

Molecular mechanisms of muscle myopathy and pancreatic beta cell dysfunction associated with cystinosis: Determination of optimal approaches for cell protection

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Cystinosis is characterised by the accumulation of the amino acid cystine in lysosomes in various cells and tissues of the body. This results in severe damage and even death of the cells. Amino acids are normally used by all cells for protein synthesis and cell protection. Clinically the first vital organ to fail in cystinosis is the kidney, probably due to the fact that it is responsible for transporting amino acids and sugars between the kidney tubules and the blood, to ensure they are not lost in the urine.

Other vital tissues and cells to be affected are muscle and pancreatic beta cells (insulin secreting). Muscle weakness can lead to difficulty in swallowing and breathing. Pancreatic beta cell failure will result in diabetes.

A new and emerging area of clinical biochemistry and physiology is that of the study of highly reactive molecules derived from oxygen (ROS) and nitrogen (RNS).

This project will explore the role of cystine accumulation in promoting ROS and RNS generation in muscle and pancreatic beta cells and subsequent impairment of cell function. Additionally, the source of the ROS and RNS will be identified and possible mechanisms to reduce their production will be explored. This will help maintain cell function and reduce clinical complications such as muscle weakness and diabetes.