[†] Edition

Cardiac MRI provides high temporal and spatial resolution in the diagnosis of cardiovascular diseases. It's the technique of choice especially for tissue characterization (viability, time course, edema etc.).

Ischemic Cardiomyopathy at 3T

By Jean-Louis Sablayrolles, MD, Chief of CT and MRI, Centre Cardiologique du Nord

Patient history

A 55-year-old hypertensive diabetic patient with a history of myocardial infarction (1993). Patient suffered an episode of brain stroke at the right superficial MCA in October 2009; the patient was under regression. An echocardiogram performed five days later highlighted the possibility of an apical thrombus. The patient was treated with anti-vitamin K. MRI performed post episode of brain stroke reveals wall motion abnormality, ischemic defects, necrosis, and the presence of an apical thrombus.

MR technique

FIESTA Cine in 4 chamber view, long and contiguous short axes were performed to study wall motion abnormality and function. FGRE Time Course (FGRE TC) was acquired at rest in multi-plane SA and 4 chamber views. Cine IR was used to determine the optimal TI time for late enhancement (2D MDE). Late enhancement (2D MDE) in 4 chamber, long and contiguous short axes helped assess viability.

FGRE TC utilizes a non-selective saturation pulse to provide uniform myocardial suppression. Multi-plane acquisition enables short axis and long axis imaging simultaneously to provide a complete assessment of the left ventricle including the apex.

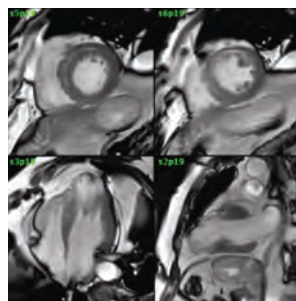


Figure 1. FIESTA Cine in multi-plane shows an impaired LV systolic function.

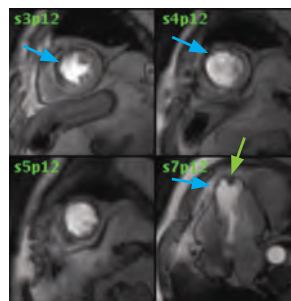


Figure 2. FGRE TC in multi-plane shows defect at the antero-septo-apical wall (blue arrows) and the thrombus (green arrows).

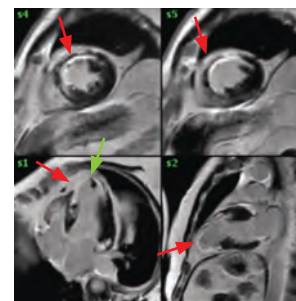


Figure 3. 2D MDE (TI = 360 ms) shows a late enhancement (red arrows) and an apical thrombus (green arrows).

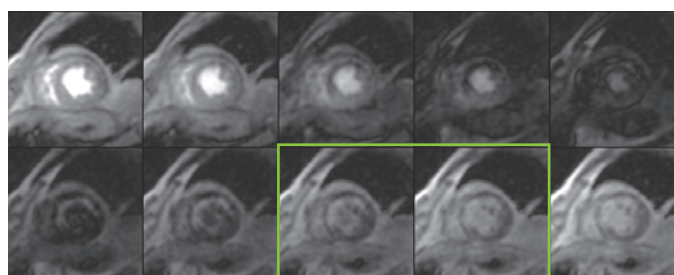


Figure 4. TI evolution in Cine IR. Optimal TI time is chosen at 336 to 374 ms, enabling robust myocardial suppression in 2D MDE.



Dr. Jean-Louis Sablayrolles

Jean-Louis Sablayrolles, MD, is a radiologist at Centre Cardiologique du Nord (CCN) in Saint-Denis, France, where he has been Chief of the CT and MRI Department since 1988.

About the facility

The Centre Cardiologique du Nord is a private practice created by a group of cardiologists in 1973 in Saint-Denis, France. CCN is considered a center of excellence in the diagnosis and treatment of cardiovascular diseases, performing cardiac and vascular MR since 1998. However, abdominal, neurological, and musculoskeletal imaging also represent an important part of CCN's MR workload. Today, with two MR scanners, a Signa HDxt 3T and Discovery MR450 1.5T, CCN is equipped to address the most challenging diagnostic situations. CCN also operates two of GE Healthcare's CT scanners, a LightSpeed[®] VCT XT and a Discovery CT750 HD.

MR finding

Myocardial thinning anterior-septo-apical extended with transmural necrosis sequelae of the anterior wall at the mid segment, the four walls at the apical segment, and the apex. The necrosis is estimated at 50% of the wall thickness at the septum of the mid segment. Presence of an apical thrombus within the left ventricle in contact with the transmural necrotic area measured 10 x 9 mm. FIESTA Cine shows impaired left ventricular systolic function with ejection fraction of 40%.

Discussion

MRI provides a comprehensive assessment of the function and myocardial viability. New techniques such as Cine IR and FGRE TC increase the robustness of the examination and help improve diagnostic confidence. Cardiac MRI provides high temporal and spatial resolution in the diagnosis of cardiovascular diseases and at our facility it is the technique of choice for tissue characterization (viability, time course, edema, etc.).

System: HDxt Optima Edition				
	Function	Cine IR	2D LGE(MDE)	FGRE TC
Scan Time (min)	0:11	0:11	0:15	1:10
Patient Position				
Patient Entry	Head First	Head First	Head First	Head First
Patient Position	Supine	Supine	Supine	Supine
Coil	HD Cardiac	HD Cardiac	HD Cardiac	HD Cardiac
Plane	Oblique	Oblique	Oblique	Oblique
Series Description	FIESTA Cine	Cine IR	2D MDE	PERF 2PL W
Imaging Parameters				
Mode	2D	2D	2D	2D
Pulse Sequence	FIESTA	Cine IR	FGRE	FGRE
Imaging Options	Gat/Seq/Z512/ Fast	Gat/IR Prep/ Seq	Gat/Fast/ IR Prep	Gat/IR Prep/ Multi-Phase/ ASSET
Scan Timing				
TE (ms)	1.7	2.1	2.5	1.6
Number of Echoes	1	1	1	1
TR (ms)	3.8	4.2	5.5	3.2
Flip	45	10	20	15
BW (kHz)	125	41.7	31.3	100
TI (ms)	N/A	N/A	360	Auto (153)
Scan Range				
FOV	35	38	35	38
Slice Thickness	10	8	9	12
Slice Spacing	0	0	2	3
Acq. Timing				
Freq	224	92	192	128
Phase	224	92	160	128
Freq Dir	Unswap	Unswap	Unswap	Unswap
Phase FOV	1	1	0.9	1
Auto Shim	On	On	On	On
NEX	1	1	1	1
Gating/Trigger				
Arrhyth Rejec Win	20%	20%	20%	20%
# RR	N/A	2	2	2
Trig Delay	Min	Min	365	Min
# Phases	26	20	N/A	N/A
VPS	20	10	20	N/A
User CVs				
CV16 Prep-Pulse	N/A	N/A	N/A	1
Multi-phase				
Phase Per Loc	N/A	N/A	N/A	35