



Medical Education and Research Grant Outcome Report

Name: Surface-rendered 3D MRI Overlaid into Live X-Ray Fluoroscopy to Guide Endomyocardial Progenitor Cell Therapy for Recent Myocardial Infarction: Technical Development and Validation Toward Clinical Translation

Principal Investigator: Amish N. Raval, MD

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Department: Medicine

Program: New Investigator Program

Grant Duration: 04-01-2007 to 03-31-2009 (24 months)

Expenditures: \$100,000 (100%)

Use of Funds (Taxonomy): Type 1 Translational Research

Research Keywords: myocardial infarction, stem cell, catheter, imaging, repair

► **Description:** Patients who suffer heart attack often develop heart enlargement, congestion and heart failure. Injection of adult stem cells into damaged heart muscle may prevent complications of a heart attack; however, catheter techniques are limited by poor imaging technology. This project aimed to develop a novel image guidance system using computer hardware and software components to combine MRI and X-Ray images to allow researchers to more clearly visualize heart attack sites during stem cell injection.

► **Contributions/Results:** The investigators successfully developed a robust and user-friendly imaging system to guide stem cell delivery in the heart using catheters. The investigators demonstrated target accuracy of the stem cell injections through a series of experiments. This approach is now ready for further testing, offering exciting potential to improve imaging guidance for other interventional procedures as well.

► **Met Objectives:** Project completed

► **Timeline for Application of Results:** Less than three years.

► **New Partnerships or Collaborations:** This project forged a successful interdisciplinary collaboration with experts from Cardiology, Radiology, Biomedical Engineering (BME), Medical Physics, Hematology, and

Physiology. As a result of this collaboration, there is now an interventional imaging and device development group at UW-Madison. Members of this group include Walter F. Block PhD (BME), Orhan Unal PhD (Medical Physics), Scott Reeder MD, PhD (Radiology), Michael Vanlysel PhD (Medical Physics), Guang-Hong Chen PhD (Medical Physics), Karl Vigen PhD (Radiology), Michael Speidel PhD (Medical Physics).

In addition, this work led to a research collaboration with Philips Research North America to accelerate this imaging technology in clinical application. The investigators are also working with Biocardia Inc. to help develop a clinical trial aimed at advancing a link between this imaging technology and a stem cell injection catheter.

► **Matched Dollars (cash or in-kind):** \$50,000 from the Department of Medicine, UW School of Medicine and Public Health.

► **Dissemination:**

- Publication: *The Journal of the American College of Cardiology* (submitted for publication)
- Presentations: 2008 Interventional MRI meeting; 2008 Radiologic Society of North America meeting

► **Additional Funding:** Submitted a Grand Opportunity RC2 Grant to the National Institutes for Health (NIH), which scored well. Plans to submit a R01 proposal to NIH in June 2010.