

Alexander Jansons Myocarditis UK Current Research – A Brief Summary

Fundraising for research is always difficult for supporters and fundraisers to identify with as it is not something that most of us encounter every day. The research that we support takes time to yield results - but when we get those results, they are pioneering and life changing for many patients and their families. Alexander Jansons Myocarditis UK is currently funding research into the following projects:

1. NHS Data:

COVID 19 – and the heart. Covid 19 has had a huge global impact with large numbers of patients affected. The overall burden of myocarditis in this cohort is around 7%. The majority are mild – we now plan a community-based study to understand how the larger cohort of mildly ill rather than hospitalised or severely ill patients have been affected and whether it causes any long-term effects. It is this data and research that enabled us to advise at government level:

<https://www.gov.uk/government/publications/covid-19-vaccination-myocarditis-and-pericarditis-information-for-healthcare-professionals/information-for-healthcare-professionals-on-myocarditis-and-pericarditis-following-covid-19-vaccination>

We will look further at the impact of COVID-19 on the NHS number of admissions across England and separately continue to update data on the number of national admissions across the UK due to myocarditis.

2. Understanding Myocarditis on a cellular level:

What is happening at the cell level to cause patients with myocarditis to develop heart failure and major rhythm disturbances?

Understanding cellular changes in the heart due to myocarditis will help understand which pathways are mainly affected and in turn therefore, which treatments may help to reverse these changes. Also, how can we get these treatments to the right place and at the right dose?

DR Rameen Shakur has been sponsored by Alexander Jansons Myocarditis UK since 2019 and is working in Prof Robert Langer's lab at MIT, Boston. This is the most prestigious bioengineering lab in the world. DR Shakur has completed 2 years looking at cell models to understand signals within the cell using human 'engineered' cells where he has constructed a scaffold system to bring the many different types of cells seen in the heart in an artificial organ or 'organoid'. Using this construct has allowed him to explore potential effective targets to therapy and test possible treatment candidates. This work is now in its final phase for this component.

3. Understanding why some hearts are more affected by Myocarditis than others:

Dr Alma Iacob – an outstanding cardiologist, has joined the research team at the Royal Brompton to continue the work of Dr Amrit Lota – her focus will be looking at patients with severe myocarditis requiring a transplant or artificial heart pump. Her main aim is to understand why the heart has been so badly affected by myocarditis.

We have been asked by the BHF to lead a national programme of research into myocarditis and this will allow us to take

forward the findings from the above work into a UK based national study. This will include 7 key themes to address who gets myocarditis, why and what to do about it. A clinical trial is planned to look at a new treatment in myocarditis. This is a collaboration of around 15 large UK centres. The power of many will make a huge difference.

4. How does myocarditis impact patients psychologically?

Why is this important? Initial feedback from patients showed very high levels of stress and anxiety following the diagnosis. Particularly as they were previously young fit individuals.

Working with clinical psychologists, we have undertaken questionnaires that measure stress and anxiety levels in our cohort of patients using objective measures. These have shown levels of stress seen in PTSD individuals. In addition to submitting a paper on this work, from a service delivery perspective, the findings highlight the need for improved local psychology services and a forum to support patients. Data from this study can help to push this agenda.

5. Why do some patients recover, and some do not?

This is still key research undertaken by the Royal Brompton Team.

Early and better recognition of the at-risk patient would allow much closer monitoring, more aggressive medical therapy and at the same time, offer reassurance to those patients likely to do well and recover.

We have built a multidisciplinary team looking at protein, metabolite, and imaging markers to build a 'signature' of recovery. This is through establishing a large biobank of

patients with a confirmed diagnosis of myocarditis over the last 5 years. These patients have then been followed up over time to see which 'model' best predicts recovery and deterioration. The model will combine all the data available on the patient including from all routine tests as well as the above markers to allow 'precision' characterisation of patients.

We are now at a point where we would like to start analysis of the protein and metabolite markers as the next step. The data from this and the genetics work should also then allow us to identify treatments towards the abnormalities identified. We have initial promising data in a pilot analysis of samples. We are now seeking funds to complete the analysis in the full cohort and to increase the number of patients in the cohort. Once we have funding in place, we believe it will take 6 months to complete analysis, interpret the data and submit a manuscript on this work. Protein targets could help measure disease severity better as well as identify which proteins to target with drug treatments.