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**Intramyocardial Pharmacokinetics of Cell Sized Particles  
after Local Transendocardial Delivery in Swine**

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**Background:** Intramyocardial delivery of cell based therapies is entering clinical studies, yet there is little known about the retention and redistribution of these biotherapeutics after their administration.

**Methods and Results:** Local intramyocardial retention and organ distributions of 15  $\mu\text{m}$  diameter fluorescent microspheres were quantified after delivery to swine hearts. Percutaneous delivery was performed with either an intracoronary (I.C.) route or through an transendocardial intramyocardial (I.M.) route. The five intramyocardial deliveries were targeted to the following zones: apical lateral, medial lateral, medial septal, medial posterior and basal lateral. For each intramyocardial delivery, the position of the helix catheter was confirmed fluoroscopically, and 0.6cc of 15  $\mu\text{m}$  microspheres ( $10^6$  spheres/ml) were delivered over 30 seconds and followed with a 0.2 cc flush of saline and a 30 second dwell period. One hour (N=5) or twenty four hours (N=3) following the final delivery in the series, the swine were sacrificed and the heart and other organs were harvested.

Microspheres found in each tissue were isolated using the sedimentation method and quantified using fluorometry. Results demonstrate the ability to successfully deliver 15 $\mu\text{m}$  microspheres to specific targets within the swine heart and that the most significant pathway of redistribution was through the venous drainage of the myocardium. For all intramyocardial deliveries performed (N=40), the animal lungs were found to have significantly larger concentrations of microspheres than other organ systems other than the heart.

**Conclusions:** Strategies to minimize venous transport of cells after intramyocardial delivery may improve the viability of cell based therapies currently in development.