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Poster Sessions

A novel intracellular drug-delivery system specific for cardiomyocytes using RNA aptamer

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A number of intracellular signaling proteins are involved in the progression of heart failure. Such proteins could be a potential therapeutic target for heart failure if an intracellular drug-delivery system (DDS) specific for a cardiomyocyte (CM) were achieved. To develop the CM-specific intracellular DDS, we attempted to isolate RNA aptamers which are specifically taken up by CM using the cell-based SELEX (systematic evolution of ligands by exponential enrichment) protocol with a library of RNA molecules containing a randomized 40-nucleotide sequence. Three different RNA aptamers were obtained after 11 rounds of SELEX using isolated rat adult CMs. The amounts of these aptamers taken up by CMs were significantly higher than those by cells other than CM. To examine whether these aptamers can be used as an intracellular DDS, we conjugated them to the phospholamban RNA aptamer. We previously reported that the latter aptamer binds phospholamban and enhances the Ca^{2+} transport activity of the sarcoplasmic reticulum (SR) within CM. The conjugated aptamers were indeed taken up by CMs and enhanced the Ca^{2+} transport activity of SR, facilitating contraction and relaxation of CMs. The present study thus provides a novel tool for the heart-specific intracellular DDS.