

## Acute Coronary Syndromes

### LONG PULSED ULTRASOUND-ENHANCED THROMBOLYSIS: A NEW THERAPY FOR MYOCARDIAL NO-REFLOW

Poster Contributions

Poster Sessions, Expo North

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**Background:** Ultrasound (US) enhanced microbubble (MB) destruction was shown to facilitate thrombolysis in infarct related coronary artery in acute myocardial infarction. After reperfused infarcted myocardium by percutaneous coronary intervention, epicardial recanalization often doesn't achieve adequate microvascular perfusion, a phenomenon known as "no-reflow". Patients with no-reflow are associated with higher incidence of malignant arrhythmia, refractory heart failure, progressive left ventricular remodeling and sudden death. In this study we test the hypothesis that long-pulsed US mediated MB destruction can achieve microthrombi dissolution and the related mechanisms were investigated.

**Methods:** An in vitro open loop system with a phantom vessel and intraluminal mesh was developed to simulate microvascular embolization. Microthrombi were entrapped in a 40 $\mu$ m-pore mesh and upstream pressure as an index of thrombus burden was recorded. Polymer-PFC MBs were continuously infused and 1MHz US with different acoustic parameters was used to induce MB destruction in the vicinity of the occlusions. A 2.25 MHz transducer, confocally aligned with the treatment transducer focal area, was used to passively detect scattered energy. 3.2 to 3.8 MHz frequency band was selected as a signature of broadband scattering for the detection of inertial cavitation (IC), and the related integral of power density during the treatment period generated inertial cavitation dosage (ICD).

**Results:** Progressive decrease of upstream pressure accompanied with persistent IC activity were observed during the 20mins ultrasound delivery period. More rapid and complete lysis was found when higher acoustic pressure and longer pulse length were utilized. Pressure drop percentage correlated well with ICD ( $r=0.793$ ,  $p<0.01$ ). Pressure dropped  $93.03\pm 6.58\%$  at 1.5MPa and 5000cycles, accompanied with highest ICD of  $32.33\pm 7.02$ .

**Conclusion:** The polymer contrast agent with assisted US showed very good capacity of thrombolysis, especially under high mechanical index and longer cycles. IC plays an important role in US-enhanced MB-mediated clot dissolution and may be monitored to evaluate the efficacy of thrombolytic treatment.