GENETIC MUATION OF ATRIAL ARRYTHMIA

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Heart Disease is the most significant cause of death in the United States of America, accounting for over 800,000 deaths per year. Many forms of heart disease are irreversible because they destroy terminally differentiated cardiomyocytes, which are non-regenerative. Atrial Arrhythmia is one of the major heart disease. Amount of people diagnosed with the disease is growing exponentially.

The main question of this research was: What was the genetic mutation that caused Atrial Arrhythmia?

Atrial Arrhythmia patients had their white blood cells extracted. These white blood cells were reprogramed to become stem cells by injecting adeno virus containing four transcription factors into these cells. These stem cells were cultured on a six-wells plate using the monolayer technique. Once the plate reached confluence, the stem cells were differentiated into cardiomyocytes by modulating the Wnt/β-catenin signaling pathway. Cardiomyocytes' antibody marker, anti-VCAM1, was added to mark cardiomyocytes. The marked cells were extracted for analysis (beat per minutes, action potential, etc.)

These diseased cardiomyocytes exhibited shorter action potential compared to the average healthy cardiomyocytes. DNA was extracted from these cells and analyzed using Bio-Informatted program. The program picked out the most likely mutation that caused Atrial Arrhythmia: The M-527-L mutation of the NFATC1 gene.

Further experiment needs to be done to confirm that this mutation causes Atrial Arrhythmia. Two GFP-fused plasmids need to be constructed. One with the normal copy of NFATC 1 gene. One with the mutation identified above.