Af phenotype notes for intro paragraph

Atrial fibrillation stats

* Atrial fibrillation is the one of the most common forms of cardiac arthymias leading to a increased risk of stroke event by 3 – 5 folds even when adjusting for external risk factors.(Wolf *et al.*, 1978)
* The prevalence based on statistics from 2017 show that the prevalence of the disease is at 37,574 million and the incidence is now 31 percent higher than the incidence rate during 1997 at 403/millions inhabitants of incidence(Lippi, Sanchis-Gomar and Cervellin, 2021).
* There are different types of atrial fibrillation dependent on the amount of time a patient has been dealing with this irregular hear rhythm. Paroxysmal is categorized by a short term (under a week) return to normal sinus rhythm. Persistent atrial fibrillation, a focus point of this research, can last more than 7 day or more than a year being considered long standing AF if it lasts more than a year. Lastly, permanent AF is usually considered.
* The majority of the prevalence is made up of mostly people with permentant AF as seen in this European study which has found that persistent AF is prevalent in 25 percent of people while permanent AF occurs in 50 percent of people with AF (Zoni-Berisso *et al.*, 2014).
* The current gold standard for treating cases of atrial fibrillation especially in people with paroxysmal fibrillation is use catheter ablation a procedure which requires installing catheter into the heart through the groin to identify the driver(section) of the heart responsible and then thermally ablate that area essentially killing the segment of tissue responsible for the atrial fibrillation.
* This has shown a great amount of success in preventing people from progressing to persistent atrial fibrillation, in which a systematic review has found that people that did not undertake had a between 10 – 20% change of professing after 1 year follow-up while people who undertook the procedure had a 2.4 – 2.7 % change of progression over 5 years of follow up(Proietti *et al.*, 2015).
* These promising results are not reflected when it comes to catheter ablation procedures for people with persistent AF, with trials like the CAPLA trial only showing an effective treatment (no atrial arrythmia lasting for more than 30 seconds) for between 52.4 to 53.6 percent of patients among slightly differing catheter ablation methods and no change when paired with anti-arrhythmic drugs.
* It is reasonable to suggest that the majority prevalence of permanent AF is partially due to an inability to effectively treat patients with persistent AF which has driven research into finding more effective differing methods of treatment or looking at ways to better diagnose and suggest a pathway of current treatment earlier on in hopes of increasing the success rate of a procedure like catheter ablation.
* In this study I looked at deep learning-based approaches to see how clustering can help us derive phenogroups based on the characteristics of someone’s ECG reading. I did this to see if we can put patients in groups and to see if those groups with similar ECGs may also have had similar treatment procedure (surgical or dug based) provided to them. Being able to establish groups based on ECG reading can help us decide the treatment that may be needed for future patients based on their ECG also.