Recombinant Growth Hormone Treatment in Children with Chronic Kidney Disease (GROW-CKD)

Olivia Nguyen, B.Sc.(Pharm); Janis Dionne, MD, FRCPC; Kathryn Haubrich, B.Sc.(Pharm), PharmD

Background

- Growth impairment is a major complication in children with chronic kidney disease (CKD)
- Recombinant human growth hormone (rhGH) has been shown to support linear growth in this population
- The underlying etiology of renal disease may impact the degree of growth impairment, and is thought to influence patient response to rhGH
- There is limited evidence on the comparative effectiveness of rhGH with respect to primary renal disease
- Comparisons of optimal dosing, duration, and long term response to rhGH therapy between primary renal disease states remain poorly described in the literature

Objectives

Primary Objective:

- To describe the differences in effectiveness of rhGH therapy on growth velocity and height standard deviation score (SDS) between primary renal disease states in children with CKD

Secondary Objectives:

- To describe dose requirements of rhGH for children receiving care through BC Children's Hospital (BCCH) Nephrology Clinics
- To describe the prevalence of adverse effects associated with rhGH treatment in children with CKD

Methods

- **Design:** Retrospective cohort study
- **Inclusion:** Patients aged 1– 20 years, who received rhGH treatment for at least 6 months between January 2001 and August 2018, and were managed through BCCH Nephrology Clinics
- **Exclusion Criteria:** Other medical causes of growth failure; use of sex steroids or anabolic steroids
- **Data Analysis:** Sample size of convenience; descriptive statistics

Results

Table 1: Patient Characteristics

	N = 29
Male – no. (%)	19 (66)
Median age at rhGH initiation – years (range)	6.2 (1.0 – 13.5)
Median duration of rhGH therapy – months (range)	24 (6 - 70)
Primary Renal Disease	**n (%)**
Dysplasia/hypoplasia	15 (52)
Glomerulonephritis	1 (3)
Tubulopathy	3 (10)
Nephrotic syndrome	5 (17)
Other primary renal disease	5 (17)
CKD Treatment Modality	**n (%)**
Non-dialysis CKD	17 (59)
Hemodialysis	0 (0)
Peritoneal dialysis	10 (34)
Post-renal transplant	2 (7)

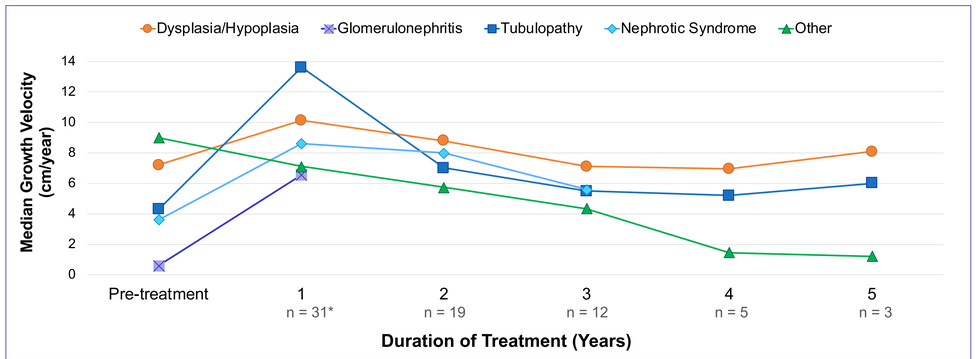

Figure 1: Growth Velocity Before and During rhGH Therapy

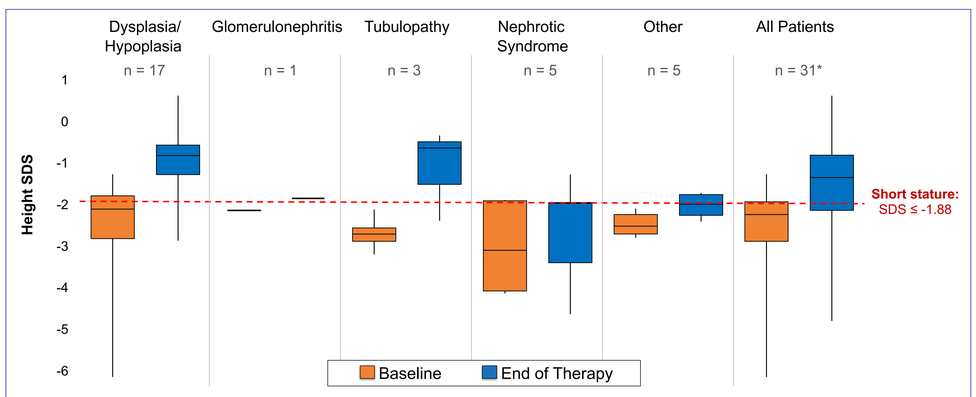

Figure 2: Height SDS at Baseline and End of rhGH Therapy

* 2 patients had two separate trials of rhGH therapy

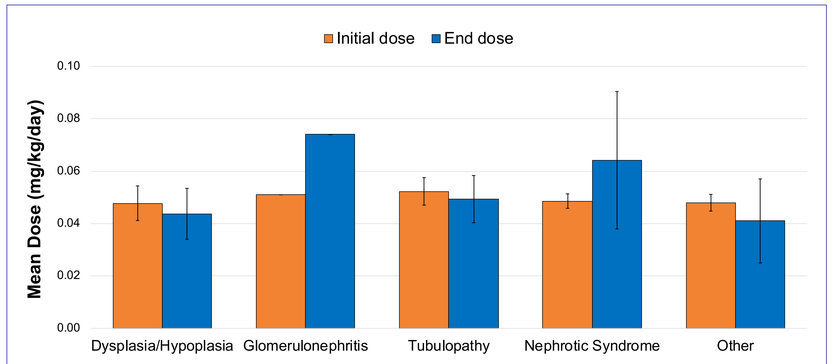

Figure 3: Dose at Initiation and Cessation of rhGH Therapy

Table 2: Adverse Effects

Outcome	N = 29 (%)
New onset insulin-dependent diabetes (after initiation of rhGH)	0 (0)
Pseudotumor cerebri	0 (0)
Avascular necrosis	1 (3)
Slipped femoral epiphysis	0 (0)

Limitations

- Unbalanced distribution of patients between primary disease groups
- 'Other' primary renal disease group consisted of very different underlying CKD etiologies
- No control group for comparison
- Age at initiation may have been a confounder due to inherent differences in growth velocity

Conclusions

- Greatest improvement in growth velocity and height SDS occurred in the first year of rhGH therapy
- Height SDS was improved in all primary renal disease groups
- Children with dysplasia/hypoplasia and tubulopathies may respond better to rhGH and require lower doses relative to those with glomerulonephritis and nephrotic syndrome
- rhGH was well tolerated overall
- Larger study required to evaluate differences in growth outcomes between primary renal disease states to better inform practice