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2013 FACE POSTER COMPETITION ABSTRACTS

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2013 FACE RESEARCH ROUNDTABLE POSTER COMPETITION ABSTRACTS

1.
From training to implementation: Ontario youth probation officers' use of the Asante Centre FASD Screening and Referral Tool

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Background/Objectives: Youth with FASD are 19 times more likely to be involved in the justice system than their non-affected peers (Popova S et al 2011). High rates of confirmed or suspected FASD are also found in the adult inmate population. Those inmates have an average of 15 youth convictions (McPherson P., Chudley A., 2006). Identifying youth with FASD early in the justice interface would provide opportunities to develop and deliver more effective interventions potentially reducing recidivism and the cycle of conflicts with the law and other negative outcomes often associated with this complex neurodevelopmental disorder. This research hypothesizes that providing formal training on FASD and an existing FASD screening and referral tool would improve the use of the screening tool and increase youth probation officer awareness, confidence, knowledge and response when considering case management, plans of care, probation orders and/or when recommending assessments for clients with/suspected FASD.

Methods: The research design was a one-group self-administered pre/post-test questionnaire using a Likert scale 1-5, combined with a qualitative open-ended guided conversational interview and a follow-up survey.

Results: There is robust evidence in this study to support the hypothesis that in-service training enhances probation officers' confidence to describe and implement program modifications for youth who have or are suspected of having FASD. Training enhanced knowledge of FASD, FASD profile identification, referral/pathways recognition, and confidence to make a referral for assessment and diagnosis. Participants also expressed a high value of use of the tool in their practice. Participants attributed the combination of training and the use of a screening tool as having the greatest impact on their practice.

Conclusions/Discussion: The findings of this research demonstrate that a five hour in-service provides sufficient knowledge for Probation Officers to be confidently aware of FASD, to learn to use the screening tool, and to recognize the referral and diagnostic pathways. The findings demonstrate that training increases probation officers' confidence to modify case management and plans of care for youth who have or may have FASD but did not have an impact on probation orders.

Abstract

The research was designed to explore the impact and value of in-service training on FASD and the Asante Centre Youth Probation Officer FASD Screening and Referral Tool on youth probation officer practice in Ontario. It was hypothesized that training will improve FASD awareness, and enhance confidence, knowledge and response when developing case management, plans of care, probation orders and/or when recommending assessments.

The research consisted of a pre/post-test self-administered questionnaire, a qualitative guided interview, and a follow-up survey four months after the 1-day /5hour in-service training.

Youth probation officers and managers from one regional office were invited to participate in the training. Of 23 participants, 19 consented to participate in the research including 17 youth probation officers and two managers; 13 completed all research components (n=13).

Comparison data and statistical analysis provides evidence that training enhances probation officers' confidence to describe and implement program modifications for youth who have or are suspected of having FASD. Training enhances knowledge of FASD, FASD profile identification, recognition of the assessment and diagnostic referral pathway, and confidence to make referrals. Staff efficacy in case management and plans of care improves but not probation orders.

All participants indicated value in screening for FASD to improve client outcomes but identified internal and systemic barriers to implementation. They

identified opportunities throughout the justice process to use or integrate a FASD screening and referral tool.

Ten participants identified the combination of FASD training along with a screening tool as having the greatest impact on their practice.

Keywords: *Fetal Alcohol Spectrum Disorder, FASD, screening tool, referral, training, youth probation, qualitative and quantitative research*

Source of Funding: Law Foundation of Ontario though the Community Leadership in Justice Fellowship
Conflict of Interest: The author declares no conflict of interest.
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2.
Fatty acid ethyl esters in meconium of fetal sheep exposed to ethanol in late gestation

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Introduction: Meconium fatty acid ethyl esters (FAEE) are established biomarkers of heavy fetal ethanol exposure. However, their utility in identifying fetal organ injury resulting from relatively moderate doses of in-utero ethanol exposure has not yet been investigated.
Objective: To measure FAEE in meconium of fetal sheep following daily ethanol exposure in late gestation, and assess their relationship with fetal organ injury.
Methods: Pregnant ewes received ethanol (0.75 g/kg; n=14) or saline (n=8) over a 1 hour daily IV infusion from 95-133 days gestational age (DGA; term ~147 days), while additional sheep served as untreated controls (n=6). Sheep were euthanized on 134 DGA, and meconium was collected and analyzed for FAEE (ethyl palmitate, stearate, linoleate, and oleate).
Results: The daily ethanol regimen produced similar maximal maternal and fetal plasma ethanol concentrations of 0.11-0.12 g/dL. Ethanol-exposed fetuses had significantly higher meconium total FAEE concentrations compared with controls, and the meconium FAEE concentration demonstrated high sensitivity and specificity for detecting fetal ethanol exposure. In the combined animal population (ethanol-exposed and controls), meconium total FAEE concentration in individual fetuses correlated with numerous pathological changes in fetal organs, including nephron endowment, relative heart weight and cardiomyocyte maturation, lung collagen deposition, and changes in gene expression in fetal lungs, cerebral vessels, and placenta. Furthermore, FAEE-positive and negative groups frequently differed with respect to these endpoints.
Conclusion: In fetal sheep, meconium FAEE concentration could serve as a biomarker of daily, moderate-dose ethanol exposure in late gestation, and could be used to identify fetuses exhibiting subtle ethanol-induced changes in various organs.

Keywords: *Fetal Alcohol Spectrum Disorders, animal models, meconium, fatty acid ethyl esters, gas chromatography-mass spectrometry*

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Conflict of Interest: The authors declare no competing interests exist.
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3.
Prevalence of drug use during pregnancy in Miramichi, NB – Analysis of a routine urine drug screen in the obstetric unit

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Background/Objectives: Since 2006, Miramichi Regional Hospital (MRH) in New Brunswick, conducts routine urine drug screens on all women admitted for labour and delivery to identify women using recreational substances during pregnancy. The aims of this study were to characterize this group by

calculating rates of positivity for all drugs tested over the past 7 years, and to compare positive cases to non-drug using pregnancies and their respective maternal and neonatal outcomes.
Methods: A retrospective chart review is currently ongoing at MRH. Controls are matched by native status. Maternal urine drug screen results, medical history, and outcomes are collected, as well as neonatal outcomes, through chart review.
Results: Thus far, 292 positive cases have been identified, with 25% being native status. The most common drugs detected are marijuana, opioids, and benzodiazepines. Cases were found to be significantly more likely to be smokers (62% vs. 17.5%), have lower education level (45% did not complete high school vs. 19%), and psychiatric disorders (ex. depression, anxiety) (20.5% vs. 9.2%). Cases had increased rates of hemorrhage and placental abruption when compared to controls. Neonates of cases were found to have significantly lower birth weight, increased length of hospital stay, and more symptoms associated with withdrawal (ex. increased muscle tone, high pitched crying) than controls.
Conclusions/Discussion: In this ongoing study, women who use substances during pregnancy have higher rates of adverse outcomes, both maternal and neonatal, than women who did not. These rates have major public health implications.

Keywords: *Retrospective chart review, pregnancy, substance use*

Source of Funding: Research Leadership for Better Pharmacotherapy during Pregnancy and Lactation
Conflict of Interest: The author declares no conflict of interest.
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4.
Theory of mind in adolescents with Fetal Alcohol Spectrum Disorder

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Background: Adolescents with Fetal Alcohol Spectrum Disorder (FASD) demonstrate difficulty with social cognitive skills required for social relationships. Studies of younger children with FASD have linked these impairments to theory of mind (ToM) deficits, but these findings have not yet been extended to adolescents.
Objective: To examine whether ToM is uniquely impaired in adolescents with FASD.
Methods: Fourteen adolescents with FASD (M = 15.26 +/- 1.62 years) and 13 typically developing control participants (M = 15.61 +/- 1.36 years) between the ages of 13 – 17 completed the ToM subtests of the Neuropsychological Assessment-II (NEPSY-II) at the Hospital for Sick Children, Toronto. Using linear regression, the relationship between FASD and ToM was explored, considering the influence of age, gender, and socioeconomic status.
Results: No significant correlations were found between FASD diagnosis, age or socioeconomic status and ToM task performance on any subtest ($p > 0.05$). Gender significantly predicted performance on Verbal ($r = -0.50$, $p < 0.01$) and Total ToM subtests ($r = -0.56$, $p < 0.01$). Gender explained 25% of the variance in ToM Verbal scores ($F(1, 25) = 8.52$, $p < .01$) and 31% of the variance in ToM Total scores ($F(1, 25) = 11.12$, $p < .01$). Females outperformed males on both subtests.
Conclusions: Near ceiling performance on NEPSY-II ToM subtests in both groups suggest that these tasks may not be sensitive enough to detect differences in adolescents' ToM. Findings support previous research demonstrating that gender predicts ToM performance. Future research should investigate the use of dynamic ToM tasks to explore ToM in adolescents with FASD.

Keywords: *Theory of mind, adolescents, linear regression*

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Conflict of Interest: The authors declare no conflict of interest.
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5.
Developing an early screening and diagnosis model for FASD intervention

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Background/Objectives: An objective biomarker, fatty acid ethyl esters (FAEE) in meconium, has been developed to provide confirmation of prenatal alcohol exposure; however no correlation between a positive

FAEE in meconium result and deficits associated with FASD has been made within Canadian children. This study aims to determine the percentage of children with FAEE-positive meconium that will receive a diagnosis of FASD and create a model framework for early follow-up and diagnosis of children at risk.
Methods: The target enrolment is 32 FAEE-positive subjects and 32 FAEE-negative controls matched for concurrent prenatal drug exposures, gender, and number of foster home placements. The test-ordering social worker or physician on file was contacted for permission to contact the family by letter and/or telephone; once permission was granted the current guardian(s) of the child were contacted to request enrollment in the study. Once permission is granted, children are enrolled into the a neurodevelopmental monitoring programs as early as 6 months of age until 5 years at which time they undergo a full FASD assessment in accordance with the Canadian guidelines.
Results: In the first round of recruitment (2009-2011), of N = 61 children where contact was attempted; n = 4 children were enrolled and assessed. In the second round of recruitment (2012-2013), of N = 157 children where contact was attempted, n = 2 children were enrolled and assessed. To date, two of the four children that have completed FASD neuropsychological and physical assessment display probable or possible diagnoses of ARND.

Keywords: *Screening, diagnosis, biomarker, fatty acid ethyl esters, meconium*

Source of Funding: Brewers Association of Canada through the Canadian Foundation on Fetal Alcohol Research
Conflict of Interest: The author declares no conflict of interest.
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6.
Ethnocultural factors influence low prevalence of FASD

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Background: Current evidence suggests that *in-utero* exposure to alcohol has the potential for causing FASD in all racial and cultural groups. However the prevalence of FASD is not uniform in different population groups. Reasons given for these disparities in FASD prevalence have included socio-economic, political, genetic and epigenetic factors.
Objectives: In this study we explore the influences of cultural, faith, and epigenetic factors on the prevalence of FASD in three racially similar populations. We hypothesize that singly or severally ethnocultural, faith and epigenetic factors influence the prevalence of FASD in a given population.
Methods: Three geographically localized populations groups, with high and widespread alcohol consumption rates were identified. Physicians who are familiar with features of FASD and have been in practice in these populations for at least 10 years were sent standard FASD diagnostic questionnaires to identify patients aged 5 to 8 year, who show features of FASD.
Results: The populations size of the three groups studied ranged from 50,000 to 70,000. All three populations are Negroid; two of the Sudanic linguistic group and one of the Bantu linguistic group. All lived in rural areas of three different countries; Benin, Botswana and Uganda, respectively. One group is predominantly catholic, the second group predominantly Moslem and the third group is of mixed faith denominations. The prevalence of FASD in the three population groups ranged from 0.1 to 0.25 per 100. The differences in prevalence rates were not statistically significant.
Conclusion/Discussion: Ethnicity, faith, linguistic group and geographic factors do not influence the prevalence of FASD in the three population groups studied. Shared epigenetic factors and other shared cultural factor could be the explanation for the low prevalence of FASD in the three African populations. In certain African cultures drinking of alcohol by women is severely proscribed. This could be the most important single factor for explaining the low prevalence of FASD in these populations.

Keywords: *Ethnocultural, epigenetics, prevalence, faith*

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Conflict of Interest: The authors declare no conflict of interest.
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7.
Translating epigenetic alterations in a mouse model to humans

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Background: While much FASD research has focused on sociological, behavioural, and neuro-structural changes, prenatal alcohol exposure also results in long-term alterations in gene expression. A small but growing number of independent international research groups have begun to speculate that the mechanisms underlying the persistence of these changes are Epigenetic marks; Stable but potentially reversible alterations in gene expression that occur without changes to the underlying DNA sequence. Some epigenetic processes are linked to the chromatin (i.e., DNA, histone proteins, and other associated proteins), commonly involve chemical modifications (e.g. methylation) and operate at as on or off switches at the level of transcription, while others (e.g. miRNA) may fine-tune gene expression post-transcriptionally.
Results: In our latest research publication (*Laufer et al. Disease Models & Mechanisms 2013)*, we used four ethanol treatment protocols to model developmental ethanol exposure in mice: injections at 3 specific neurodevelopmental time points that model a "binge" exposure, and a voluntary maternal consumption model, which represents a moderate and chronic exposure throughout development. We then assessed small RNA brain gene expression in resulting adult offspring (PD 70) using miRNA expression arrays, gene expression arrays, and qPCR. The analysis revealed that a large number of microRNAs are altered, both up and down, depending on treatment paradigm. Some of these expression profiles are unique to a treatment protocol while others overlap. Strikingly, approximately 20% of the altered noncoding RNAs (ncRNAs) localized to three imprinted clusters. The first two, S*nrpn-Ube3a* (Human 15q11-q13) and *Dlk1-Dio3* (Human 14q32.2), are associated with processes involved in neuronal plasticity and several neurodevelopmental disorders that include schizophrenia, autism, Prader–Willi syndrome, and Angelman Syndrome. Next, we assessed brain DNA methylation using methylated DNA immunoprecipitation followed by hybridization to DNA arrays (MeDIP-Chip), which revealed that even moderate fetal alcohol exposure has a genome-wide effect on DNA methylation, with PTEN/AKT/mTOR/PI3K signaling and imprinted regions of the genome appearing to be particularly sensitive. More recent results from our group have examined the hippocampal formation and confirmed brain region specificity of these results via analysis of gene expression, miRNA and snoRNA regulation, and DNA cytosine methylation. Histone modifications and trans-generational studies are a current avenue of investigation.
Conclusion: Our results suggest that imprinted ncRNAs, which play critical roles in neurodevelopment and brain function, may have a role in the long-term maintenance of altered gene expression and cognitive endophenotypes associated with FASD.
Discussion: Current research from our group is examining how environmental conditions; both enriched and deprived, affect disease development. This presentation will conclude with our current efforts to translate these results to create a diagnostic molecular profile in humans, which may then be used by clinical researchers to establish therapeutic attenuations, given the highly dynamic nature of epigenetic marks.

Keywords: *Epigenetics, translational research, systems biology*

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