Moving Beyond Birthweight: Examining Developmental Origins of Disease Using Dynamic Postnatal Growth Indicators

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Conclusion

NOVEL NONLINEAR MODEL APPLICATION LINKS PARADOXICAL PFOA-INDUCED CHILD GROWTH PATTERNS

Background

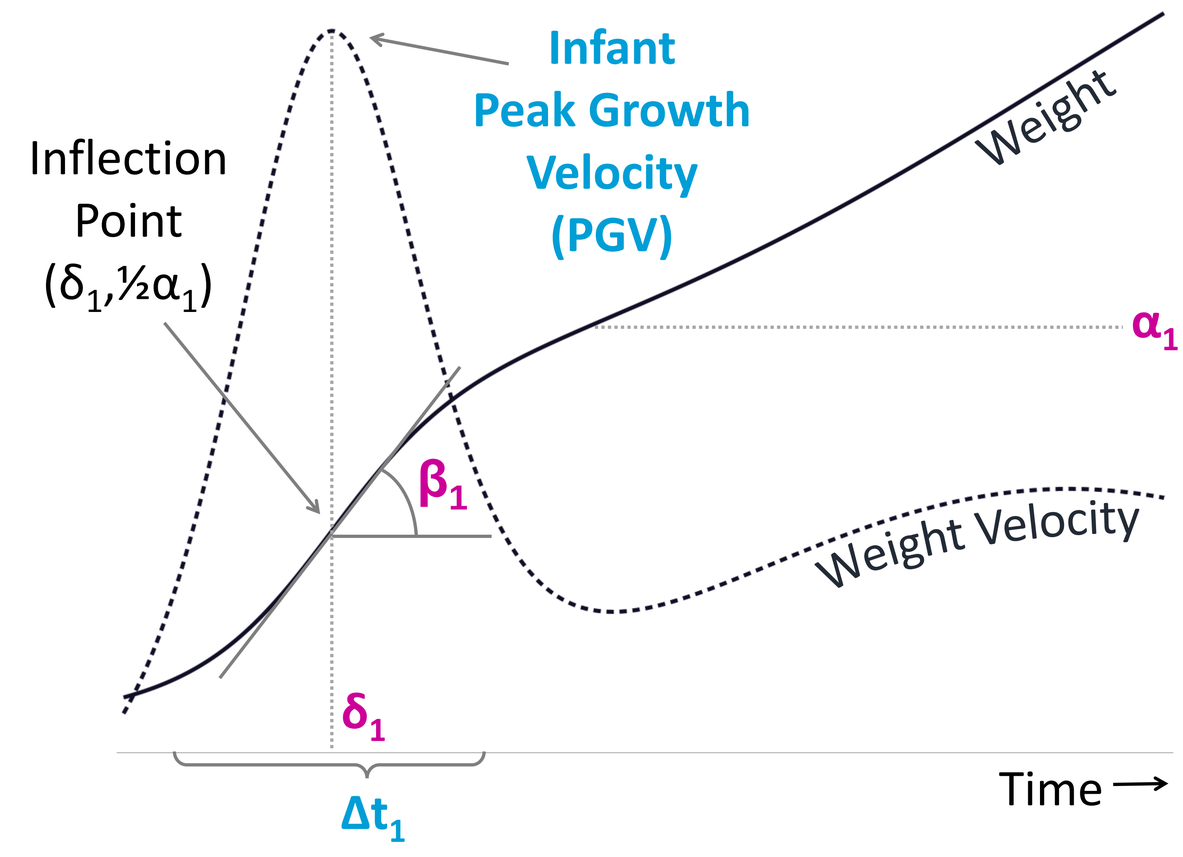
- Most prenatal exposure and growth studies use cumulative outcome measures (e.g. weight, BMI)
- PFOA related to lower birthweight, but higher weight later on

Methods

- Modeled weight trajectory from birth to 5.5 years among 1334 children in the SELMA Study

$$\mu(t) = \frac{\alpha_1}{1 + e^{-\beta_1(t-\delta_1)}} + \frac{W - \alpha_1}{1 + e^{-\beta_2(t-\delta_2)}}$$

Double Logistic Model



- Assessed prenatal PFOA exposure in relation to growth
  - Infant **PGV**
  - Age at infant PGV (δ_1)
  - Infant growth spurt length (Δt_1)
  - Post-spurt weight plateau (α_1)

More Info

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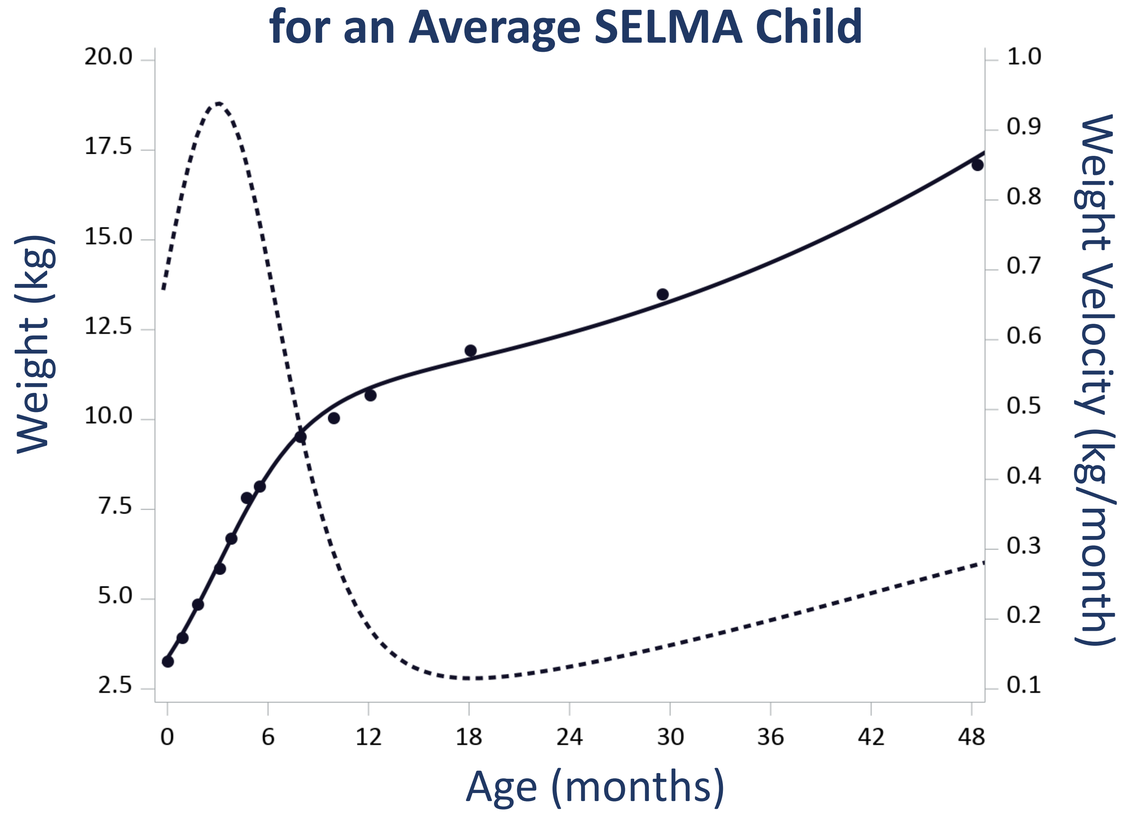
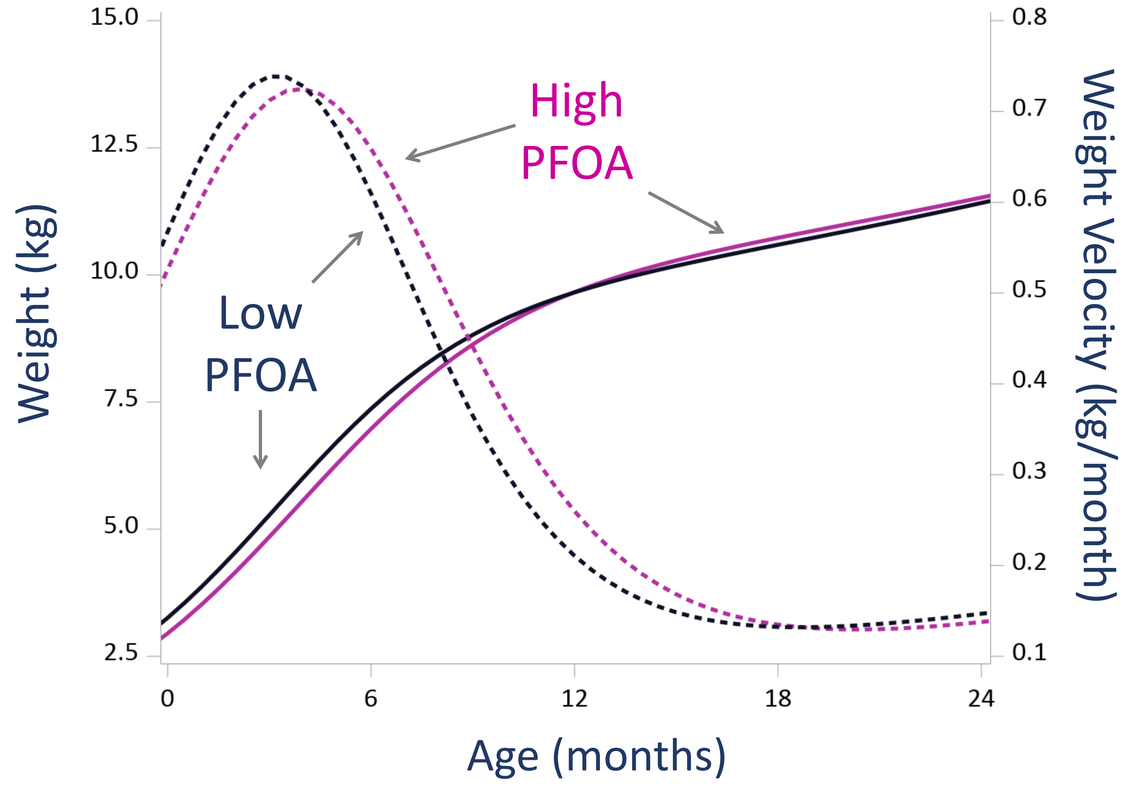
Results

Observed vs. Predicted Weight & Weight Velocity for an Average SELMA Child



Average Predicted Weight & Weight Velocity Trajectories for 10th% vs. 90th% PFOA Levels



Discussion

- PFOA-induced low birthweight followed by delayed PGV (δ_1), longer infant growth spurt (Δt_1), higher post-spurt weight (α_1)
- Nonlinear model useful to identify shifting growth patterns
- Future studies can extract additional dynamic growth metrics