Non- Invasive Evaluation of Reparative Processes after Myocardial Infarction by Three- Dimensional Magnetic Resonance Imaging

Prof. Jonathan Leor

Dr. Orly Goitein

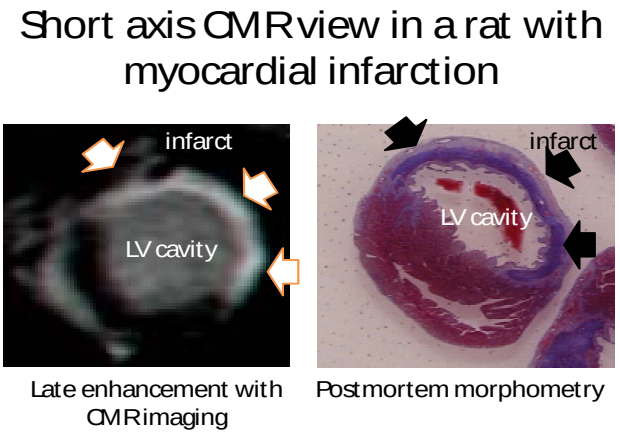
Department of Cardiology, Sackler School of Medicine Tel-Aviv Medical Center.
Sheba Medical Center, Tel-Aviv University

The Aim was to develop and validate an MRI method for high resolution contrast-enhanced three-dimensional (3D) imaging of macrophage infiltration and scar expansion in rats.

Description of work carried out in 2008-9 and major accomplishments

1. Purchasing a CMR rat coil and establishment of CMR set-up for rats at Sheba Medical Center and Tel-Aviv University.
2. Organized the CMR Research Laboratory at the Sheba Medical Center and Tel-Aviv University in order to conduct experiments in small animal models of cardiovascular diseases.
3. Established and implemented standardized CMR scanning and reading protocols for CMR in rats.
4. Conducted reliability studies of CMR and contrast-enhanced methods.

CMR imaging of rat infarcted heart: correlation of late gadolinium enhancement with post mortem morphometry.



CMR imaging of rat heart 4 days after extensive anterior MI. Late enhancement of infarct 45 min after IP gadolinium injection.

Postmortem heart sections of the same heart (Masson's trichrome)

In summary, the successful completion of the first year of our project resulted in functional MRI methods for comprehensively assessing post-MI macrophage infiltration and infarct expansion in a rat model of MI. Combined with MRI of global and regional LV function, these methods uniquely enable the noninvasive serial assessment of novel preclinical therapies for MI. The application of these methods to the evaluation of injected biomaterial is expected to demonstrate the therapeutic benefits of this therapy, including improved infarct healing, and prevention of infarct expansion and cardiac remodeling and dysfunction.