**IMPORTANCE OF THE MYOCARDIAL MICROENVIRONMENT IN THE BIOLOGY OF TRANSPLANTED MESENCHYMAL STEM CELLS**

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**Objective:**To study the importance of the myocardial microenvironment on the biology of Mesenchymal Stem Cells (MSCs) transplanted in the myocardium.

**Background:**The use of cell therapies is hampered by the poor survival of cells after transplantation. It has been hypothesized that the myocardial microenvironment can affect their biology and survival. Here, we use a dual reporter gene sensor for the *in vivo* monitoring of the biology of MSCs under different conditions of myocardial injury.

**Methods and Results:** MSCs (3x105) were transplanted after induction of myocardial injury, achieved via ischemia-reperfusion (IR) or myocardial infarction (MI), on animals fed either regular or hypercholesterolemic diet for 12 weeks. Bioluminescence imaging (**Figure 1A**) was used to assess the biology and viability of transplanted cells. Preliminary data show a significant but transient increase in mitochondrial dysfunction with a similar time course in both MI and IR, suggesting that the mitochondrial function and survival of transplanted MSCs was similar after either type of myocardial injury. Importantly, mice that received the cells after IR, despite their poor survival, displayed a significant improvement in cardiac function (**Figure 1B** - ejection fraction and **Figure 1C** - regional myocardial strain).

**Conclusions:** The myocardial microenvironment may not be as influential on the mitochondrial function of transplanted MSCs as initially thought and other factors may play a more critical role on their biology.

