Cystinosis Research Foundation

Lay Abstract Template for Awardees

Please complete this lay-oriented grant abstract form which will be published on the CRF web site, in CRF Star Facts and in the CRF magazine when we announce your grant award. *Please do not exceed 400 words (no more than 1-1/4 page total).* Please submit this form electronically to nstack@cystinosisresearch.org as a Word document.

Principal Investigator (s): Benjamin Freedman

Project Title: Developing a therapeutic strategy for cystinotic nephropathy with iPS cells

Objective/Rationale: Please write a lay-oriented statement of the scientific rationale for this project. Approximately 75-85 words.

The kidneys are particularly vulnerable to cystinosis, even during childhood. Cysteamine delays kidney decline, but is not considered a cure. Our group has recently discovered a way to generate human 'mini-kidney' structures, or organoids, outside of the body, starting from stem cells. The goal of this project is to use mini-kidneys as surrogates for patients, to explore the potential of kidney regeneration, gene therapy, and drug discovery to remedy the effects of cystinosis on the kidneys.

Project Description: Please write a brief, lay-oriented description of how you will carry out the project. Approximately 125-135 words.

Our work will be performed in three sub-projects ('aims'). In the first aim, we will recruit patients with cystinosis and turn their urine into stem cells and kidney grafts, which we will test for transplant ability. In our second aim, we will develop a gene therapy approach for cystinosis in human kidneys, by applying genome editing (CRISPR) to restore cystinosin function in organoids. In our third aim, we will intentionally re-create the symptoms of cystinosis in mini-kidneys outside of the body, to gain new insight into why kidney cells are damaged and how this can be prevented chemically. Together, these sub-projects will add up into a larger whole, bringing us closer to a cure.
Note: If you are a cystinosis patient and would like to donate urine, please contact benof at uw.edu to join our study.

Relevance to the Understanding and/or Treatment of Cystinosis: Please explain how the project will impact cystinosis treatment or increase our understanding of cystinosis. Approximately 75-80 words.

We are taking a multi-faceted approach to determine which strategies have the most potential for treating cystinosis in human patients. The mini-kidney platform enables us to perform exploratory experiments of this sort that would not be possible in actual patients. This will enable us to help us better understand how cystinosis damages the kidneys and to discover specific and effective interventions that could be further tested in clinical trials.

Anticipated Outcome: Please write a lay-oriented description of what you expect to learn/discover. Approximately 75-80 words.

Our experiments will teach us whether (1) kidney stem cells can be derived from cystinosis patients with the potential for engraftment back into the patients; (2) gene therapy can be effective in restoring the lost functionality of the cystinosin gene in human kidneys; and (3) a common blood protein might be a major culprit in damaging human kidney cells in cystinosis. Collectively, these studies will clarify which are the most promising strategies for therapy in cystinotic kidneys.