

APrON Alberta Pregnancy Outcomes and Nutrition

www.ApronStudy.ca



Topics to cover

- What is APrON and why are we doing it?
- What are APrON's specific objectives?
- What has APrON found so far?
- Implications and next steps

WHAT IS APrON?



APrON is a longitudinal pregnancy cohort study

It evolved from 2 health concerns:

- Increasing burden of **mental disorders**
- Increasing burden of **neurodevelopmental disorders**





Increasing burden: Mental disorders

- In 2000, depression was the leading cause of disability worldwide, and the 4th leading contributor to the global burden of disease
- According to Statistics Canada's 1998/99 survey cycle, about 2.5 million adults suffered from a depressive disorder **>10% of the Canadian population**
- The prevalence of clinically meaningful levels of depression in pregnancy and the post-natal period is **6 -13%**
- The Public Health Agency of Canada reports that anxiety disorders affect **12% of the population**, causing mild to severe impairment.
- Anxiety and Depression during pregnancy have been associated with obstetrical complications, pre-term birth and poor infant outcome

Increasing burden: Neurodevelopmental disorders

- ADHD and learning disabilities: each occur in $\geq 5\%$ of the population in Canada. This means $\sim 800,000$ children < 19 have a learning disability and/or ADHD.
- Autism Spectrum Disorders: at least 0.6% of the population (48,000 Canadian children)
- American Pediatric Society now estimates that **20% school-aged children have a diagnosable developmental/mental disorder**

Nutrition is a very important variable to examine....

"...it is our continuous exposure to foods throughout our lifetime that renders diet the most important environmental factor challenging our biological system"



Mutch et al., 2005

Role of nutrition



- Nutrient deficiencies & insufficiencies have been associated with mood disorders, as well as with poorer child development (cognitive and physical development)
- The strongest evidence exists for
 - Vitamins: B-vitamins, and vitamins C, D
 - Minerals: calcium, chromium, iron, magnesium, zinc, selenium
 - Others: choline, omega 3 fatty acids

Relevance during gestation

- Pregnant women (in North America!) have been found to have low status and/or low intakes of certain nutrients, *especially*
 - iron, zinc, calcium, magnesium, folate, omega 3 fatty acids, vitamins D & E
- **Not just a question of poverty!!!**
 - Deficiencies/inadequacies have been reported in middle- to upper-level-income as well as lower income women

Need to Know More...

- Past research has just targeted single nutrients
 - i.e., Studies on folate, Vit D & omega-3 interventions

APrON Participants

- We have over 2000 AMAZING mothers, 2000 infants, and 1200 fathers enrolled in APrON
- Most of our 2000 mothers and infants have completed their 3 month post-partum maternal-infant visit





**WHAT ARE APrON's
OBJECTIVES?**

Overall goal

- To determine the relationship between maternal **nutrient** intake and status during pregnancy:
 - and the *mother's mental health*
 - and *birth outcomes*
 - and the *child's development*

Objective 1

Assessment of Nutrient Intake and Nutrient Status of Pregnant & Postpartum Women

- Determine maternal nutrient intake & status, physical activity, weight change, and the modifying psychosocial variables during each of the trimesters of pregnancy, at delivery and during the post-natal period.



Objective 2

Assessment of Maternal Mental Health

- Determine the relation between maternal nutrient status during gestation and maternal depression and anxiety during pregnancy and postpartum.
- Determine the relation between maternal nutrient status during gestation and maternal thyroid function and its contribution to gestation and perinatal depression/anxiety & neurodevelopmental outcome.



Objective 3

Assessment of Birth & Neonatal Outcomes, including Congenital Anomalies

- Examine the relationship between nutrient variables and standard perinatal variables, such as **prematurity, birth weight, cerebral palsy, neural tube defects, congenital anomalies.**



Objective 4

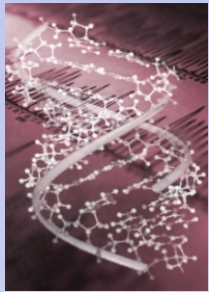
Assessment of Developmental Outcomes

- Investigate the relationship between maternal nutrient variables and *child developmental outcomes*
- Investigate the relationship between *maternal mental health* and child development

Objective 5

Establishment of a DNA Biobank for future genomics studies

- Over 5000 DNA samples have been biobanked.
- These samples will be used in future studies to investigate genomic relationships in children and families (e.g., metabolomics, epigenetics, nutrigenomics)





WHAT HAS APRON FOUND SO FAR?

Demographics -- first 600 APrON women

Maternal Characteristics (n=600)	n (%)
Maternal Age (600)	31.6±4.4
Parity (574)	Nulliparous 335 (58.4%) Primiparous 182 (31.7%) Multiparous 57 (9.9%)
Marital Status (562)	Married 480 (85.4%) Other 82 (14.6 %)
Maternal Education (559)	≤ High school diploma 55 (9.8%) Trade 116 (20.8%) University Degree/Post Grad 388 (69.4%)
Ethnicity (558)	Caucasian 486 (87.1 %) Other 72 (12.9 %)
Family Income (552)	20-69K 107 (19.4%) 70-99K 140 (25.4%) ≥100K 305 (55.2%)

Demographics -- first 600 APrON children

Child Characteristics (n=600)	n (%)
Gestational Age (wk)	39.0 ±2.0
Birth-weight (kg)	3.44 ±0.6
Gender	Female 44.8% Male 55.2%

Use of Natural Health Products

- More than 92% of women report using a multi-vitamin/mineral supplement during pregnancy
- 50% take an additional single nutrient supplement
- 25% of women take an amino acid or fatty acid supplement
- 3% of women take a probiotic supplements.
- 1% of women use homeopathic remedies

Food Intake

- Avoiding foods associated with food-borne illness
 - 27% altered intake of raw fish/sushi
 - 34% decreased/eliminated undercooked meat (e.g., Deli-meat)
- Caffeine
 - 74% of participants met intake recommendations during pregnancy
 - 66% purposefully made a change
- Alcohol
 - 52% reported eliminating alcohol from their diet



Some Dietary Changes Contradict Recommendations

Dietary Change	%(n)	Top Reason
Decrease items from Canada's Food Guide		
Vegetables and Fruit	12.1(46)	Nausea
Meat and Alternatives	24.0(91)	Aversion
Milk and Alternatives	7.4(28)	Aversion
Grain Products	3.7(14)	Aversion
Decrease cooked fish	5.5(21)	Aversion
Decrease water	0.8(3)	Physical complaint
Increase caffeine	0.5(2)	Enjoyment, Other (to stay awake)
Decrease alcohol (not eliminated)	1.1(4)	Concern

Maternal Mental Health

- Depressive mood (EPDS) increased as pregnancy progressed, with the highest scores at 12 wks postpartum
- Anxiety levels (SCL90) increased from first to third trimester, but scores were lower in the 12 weeks postpartum period compared to the third trimester
- Depression and anxiety scores were strongly correlated at all time points throughout pregnancy and at 12 weeks postpartum

**WHAT ARE APrON's NEXT
STEPS?**

Remaining Work

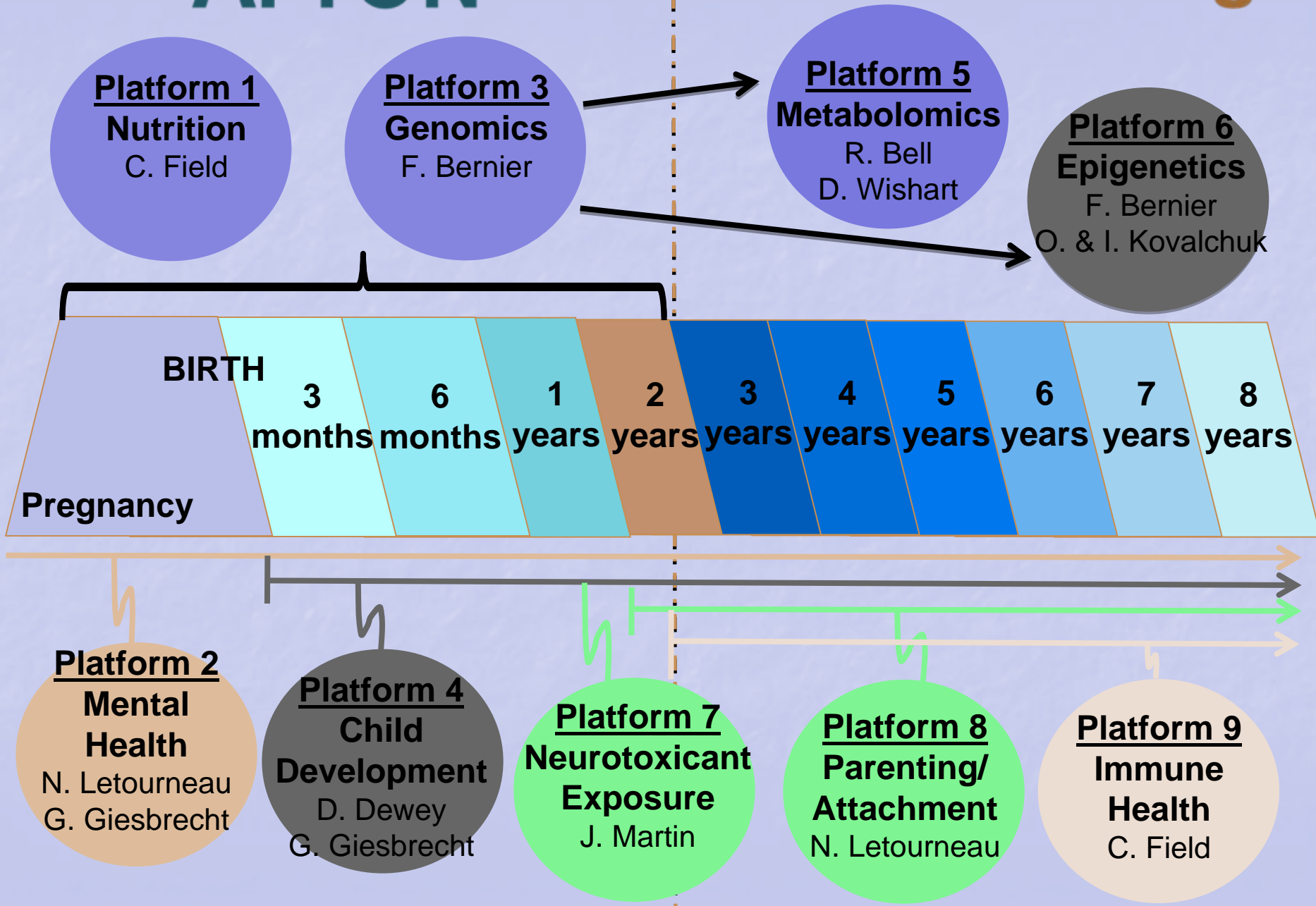
- Enrolment in the first 'wave' ended in June 2012
- Complete the data collection on the cohort to 3 years of age
- The first APrON babies will have their 3rd birthday in October 2012
- Continue to conduct analyses to address the original objectives
- Disseminate the findings

Funded Research

- ***Alberta pregnancy outcomes and nutrition (APrON): Toxicant-diet interactions on neurodevelopment in children***, National Institute of Environmental Health Sciences, \$323,926 (PI: Jonathan Martin)
- ***Is internet data collection superior to traditional methods in retaining participants in longitudinal research?*** M.S.I. Foundation, \$96,000 (PI: Gerry Giesbrecht)
- ***Neurodevelopment of preschoolers exposed perinatally to bisphenol A and phthalates: Interactions with diet and neurotoxicant co-exposures***, Canadian Institutes of Health Research, \$1,271,880 (PI: Jonathan Martin)
- ***Fetal Programming of Infant Stress Reactivity***, Canadian Institutes of Health Research, \$411,738, Alberta Centre for Child, Family and Community Research, \$98,344 (PI: Gerry Giesbrecht)

APrON

APrON Strings



**WHAT ARE THE *EXPECTED*
IMPLICATIONS OF APrON?**

Implications for Policy and Practice

Guidance for maternal-infant policy and programs:

- Prenatal education, support and care for expectant couples
- Postpartum support to promote mother-child interaction
- Community partnerships to test programs
- Prenatal psychological distress is modifiable, and represents a feasible strategy for reducing risk factors for child development
- Inform nutrition guidelines for pregnancy and early childhood



Team Members

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Questions?

