Methamphetamine Use during Pregnancy in the U.S.

The Infant Development, Environment and Lifestyle (IDEAL) study

Amelia M. Arria, Ph.D.

Barry Lester, Ph.D.
Principal Investigator
Lynne LaGasse, Ph.D
Co-PI, Brown University

Clinical Investigators:
Lynne Smith, M.D. (CA)
Rizwan Shah, M.D. (Iowa)
Penny Grant, M.D. (OK)
Chris Derauf, M.D. (Hawaii)
Trecia Woulde, Ph.D. (NZl)

Center for Substance Abuse Research (CESAR)
University of Maryland

For more information,
contact aarria@cesar.umd.edu

CPDD Special Symposium
on Pregnancy
June 18, 2007

Background

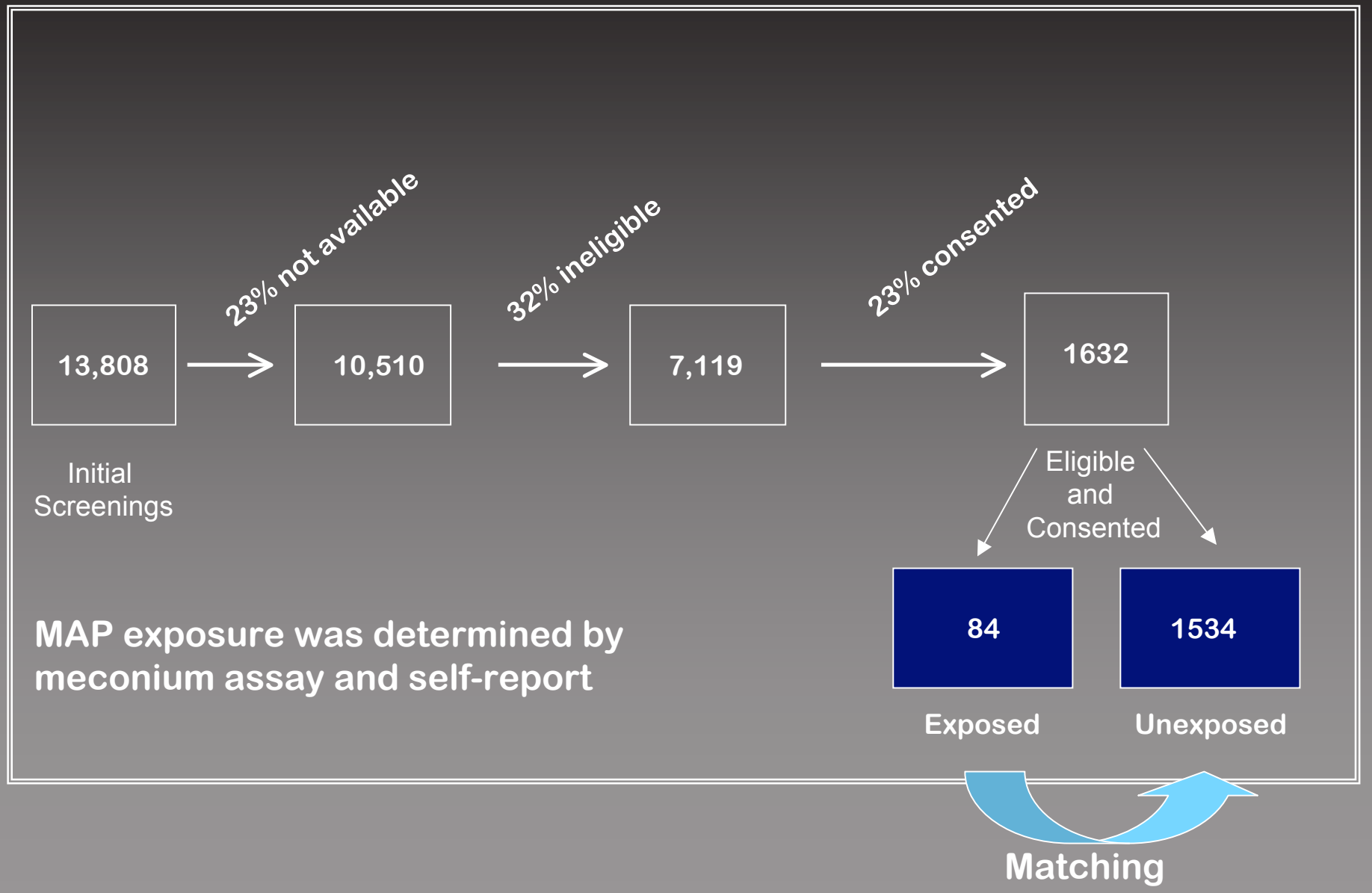
- Methamphetamine: a worldwide problem
- Methamphetamine in the U.S.
- Prior literature on neonatal effects
- Need for systematic study

IDEAL Clinical Sites

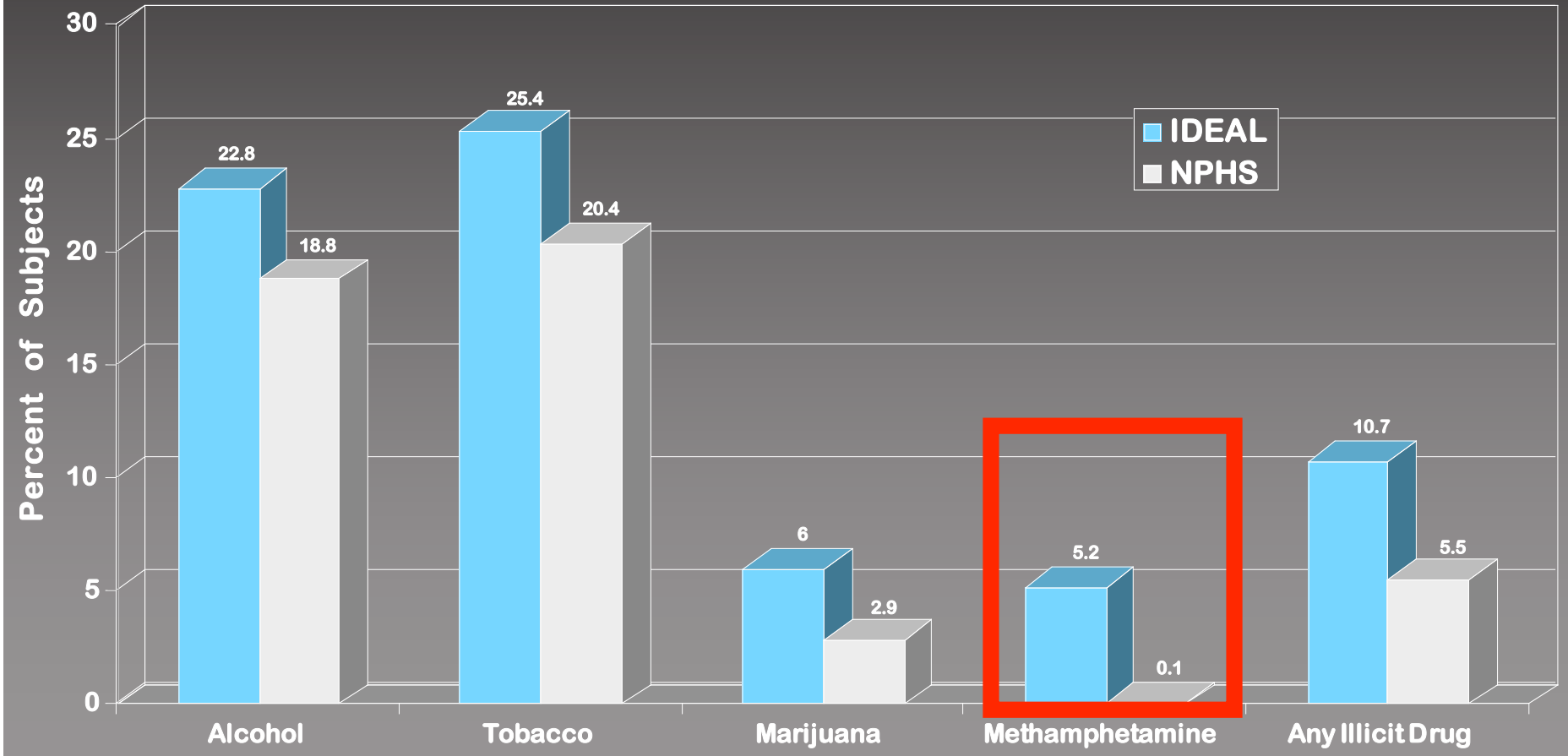


- The cities chosen were Los Angeles, CA; Des Moines, IA; Tulsa, OK; and Honolulu, HI.
- New Zealand was added as a fifth site with NIDA support.
- The primary routes of administration in these areas are snorting and smoking.

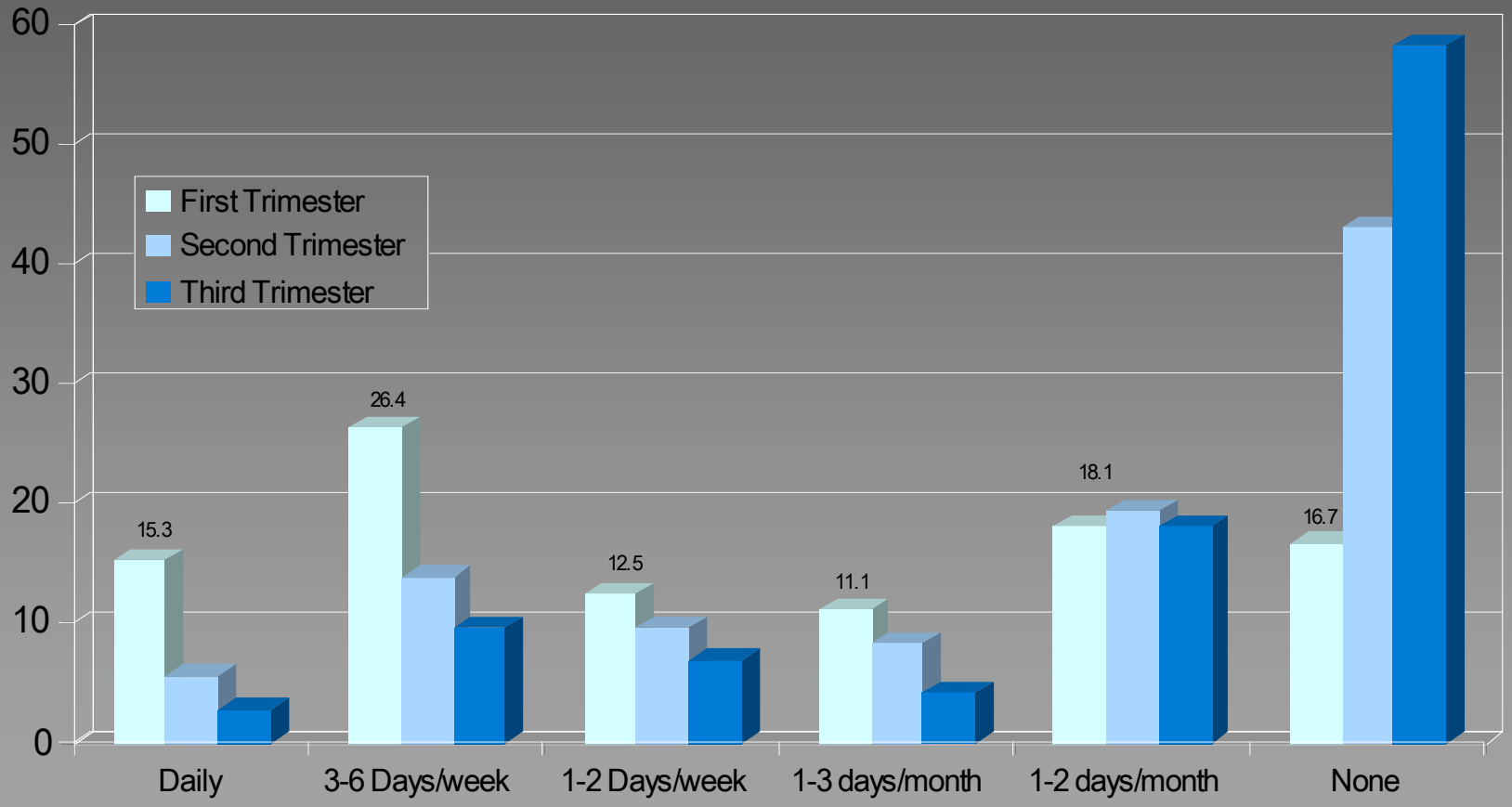
IDEAL Study Design



Prevalence of methamphetamine and other drug use among the IDEAL sample of pregnant women



Methamphetamine Use Frequency by Trimester among Pregnant Women (IDEAL)

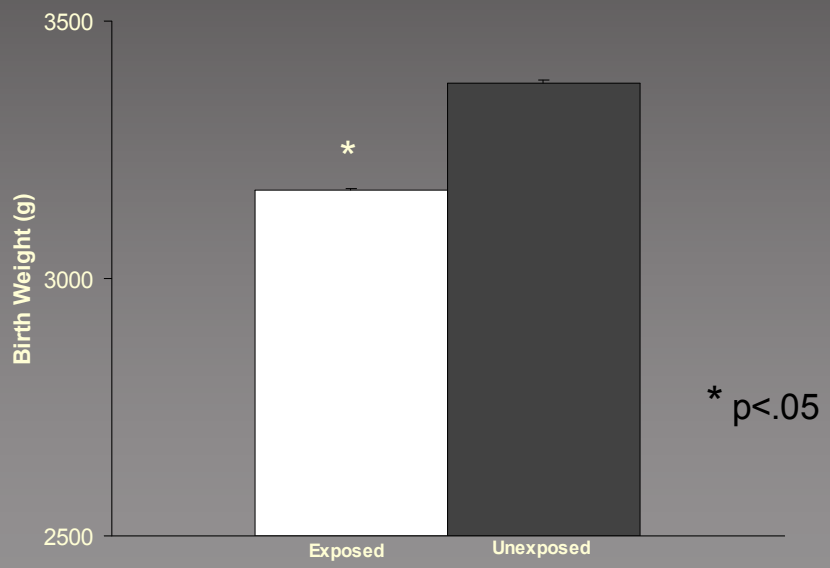


Demographic Characteristics

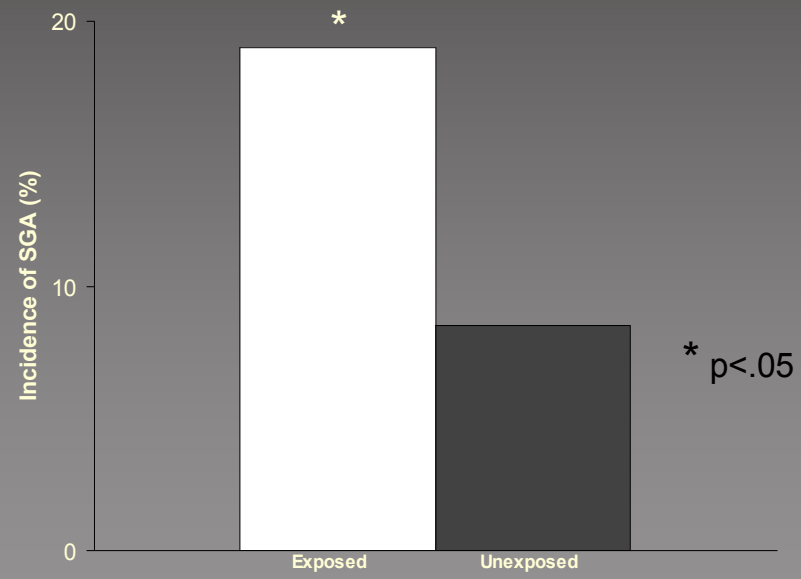
	Exposed (N = 84)	Unexposed (N=1534)
Race		
White	39 (46.4%)	801 (52.6%)
Hispanic	14 (16.7%)	179 (11.7%)
Pacific Islander	10 (11.9%)	119 (7.8%)
Asian	13 (15.5%)	156 (10.2%)
Black	5 (6.0%)	223 (14.6%)
American Indian	2 (2.4%)	35 (2.3%)
Other	1 (1.2%)	11 (0.7%)
Low SES, Hollingshead – V	30 (35.7%)	109 (7.1%)
SES Hollingshead Social Position Index	25.64 (10.02)	37.99 (12.95)
Household Income < $10,000	25 (33.8%)	170 (11.6%)
Public Insurance	70 (90.9%)	740 (49%)
No Partner	48 (57.1%)	442 (28.8%)
Education <12 years	41 (48.8%)	244 (16.0%)
Age, yr	25.37 (5.38)	26.89 (5.93)
Gestational Age at 1st Prenatal Visit, wk	14.81 (8.02)	9.29 (5.28)
Prenatal Visits < 5	14 (18.7%)	27 (1.8%)

Effects of Methamphetamine on Infant Growth

Birth Weight



Small for Gestational Age



The EXP group was 3.5 times more likely to be SGA than unEXP (OR 3.48, CI 1.65-7.33). Mothers who used tobacco during pregnancy were nearly 2 times more likely to have SGA infants than those who did not. Birthweight (mean±SEM) in EXP neonates was lower than the unEXP group (3173±68 vs. 3381±14 g, respectively, P = .039). When adjusted for covariates methamphetamine was found to contribute to the findings of lower birthweight. In addition, gestational age, male gender, fewer than 5 prenatal care visits, annual household income less than $10,000, tobacco exposure, low maternal weight gain, maternal age and being without a partner contributed to the findings of lower birth weight.

Methamphetamine and the NNNS

	CNS Stress		Physiological Stress		Quality of Movement	
	β[a]	R^2	β	R^2	β	R^2
		0.13		0.13		0.22
1st Trimester MAP	0.00		0.01*		0.00	
2nd Trimester MAP	0.00		-0.02		-0.01	
3rd Trimester MAP	0.02*		0.02*		-0.15**	
Birth weight, g	0.00		0.00		0.03**	
Marijuana Use	-0.03		0.02		0.20	
Alcohol Use	0.02		-0.01		-0.20	
Tobacco Use	-0.01		-0.04**		-0.03	
SES	0.00		-0.00		0.01	
>5 days Postpartum	-0.04		0.03		0.19	
First born	0.03*		-0.01		-0.25**	

[a] Standardized Regression Coefficient
*P<0.05
**P<0.01

Exposure to MA was associated with lower arousal and increased physiological stress. First trimester MA use was related to elevated Physiological Stress. Third trimester use was related to poorer Quality of Movement, greater Physiological Stress, and greater CNS Stress. Higher level of amphetamine metabolites in meconium was associated with increased CNS stress.

Future Directions for Clinical Practice, Research and Policy

CLINICAL PRACTICE

Improved and earlier assessment of alcohol, tobacco and other drug use among MAP-using mothers

Assessment and treatment of psychiatric comorbidity

Assessment of child safety in the home

RESEARCH

Continued follow-up to understand the complex relationships between MAP and outcomes

Developing effective treatment strategies for methamphetamine dependence

Understanding the barriers to treatment and risk factors for MAP use during pregnancy

POLICY

Increasing awareness of possible neonatal effects

Removing barriers to drug treatment

Providing sufficient resources for aftercare and follow-up of client and family-related outcomes

References

Amelia Arria, PhD, Chris Derauf, MD; Linda L. LaGasse, PhD; Lynne M. Smith, MD; Penny Grant MD; Rizwan Shah, MD;; Marilyn Huestis, PhD, William Haning, MD; Arthur Strauss, MD; Sheri Della Grotta, MPH; Jing Liu PhD and Barry M. Lester, PhD **Methamphetamine and Other Substance Use During Pregnancy: Preliminary Estimates from the Infant Development, Environment, and Lifestyle (IDEAL) Study**

Chris Derauf, MD; Linda L. LaGasse, PhD; Lynne M. Smith, MD; Penny Grant MD; Rizwan Shah, MD; Amelia Arria, PhD; Marilyn Huestis, PhD, William Haning, MD; Arthur Strauss, MD; Sheri Della Grotta, MPH; Jing Liu PhD and Barry M. Lester, PhD **Demographic and Psychosocial Characteristics of Mothers Using Methamphetamine during Pregnancy: Preliminary Results of the Infant Development, Environment and Lifestyle Study (IDEAL)**

Lynne M. Smith, MD; Linda L. LaGasse, PhD; Chris Derauf, MD; Penny Grant, MD; Rizwan Shah; MD; Amelia Arria, PhD; Marilyn Huestis, PhD, William Haning, MD; Arthur Strauss, MD; Sheri Della Grotta, MPH; Jing Liu PhD and Barry M. Lester, PhD. **The Infant Development, Environment and Lifestyle Study (IDEAL): Effects of Prenatal Methamphetamine Exposure, polydrug exposure, and poverty on intrauterine growth.**

Lynne M. Smith, MD; Linda L. LaGasse, PhD; Chris Derauf, MD; Penny Grant, MD; Rizwan Shah, MD; Amelia Arria, PhD; Marilyn Huestis, PhD, William Haning, MD; Arthur Strauss, MD; Sheri Della Grotta, MPH; Melissa Fallone, PhD; Jing Liub PhD and Barry M. Lester, PhD **Prenatal Methamphetamine Use and Neonatal Neurobehavioral Outcome**

This study was supported by the National Institute on Drug Abuse, Grant# 1RO1DA014918 and in part by the National Center on Research Resources, Grant # P20 RR11091.