# Ultra-high density mapping to characterize effective cryoballoon ablation of roof line in persistent atrial fibrillation: a pilot study

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**Background:** Roof Posterior Wall (RPW) debulking may be important in the maintenance of AF activity as reducing the surface area below a critical mass can prevent persistent AF. No data exists on a combined cryoballoon ablation (CBA) approach guided by ultra-high density mapping (UHDM) system.

**Objective:** To explore, through UHDM, generation of consistent linear lesions at the left atrial (LA) roof using CBA in patients (pts) with persistent AF.

**Methods:** Once PVI was completed, the CB (Arctic Front Advance) was used to perform RPW isolation (RPWI). CBA was applied to create a continuous lesion connecting the ostial areas of the right and left superior PVs. Optimal position of the CB along the different segments of the RPW was obtained by advancing/retracting the inner lumen catheter distally/proximally within the PV. A detailed pre- and post-ablation 3D map was created in each pt using the Orion catheter and the Rhythmia UHDM system. Areas and type of isolation over the RPW and the entire LA were precisely identified and measured. Ablation endpoint was PVI and RPWI as assessed by entrance and exit block and after administration of intravenous adenosine.

**Results:** Ten consecutive pts were included (mean LA volume = 126 ± 36 ml, mean points per map = 10800 ± 8500, mean roof area = 22 ± 4 cm²). A mean of 4.6 ± 0.8 freezes at PV and 5.4 ± 2 at the roof per pt were required (mean nadir temperature (T) = −45°C ± 6°C and −41°C ± 3°C, respectively, mean T at the roof = −33°C ± 4°C) during a mean CBA time of 954 ± 73 s for PVs and 810 ± 311 s for the roof. The mean conduction delay along the roof line at the shortest segment was 55 ± 13 ms. Resulting low-voltage areas (<0.1 mV, 12 ± 4cm², 53% of the roof area) and complete electrical quiescence areas (<0.05 mV, 8 ± 3cm², 32% of the roof area) correlated well with the linear roofline of CB positions. At the first pass all PVs were successfully isolated in all study pts. In two cases at the RPWs UHDM revealed a small conductive corridor (<0.1 mV) along a posterior takeoff that required adjunct RFA to complete RPW isolation. No complications were reported.

**Conclusions:** In our preliminary experience PVI plus RPWI can be achieved safely and effectively using the CB in conjunction with UHDM. The use of UHDM allowed a precise definition of the effective isolation areas.