Introduction & Purpose: Leadless pacemaker technology is an emerging method to deliver pacing therapy to the right ventricle with several potential advantages. In this study, we examine the feasibility, safety and effectiveness of retrieval of a leadless cardiac pacemaker (LCP) in an in vivo ovine model.

Methods: 10 sheep underwent a percutaneous retrieval procedure with an 18Fr introducer sheath via the right femoral vein at 5 months post implantation. The retrieval catheter was introduced into the RV and positioned at the proximal end of the LCP with a deflectable, steerable catheter under fluoroscopic guidance. All LCP’s were retrieved and re-implantation was conducted in 5 of the 10 subjects. The 5 subjects that did not receive re-implantation were euthanized following the procedure and the hearts were examined at necropsy. The 5 subjects that had an LCP re-implantation at the RV apex were assessed angiographically at 6 weeks following re-implantation and then euthanized. The hearts were examined at necropsy.

Results: The LCP was successfully retrieved in all 10 subjects. Implant duration before retrieval was 159-161 days (>5 months). The mean time from retrieval catheter insertion into the 18F introducer and mating to the LCP docking button was 48 sec (range: 13 sec-3 min 58 sec). The average time from retrieval catheter insertion into the 18F introducer to removal of the LCP and retrieval catheter from the 18F introducer was 2 min 35 sec (range: 1 min to 4 min 4 sec). The average delivery time for re-implantation from delivery catheter insertion to removal of the LCP was 2 min 42 sec (range: 2 min to 3 min). There were no embolizations or dislodgements noted either during the initial 10-subject retrieval cohort or the subsequent series of 5 re-implanted LCP’s. There were no perforations or extrusions of the LCP helix into the pericardial space and the pericardial sac contained normal amounts of serous fluid.

Conclusions: We demonstrate i) the feasibility of retrieval of a leadless pacemaker, ii) efficacy of retrieval and, iii) safety of a novel leadless cardiac pacemaker retrieved from the RV apex.