STUDY DESIGN: A total of 731 subjects were enrolled while undergoing genetic amniocentesis at 15-23 weeks. Randomized samples were assessed by mass-spectrometry, and identified using a custom metabolite library. Lowess normalization, as well as pooled standards, enabled deconvolution, and correction for batch effects. Comprehensive analysis was made using the R package *metaboanalyst*.
RESULTS: Of the 731 subjects, 87 (11.9%) experienced a PTB with 56 (67%) of those being spontaneous (sPTB). Following Q-TOF mass spectrometry, 7 samples were discarded after QC control. Among the remaining, we quantified peaks for ~700 metabolites after normalization and feature reduction. Seven of these metabolites were found to be altered in sPTB compared to term birth (Figure A) (FDR< 0.1). Of these, two were derivatives of nicotine (Figure A&B). Examination of the distribution of normalized cotinine signal revealed a bimodal distribution of presumed nicotine exposed and unexposed (Figure C). The high cotinine mode consisted of 63 subjects, representing 8.7% of cohort pregnancies. Of these subjects, 18.3% had a sPTB, compared to 7.6% of the low/undetected mode, representing an odds ratio 2.73 (p=0.005). There was no association with indicated PTB.
CONCLUSION: The data demonstrate that in a large, naive prospective study of >700 metabolites in amniotic fluid obtained at second trimester amniocentesis, chemicals related to nicotine exposure are among the most predictive of later spontaneous preterm delivery.

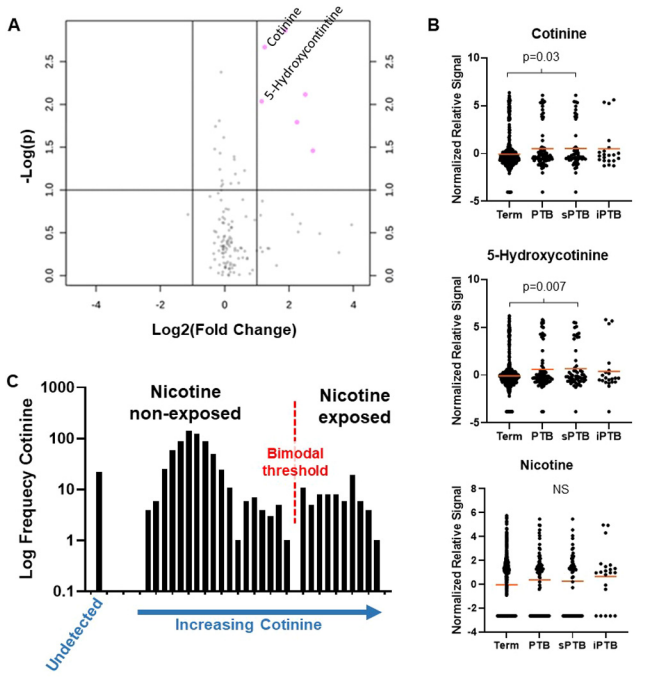
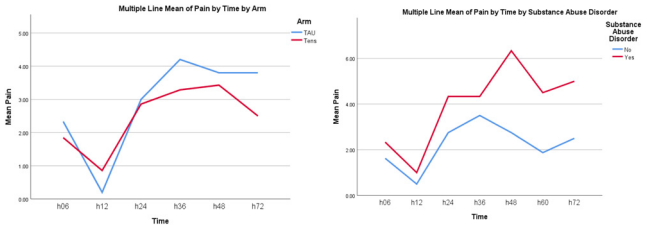


Figure. (A) Volcano plot of significant 2nd trimester AF metabolite changes. **(B)** Nicotine metabolites enriched in sPTB. **(C)** Bimodal distribution reveals pregnancies exposed to nicotine.

281 Transcutaneous electrical nerve stimulation to reduce pain and opioid use after cesarean: A pilot study

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OBJECTIVE: Women are prescribed opioid medications as inpatients and upon discharge following cesarean delivery (CD), contributing to the national opioid epidemic. This study aimed to explore the effect of Transcutaneous Electrical Nerve Stimulation (TENS) therapy in the pain management of women after CD.
STUDY DESIGN: This was a randomized interventional pilot of subjects delivering by elective CD, stratified by history of opiate substance abuse disorder (SAD). The control group received standard care with opioids and NSAIDS upon request as ordered. The intervention group received standard care plus TENS therapy beginning 4-6 hours after CD through discharge. Primary outcomes were pain ratings, number and type of pain medications used, and patient satisfaction with pain control. Fixed effects repeated measures analysis of variance were used to evaluate the differences in pain scores between groups and Mann-Whitney tests were used to examine differences in medication intake.
RESULTS: 5 women without SAD and 2 with SAD underwent intervention, and 4 women without SAD and 1 with SAD were controls. Acceptability of the intervention was high, with one subject with SAD requesting cessation of the intervention and 83% utilizing the device through discharge. There was a statistically significant decrease in pain levels over time (p=0.001) in all groups. The intervention arm had significantly lower pain scores from 24 hours after surgery through discharge by arm by time interaction (p=0.008). Subjects with a history of substance abuse had higher pain scores than those without (p=0.033). TENS subjects requested 6mg less oxycodone than the usual care group. (p=0.879). Sixty-seven percent of TENS subjects felt their pain was improved by the device, and 50% felt their recovery was improved.
CONCLUSION: This pilot study found that TENS therapy can be applied as an effective pain management tool post-CD and is specifically a beneficial alternative/adjunct for women with history of opioid use. Overall, this study supports a larger study of the application of TENS therapy in postpartum pain management.



282 Maternal obesity-associated reduction in offspring mesolimbic dopamine signaling correlates with sex-specific overeating and obesity risk

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OBJECTIVE: We have previously shown that maternal diet-induced obesity (MATOB) is associated with decreased dopamine release in the mesolimbic reward circuit across the lifespan, with persistent deficits in female (F) offspring only. Diminished dopamine in the mesolimbic circuit is associated with addictive/reward-seeking behaviors. We sought to determine whether the sex differences observed in mesolimbic dopamine were associated

with increased reward-based (hedonic) eating and obesity liability in MATOB-exposed offspring, with Fs more vulnerable.

STUDY DESIGN: C57Bl/6J dams were assigned to a 60% high-fat or 10% fat control diet (CD) for 14 weeks pre-breeding and during pregnancy/lactation. Male (M) and F offspring were weaned at 3.5 weeks to CD. 15-30 offspring/sex/diet group were evaluated for all experiments. Hedonic eating was evaluated in adolescent (8wk) MATOB and CD offspring with palatable food and liquid consumption tests (peanut butter and chocolate beverage). Usual food consumption and metabolic rate were quantified in adult offspring using metabolic cages. Weekly weight gain was quantified from weaning to adulthood, and adult body composition was determined with EchoMRI.

RESULTS: F but not M MATOB adult offspring were significantly heavier with significantly increased body fat percentage compared to sex-matched controls (Fig 1A/B). Metabolic rate was not significantly different between MATOB and CD adult offspring (Fig 1C). F offspring had both significantly increased hedonic eating (Fig 2A) and usual food consumption compared to sex-matched controls and MATOB Ms, respectively (Fig 2B). Patterns of hedonic eating differed by offspring sex (Fig 2A).

CONCLUSION: F offspring have increased vulnerability to obesity when exposed to MATOB in utero. Together with our prior finding of persistently reduced mesolimbic dopamine release in F MATOB offspring only, these data suggest that reduced dopamine release may program F offspring to overeat, leading to a sex-biased increase in obesity risk. Future studies will focus on mesolimbic dopamine signaling as a therapeutic target to reduce offspring obesity.

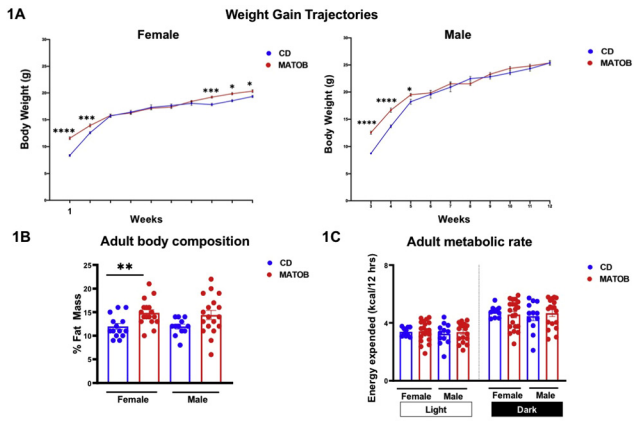


Figure 1: Weight gain, body composition, and metabolic rate of MATOB-exposed male and female offspring
A: MATOB-exposed female offspring were significantly heavier than sex-matched controls in adult life.
B: MATOB-exposed females had significantly increased adult body fat percentage.
C: MATOB-exposed offspring of both sexes had no significant differences in mean metabolic rate as adults.
CD: *control diet;* ***MATOB:*** *maternal diet-induced obesity;* ***Light cycle:*** *7am-7pm, typical quiet or sleeping period for mice;* ***Dark cycle:*** *7 pm-7am, typical active period for mice. *p<.05; **p<.01; ***p<.001; ****p<.0001. All data depicted are mean ± SEM*

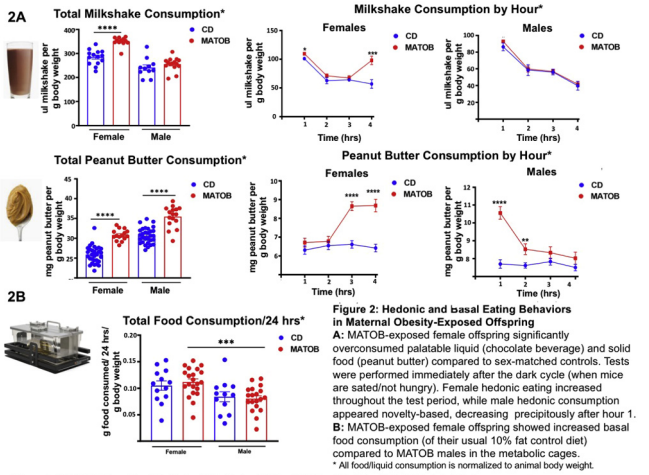


Figure 2: Hedonic and basal Eating Behaviors in Maternal Obesity-Exposed Offspring
A: MATOB-exposed female offspring significantly overconsumed palatable liquid (chocolate beverage) and solid food (peanut butter) compared to sex-matched controls. Tests were performed immediately after the dark cycle (when mice are sated/not hungry). Female hedonic eating increased throughout the test period, while male hedonic consumption appeared novelty-based, decreasing precipitously after hour 1.
B: MATOB-exposed female offspring showed increased basal food consumption (of their usual 10% fat control diet) compared to MATOB males in the metabolic cages.
* All food/liquid consumption is normalized to animal body weight.
CD: *control diet;* ***MATOB:*** *maternal diet-induced obesity; *p<.05; **p<.01; ***p<.001; ****p<.0001. All data depicted are mean ± SEM*

283 Labor induction at term and cesarean delivery rates — Earlier rather than later?

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OBJECTIVE: Mechanisms involved in parturition evolve throughout pregnancy, and therefore might be insufficiently mature for medically indicated induction of labor (IOL) during the different stages of pregnancy. We investigated labor induction failure rates (i.e. leading to cesarean delivery-CD) during the different stages of pregnancy.

STUDY DESIGN: A population-based retrospective cohort analysis was performed, including all labor induction cases occurring at 32 to 44 gestational weeks, between 1991-2017, at a regional tertiary medical center. Congenital malformations, antepartum fetal demise, and multiple pregnancies were excluded. Rates of CD following IOL were assessed at different gestational weeks (GW). Term deliveries ($\geq$37 weeks) following IOL were subdivided into separate GW. All post-term deliveries ($\geq$42 weeks) following IOL were grouped together. A multivariable analysis was performed, assessing the independent association between IOL gestational age (within term) and failure rates, while adjusting for confounders.

RESULTS: T The study population included 26,722 pregnancies involving IOL, 25,392 (95%) of which occurred at term. The trendline of CD rates according to gestational week demonstrated an "inverted J" shape, with a gradual decrease in CD rates as GA increased from 32 to 41 weeks (Figure, $p< 0.001$). A subsequent increase in CD rates was observed from 41 weeks and on. Among term pregnancies involving IOL, 73% were induced mechanically and the rest using prostaglandins, with a total CD rate of 16.8%. In the multivariate analysis, post-term IOL was independently associated with a higher CD rate (18.8%) as compared to IOL performed at 39 weeks' gestation (17.4%, aHR 1.15, p=0.05, 95%CI 1.00-1.32, Table) while controlling for maternal age, IOL indication, previous CD, IOL method (mechanical vs. pharmacological) and birthweight.

CONCLUSION: In this large cohort of IOL cases, CD rates are relatively low, and decrease as GA increases. Post-term deliveries involving