What is pulmonary vein atrial fibrillation?

* Pulmonary vein isolation has become the current gold standard in medicine and as previously mentioned has shown high level of success with people with paroxysmal AF.
* Pulmonary veins are located on the left side of the heart they are responsible for taking in oxygen rich blood from the lungs into the heart, the entrance point for these veins into the heart are called Ostia.
* The majority of Humans normally will have 4 pulmonary veins and therefore 4 ostia but there are some scenarios where some people can have 5 pulmonary veins with a middle right pulmonary vein present there are also edge cases of hearts with 2,3 and 6 pulmonary veins (Klimek-Piotrowska *et al.*, 2016).
* Pulmonary vein has been linked to the pathogenesis of AF in multiple way, while not all the mechanism has been fully explored there are still some promising ideas of what causes AF. One proposed issue is re-entry into the Pulmonary veins, this has been linked to alteration in the electrophysiological properties of the muscle cells responsible for Pulmonary vein blood entry into the heart(Mahida *et al.*, 2015). More specifically the issue is seen in a shorter ERP, a refractory period of the action potential, this is responsible for coordinating the contractions within the heart which if effected in this way can lead to irregular contraction and therefore re-entry of blood into the veins(Nat℡, Bourne and Talajic, 1997).
* This makes pulmonary veins a an effective target as a common driver of AF , in pulmonary vein catheter ablation the veins and the areas around them become the target for ablation.
* This ablation procedure will involve creating a EAM( 3d electro anatomical map) of the left atrium in which the pulmonary veins are connected to, then a single catheter is used to ablate around the pulmonary veins that are showing abnormal electrophysiological behaviour , this is referred to as point to point ablation. This gives surgeons time to identify other drivers in different chambers and location of the heart that may also be contribute to the Atrial fibrillation. (Reddy *et al.*, 2021).
* There are a multitude of factors that add complexity to the ablation procedure, the first is the time to create a map, the other is identifying what to ablate. This is because there are a multitude of drivers of AF however we only have a simple classification process either paroxysmal, longstanding, or persistent AF which if failing to adequately capture the complete heterogeneity of the disease itself. This means when it comes to treatment whether it is deciding what drugs to use, or the details of the ablation procedure there will always be an exploratory stage to see what works or what doesn’t. We have seen this in ablation in which a secondary ablation is required due to the first ablation not resulting in freedom from AF which adds to the cost of treatment. It would be more effective if we had more specificity in diagnosing subcategories of AF, so that we can identify the most likely treatment pathway and relying less on an exploratory approach.