Cardiac disease is an issue that plagues many Americans every day. One of the further extremes of this disease is cardiac arrest. In 2019, 232,000 people visited the emergency department of a hospital with cardiac arrest in the United States (Hsu et al., 2024). This is 0.2% of the population. Even though the percentage seems small and a miniscule statistic, this is still a significant amount of the population. Especially given the number of people that suffer from this condition every year. There are certain factors that contribute to a person's risk of cardiac disease and later arrest. These factors include, but are not limited to: Age, Race, Family History/Genetics, Lifestyle, High Blood Pressure, and others (*Causes and Risk Factors | NHLBI, NIH*, 2022). Each factor contributes its own role in the issue of heart disease. Cardiac Arrest is nearly 90% fatal (*Sudden Cardiac Arrest: 5 Things Women Need to Know*, 2021). In the United States, nearly 436,000 cardiac arrest related deaths occur (*What Is Cardiac Arrest*? 2024).

Reperfusion injury is the tissue damage caused when the blood supply returns to tissue after a period of ischemia (Wikipedia contributors, 2024). This treatment generally follows a stroke or cardiac event such as a STEMI. Ischemia means having less than normal levels of blood flow to a certain part of the body (*Ischemia*, 2024). Ischemia can occur in the heart (Myocardial Ischemia), in the digestive system (Mesenteric Ischemia), in the brain (Ischemic Stroke), in the limbs (Peripheral Ischemia), or also in the brain as a Transient Ischemic Attack (TIA) (*Ischemia*, 2024). Reperfusion therapy is a process to restore healthy blood flow using drugs or surgery (Wikipedia contributors, 2023). The principle behind reperfusion therapy is to open blockages in the arteries. This treatment can apply to any part of the body and treatment difficulty is dependent on the location of the ischemia. The patient must be examined with an ECG to determine whether it can be treated with drugs or if it requires surgical intervention.

Mitochondrial transfer involves the exchange of mitochondrial components, such as DNA, RNA, and proteins, between cells and has been shown to improve mitochondrial function and reduce oxidative stress in various cell types (Clemente-Suárez et al., 2023). Intercellular mitochondrial transfer facilitates the incorporation of the donated mitochondria into the endogenous network of recipient cells, which results in the change in the bioenergetics profile and other functional properties of the recipient cell (Qin et al., 2021). Mitochondrial transplantation is a therapy

approach that is aimed at delivering healthy mitochondria to cells to alleviate the symptoms of these diseases. Diseases such as MELAS, LHON, KSS, Leigh Syndrome, and MERRF (*Mitochondrial Diseases*, 2024). Mitochondrial transplantation has been shown to be a promising approach for the treatment of mitochondrial diseases in animal models (Kim et al., 2023). Mitochondrial transplantation is shown to be a beneficial treatment in the animal studies. Studies in mice have demonstrated that mitochondrial transplantation can lead to the improvement of cellular energy metabolism, the restoration of mitochondrial function, and the prevention of cell death (Kim et al., 2023).