Methods: In a first-in-human multicenter single-arm trial of paroxysmal AF ablation, after informed consent and under general anesthesia, ICE-guided transseptal puncture was performed. Through a custom 19 Fr deflectable sheath, the multielectrode spherical array PFA catheter (Globe; Kardium Inc, Canada) was advanced into the left atrium and deployed to its full spherical shape. Using the custom mapping system (GPS; Kardium Inc), the PFA catheter rendered anatomic maps with ostial tags, using contact maps based on blood flow detection. The PFA catheter was positioned at each PV ostium for PVI (1.6-2 kV/application; typically ungated - 3 sec. PV entrance and exit block were assessed. Post-procedure endoscopy (EGD) and brain MRI occurred within 5 days.

Results: At a single center, a total 11 PAF pts (age 62.8 ± 13.0 yrs; M / F 5 / 6; LVEF 55 ± 8.1%; LA 41.5 ± 5.8 mm) underwent PVI. Using typically just one application per vein, PVI was acutely successful in 43 of 43 (100%) PVs in 11 of 11 pts (100%). The total pulse delivery period for each patient was 24 ± 6 seconds (range: 15 - 36 seconds). The PVI duration time (transpired from 1st to last lesion) was 30.6 ± 6.3 min (range 22.6- 42.5). The total LA catheter dwell time for the PFA catheter was 51 ± 7 min (range 42 - 66). There were no safety events - including no esophageal fistula, stroke/TIA, phrenic injury or tamponade. EGD in was normal in 4 of 4 pts. Brain MRI was normal in 6 of 7 pts; one pt had DWI+/FLAIR- lesions.

Conclusion: In this first-in-human study, the "single-shot" map-and-ablate spherical array PFA catheter was able to safely and effectively isolate PVs to treat paroxysmal AF.

Methods: Using a CT derived computer model, the following catheter designs were compared: penta-spline basket, 9 mm nitinol cage sphere, circular decapolar, balloon, and flex-circuit ball catheter. Energy magnitudes and delivery configurations were per publications. Target was a 6 x 47 mm circumferential slab of atrial wall at LPV antrum, with electrodes in contact with myocardium. 100% transmurality was defined conservatively as entire target having >600 V/cm electric field needed for irreversible electroporation.

Results: Efficacy ratios were 2.1, 0.6, 4.7, 12.1, and 9.8 % for the penta-spline basket, 9 mm nitinol sphere, decapolar, balloon, and flex-ball catheters, respectively. Regarding safety, the current densities (surrogate for bubble generation) were 434,140, 93, 33, and 42 Amps/sq cm, respectively, with lower values meaning less gas production.

Conclusion: The safest and most efficacious catheters were those with less electrode exposure to atrial blood, by factors of up to 20X compared to exposed ones.

Background: Magnetic resonance imaging of pulsed field ablation (PFA) lesions in the ventricular myocardium has not been well characterized.

Objective: To evaluate the characteristics of late gadolinium enhanced (LGE) MRI after PFA delivery in healthy and infarcted ventricles.

Methods: Seven swine (5 post-infarct [5 weeks after myocardial infarction induced by balloon occlusion of the LAD] & 2 healthy animals) underwent endocardial (5) or epicardial (2) ventricular PFA under general anesthesia. Pulses (2 kV) were delivered using an 8 Fr focal PFA catheter (Farapoint, Boston Scientific) in bipolar/biphasic mode to the: 1) endocardium over healed infarcts and adjacent healthy myocardium, and 2) over the epicardium in healthy swine. All animals underwent 3.0T MRI.