Introduction: Treatment of Persistent Atrial Fibrillation (PsAF) remains challenging with the optimal ablative approach unclear, largely due to poor understanding of mechanistic triggers and propagators of AF maintenance. Emerging evidence suggests that targeting arrhythmogenic substrate in areas of atrial fibrosis may be beneficial, as AF drivers may be harboured within these regions. DECAAF II will be assessing a MRI-DE guided approach to identifying and ablating these areas of fibrosis. We have recently described a novel evaluation of AF voltage which correlates better with MRI-DE defined scar than sinus rhythm voltage. We evaluated the clinical efficacy of additional ablation of low voltage regions mapped in AF, in conjunction with PVI, in patients undergoing catheter ablation for PsAF and present a single centre case series.

Methods: We compared the effectiveness of additional radiofrequency ablation of low voltage regions in AF (mean <0.35 mV) to pulmonary vein isolation in patients undergoing catheter ablation for persistent AF. The ablation lesions constituted scar homogenisation, scar transection or “boxing” of the scar identified as low voltage areas (Fig. 1). 22 PsAF patients undergoing catheter ablation at Imperial College Healthcare were recruited. Left atrial electroanatomical maps were created, in AF, using the double spiral AFocus II catheter before any ablation was performed in all patients on Precision, Abbott, USA. Mean AF voltage mapping was undertaken using 8s segments of AF (Fig. 2). PVI was then performed in all patients after which, further ablation lesions were delivered on the underlying scar tissue with ablation lines anchoring to points of non-conductive tissue (PVI lines or anatomical points). Patients are followed up with a clinic review in 3 and 12 months and a 24-hour ECG in 3, 6, 9 and 12 months. We defined as recurrence, any atrial arrhythmia lasting more than 30 seconds on monitoring. Follow up period would be between 3- and 12-months post procedure, allowing for a blanking period of 3 months.
**Result**: Of the 21 patients currently under follow up, 14 patients are more than 12 months after their initial procedure (one patient was lost to follow up). 10/14 patients have had no recurrence (only 1 maintained on anti-arrhythmic drug therapy). 4 have had a recurrence of atrial arrhythmias – a single patient presented in persistent atrial flutter, which was successfully ablated in the blanking period. The other 3 have had AF recurrence and are due to have re-do ablations.

**Conclusion**: From our series, 71% of PsAF patients remain arrhythmia free at one year follow up post blanking period with a single procedure. Ablation of low voltage areas in addition to PVI appears to offer an incremental benefit for the PsAF population. We are currently undertaking a randomised multi-centred study to further evaluate this strategy.