

# Obstetrics and Gynecology Laboratory

## Lab Introduction

### 1. Maternal obesity and offspring neurodevelopment

Pregnancies complicated by obesity are associated with various obstetric complications, including gestational diabetes, preeclampsia, and preterm labor. The long-term consequences of maternal obesity in offspring are well documented, including an increased risk of developing cardiovascular disease, metabolic syndrome, diabetes, cancer, and neuropsychiatric disorders. Perinatal exposure to maternal obesity is associated with adverse neurodevelopmental outcomes in offspring, including intellectual disabilities, autism spectrum disorder, and attention deficit hyperactivity disorder. However, the mechanisms are incompletely understood. Our lab has established a mouse model of maternal obesity and childhood neurodevelopmental disorders. We explore the effects of maternal obesity on the placenta, fetal forebrain, and abnormal behavior in adult mice. Furthermore, we use this animal model to examine prenatal drug prevention for maternal obesity-related neurodevelopmental abnormalities.

### 2. The role of the septin family in sperm maturation and neurodevelopment

Infertility is a rising issue in the world, and WHO estimated that over 10% of the couple is infertile. However, the cause of male infertility remains unknown for most infertile men. We focus on the role of the Septin family in sperm maturation. Different septins assemble to form complexes and further polymerize into filaments and rings. They are assembled as intracellular filaments scaffolds and involved in cytokinesis, cellular morphogenesis, neural polarity, vesicle trafficking, and spermatogenesis. Our lab explores the role of the septin family in sperm maturation. In addition, Septin-14 has been reported to be associated with the development of various neuropathologies. Therefore, we explore the effects of Septin-14 gene deletion on adult cognitive/emotional behavior.

## Principal Investigator:

Professor Pao-Lin Kuo, M.D.

### Contact Information:

No. 6, Yida Rd., Yanchao District, Kaohsiung 82445, TAIWAN

TEL: +886-7-615-1100 ext. 5070 (Office)

Email: paolinkuo@gmail.com

### Educations:

M.D. National Taiwan University, Taipei, Taiwan, ROC

**Academic Experiences:**

<b>Service Institution</b>	<b>Position</b>	<b>Date</b>
Department of Obstetrics and Gynecology, E-Da Hospital	Attending Doctor	2023.08 ~
Department of Obstetrics and Gynecology, National Cheng Kung University College of Medicine	Professor	2003.08
Department of Obstetrics and Gynecology, National Cheng Kung University College of Medicine	Associate Professor	1996.08 ~ 2003.07
NIH, USA	fellow	1993.08 ~ 1995.07

**Team Members:****Assistants:**

Han-Yu Wang

Bor-Chun Yeh

Chih-Wei Huang

**Techniques & Equipments**

1. Cell culture equipment
2. Bacterial culture equipment
3. Molecular biology equipment
4. High-fat diet animal model
5. Septin gene knockout mice

**Research Projects**

<b>Project titles</b>	<b>PI</b>	<b>Source</b>	<b>Duration</b>
Prenatal drug prevention for the maternal obesity-related neurodevelopmental abnormalities	Pao-Lin Kuo	MOST	2022/08/01~ 2023/07/31
A study on the role of SEPT14 in spermatogenesis and embryogenesis	Pao-Lin Kuo	MOST	2021/08/01~ 2023/07/31
Inflammasome Activation and Cortisol Metabolism and in Obese Women with Recurrent Miscarriage	Pao-Lin Kuo	MOST	2017/08/01~ 2020/07/31

Sept12 Phosphorylation and Sperm Maturation	Pao-Lin Kuo	MOST	2017/08/01~ 2020/07/31
---	-------------	------	---------------------------

## Selected Publications (2020~present)

1. Wang H-Y, Shen Y-R, Tsai Y-C, Wu S-R, Wang C-Y, **Kuo P-L\***. Proper phosphorylation of septin 12 regulates septin 4 and soluble adenylyl cyclase expression to induce sperm capacitation. *Journal of Cellular Physiology*. 2023;238(3):597-609.
2. Chen K-R, Yu T, Lien Y-J, Chou Y-Y, **Kuo P-L\***. Childhood neurodevelopmental disorders and maternal diabetes: A population-based cohort study. *Developmental Medicine & Child Neurology*. 2023;65(7):933-41.
3. Chang Y-S, Chen L-W, Yu T, Lin S-H, **Kuo P-L\***. Preterm birth and weight-for-gestational age for risks of autism spectrum disorder and intellectual disability: A nationwide population-based cohort study. *Journal of the Formosan Medical Association*. 2023;122(6):493-504.
4. Yu T, Chang K-C, **Kuo P-L\***. Paternal and maternal psychiatric disorders associated with offspring autism spectrum disorders: A case-control study. *Journal of Psychiatric Research*. 2022;151:469-75.
5. Chen K-R, Wang H-Y, Liao Y-H, Sun L-H, Huang Y-H, Yu L, **Kuo P-L\***. Effects of Septin-14 Gene Deletion on Adult Cognitive/Emotional Behavior. *Frontiers in Molecular Neuroscience*. 2022;15.
6. Chang W-H, Chou W-C, Waits A, Liao K-W, **Kuo P-L**, Huang P-C. Cumulative risk assessment of phthalates exposure for recurrent pregnancy loss in reproductive-aged women population using multiple hazard indices approaches. *Environment International*. 2021;154:106657.
7. Liang F-W, Tsai H-F, **Kuo P-L\***, Tsai P-Y. Antenatal corticosteroid therapy in late preterm delivery: a nationwide population-based retrospective study in Taiwan. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2021;128(9):1497-502.
8. Chen K-R, Yu T, Kang L, Lien Y-J, **Kuo P-L\***. Childhood neurodevelopmental disorders and maternal hypertensive disorder of pregnancy. *Developmental Medicine & Child Neurology*. 2021;63(9):1107-13.
9. Huang T-C, Chang K-C, Chang J-Y, Tsai Y-S, Yang Y-J, Chang W-C, Mo C-F, Yu P-H, Chiang C-T, Lin S-P, **Kuo P-L\***. Variants in Maternal Effect Genes and Relaxed Imprinting Control in a Special Placental Mesenchymal Dysplasia Case with Mild Trophoblast Hyperplasia. *Biomedicines*. 2021;9(5):544.
10. Shen Y-R, Wang H-Y, Tsai Y-C, Kuo Y-C, Wu S-R, Wang C-Y, **Kuo P-L\***. The SEPT12 complex is required for the establishment of a functional sperm head-tail junction.

Molecular Human Reproduction. 2020;26(6):402-12.