Janel Long-Boyle, J Genet Syndr Gene Ther 2017, 8:3 (Suppl)
DOI: 10.4172/2157-7412-C1-015

Using quantitative pharmacology to overcome challenges in hematopoietic cell transplantation: Application towards primary immune deficiencies and inborn errors of metabolism

Janel Long-Boyle
University of California San Francisco, USA

Statement of the Problem: Quantitative science is a multidisciplinary approach to studying therapeutics, which emphasizes the integration of the relationships between diseases, drug characteristics, and individual variability across studies/drug development. Historically, the adoption of complex pharmacokinetic models into mainstream clinical practice has been hampered by complicated software and the tendency to develop complex models impractical for clinicians to utilize quickly. However, with recent advancements in technology model-based dosing algorithms can be easily implemented into clinical protocols and used to individualize therapy. For pediatric therapeutics this signifies an important paradigm shift from a pre-defined dose (e.g. mg/kg or mg/m^2) to a more tailored, individualized approach to therapy.

Methodology & Theoretical Orientation: The overarching goal of model-based dosing is to effectively treat diseases without acute toxicity and to prevent long-term side effects of drug therapy. In pediatrics the pharmacokinetics of drugs in infants can differ widely between children and adults. Within the first year of life, age-related changes can lead to altered drug disposition. Additionally, the relationship between drug concentration and outcomes may be highly variable across different age groups or disease states. Intervention with hematopoietic cell transplantation (HCT) early in life is often critical to effectively treat several childhood diseases including immunodeficiencies and genetic metabolic disorders. Newborn screening allows for diagnosis and thus interventions such as HCT or gene therapy to be offered early when outcomes are superior. Examples of how model-based dosing can be applied to infants, including the commonly used agents used in the setting of pediatric HCT, will be described.

Conclusion & Significance: Moving away from traditional dosing intensity strategies to model-based dosing allows for tailored drug exposure. Further development of model-based dosing in the setting of HCT has the potential to minimize toxicity while maximizing efficacy, resulting in superior outcomes for children with rare diseases.

Biography

Janel Long-Boyle is a Translational Scientist with research interests that include pediatric cancer therapeutics, pharmacokinetics, pharmacodynamics, pharmacogenomics, and clinical trial design. The majority of her research resides within the complex setting of hematopoietic cell transplantation (HCT) and focused around chemotherapeutic and immunosuppressive agents used in the preparative regimens of pediatric HCT and gene therapy. More recently, her work aims to facilitate the adoption of population pharmacokinetic models into routine clinical practice to improve patient care. Professionally, she has an established clinical pharmacy practice within the UCSF Pediatric Bone Marrow Transplant Service. She also directs an advanced clinical pharmacology consultation service utilized by members of the UCSF Pediatric Bone Marrow Transplant, Immunology and Oncology Services as well as many external clinical centers worldwide.

janel.long-boyle@ucsf.edu

Notes: