Determining Early Life Factors for Type 2 Diabetes in Childhood: The Next Generation Study

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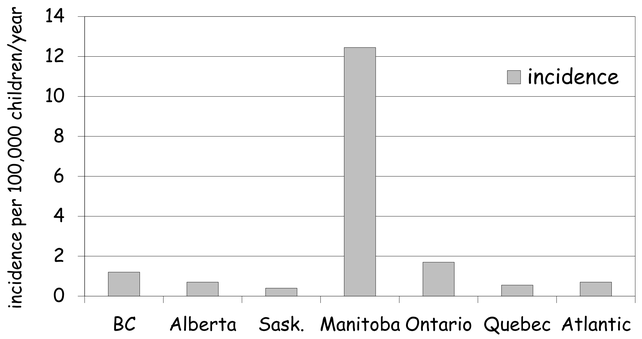
Incidence of T2D

Children born to parents with type 2 diabetes (T2D) are at increased risk of developing T2D. The incidence rate is increasing annually and disproportionately affects the Manitoba Indigenous population. Rates of T2D in Manitoban children are 15-20 times higher than in any other Canadian province. Some of the genetic (HNF1a G319S private polymorphism) and environmental (prenatal and postnatal) risks are known; however, the independent role of other potential risk factors remains to be determined.

The goal of this longitudinal birth cohort study is to determine the natural history and independent risk factors of T2D in childhood.



Amed S et al., *Diabetes Care* (2010)

Methods

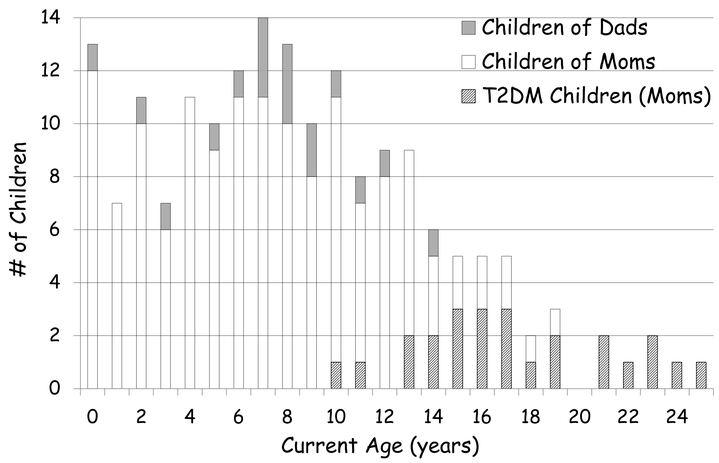
Population

- Children born to a parent with pre-gestational T2D and grew up in Manitoba
- There are currently 78 parents (69 females, 9 males) and 180 children (95 females, 85 males) in the study (median age = 8.28)

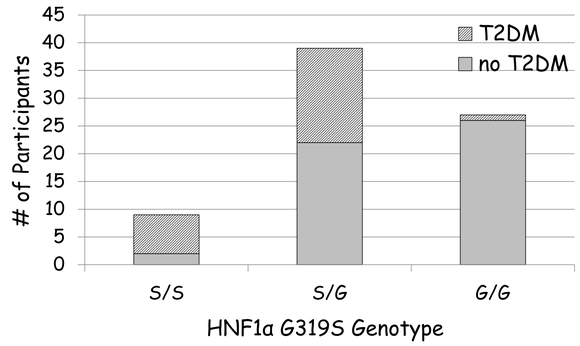
Design

- Assessment measurements include:
  1. Height, weight, blood pressure, waist circumference,
  2. Metabolic (glycemic control, inflammatory markers),
  3. Genetic (HNF1α G3192S), and
  4. Environmental questions (smoking, SES, health hx).

Results



- 17/180 (9%) offspring born to fathers and 163/180 (91%) offspring born to mothers
- 25/180 offspring (17 females, 8 males; 14%) have been diagnosed with T2D – all born to mothers with pre-gestational T2D
- These offspring have been diagnosed with T2D earlier (median = 12.39 years) than the pediatric clinic population (median = 13 years)
- Of the offspring >10 years old, 40% have been diagnosed with T2D



- Of the offspring diagnosed with T2D, 96% have at least 1 allele of the HNF1α G3192S

Conclusions

This study demonstrates that there are/is:

- High rates of T2D in offspring of mothers with pre-gestational T2D,
- An earlier age of diagnosis in offspring followed in this study when compared to the clinic population,
- High frequency of the HNF1α G3192S allele, and
- Something affecting offspring born to mothers with pre-gestational T2D.

Limitations:

- Small number of fathers and their offspring
- Offspring of fathers are younger than those of mothers

Current and Future Ventures

Cord Blood

This study is now investigating the effects that in utero exposure to insulin fluctuations have on the infant.

By obtaining cord blood samples, we can explore the epigenetic markers that may increase the risk of developing T2D before post-natal environmental factors play a role.

Also, this method will allow us to look at the beta cell development and functionality right at birth to determine their impact on the development of T2D.

Intervention

Breastfeeding: Early evidence suggests that breastfeeding an infant for 12 months delays the onset of T2D.

Acknowledgements

Thank you to all our participants, Northern medical staff, collaborators, and supporters!