Lifecourse Journey in Cystinosis

Authors: Marcela Del Rio, Nicole Hayde, Walkiris Cruz-Perez, Maya Doyle, Tomas Kiss Farengo, Patricia Flynn, Frederick Kaskel from the Ira Greifer Children’s Kidney Center, Children’s Hospital at Montefiore, Albert Einstein College of Medicine

Introduction

Lifecourse research first studied social & cultural influences on health and now includes effects of maternal, prenatal, postnatal, infancy/childhood, adolescent, early adult & aging environmental exposures across the life continuum. It is a multidisciplinary approach to developmental & biologic trajectories which are considered over time. As defined, it involves studies of biological, environmental, genetic, epigenetic, behavioral, & psychosocial pathways that operate across an individual's lifecourse as well as across generations, to influence the development of chronic disease. Conceptual models include cohorts of subjects with early life exposures, birth weights, socioeconomic status, & identified conditions that are entered into a registry for investigations using multivariate analyses.

There are critical time points along the continuum for unique exposures called allostatic loads, to have additive influences on the subsequent phenotype or expression of outcomes. Allostatic loads are defined as accumulated biologic stresses, including those related to social determinants of health and adverse childhood events (ACES), that may affect genes throughout

---


the lifecourse. Biomarkers of these exposures & their epigenetic mechanisms\textsuperscript{7} at critical stages of the lifecourse will advance our knowledge of health & disease.

**Application to cystinosis**

- Identify what critical time points and factors such as: epigenetic, environmental, psychosocial, are affected in cystinosis.
- Apply what is known regarding multiorgan involvement during growth & development in cystinosis & how best to examine them using principles of lifecourse research.
- Establish secured shared registries and databases using the electronic medical record, biobanks, and other longitudinal cohorts for future development of targeted lifecourse research at ideal windows.
- Using big data opportunities develop predictive/prognostic modeling of multiorgan involvement.

**Conclusion:**

From newborn screening allowing early diagnosis and treatment\textsuperscript{8} to increased understanding of the long-term sequelae of cystinosis in adulthood, a lifecourse perspective adds a vital perspective to understanding and managing the disease over time.

Priority areas for future research around cystinosis include individual level and transgenerational research, identification of time points and ideal windows for intervention, use of big data, omics, lifespan template for EMRs, and development of biomarkers and measures.

---
