

Medical Genetics 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 couples are 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 filament 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:

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Educations:

Ph.D. degree,

Basic Medical Sciences, National Cheng Kung University, Tainan, TAIWAN

Academic Experiences:

Service Institution	Position	Date
Department of Medical Research, EDA Hospital	Associate Research Fellow	2023/03-present
Department of Obstetrics and Gynecology, National Cheng Kung University Hospital, National Cheng Kung University	Postdoctoral fellow	2019/05~ 2023/02
Institute of Biomedical Sciences, Academia Sinica	Postdoctoral fellow	2019/02~ 2019/05
Innovation Headquarters, National Cheng Kung University	R&D Dept. Researcher	2018/01~ 2018/12
Institute of Biomedical Sciences, Academia Sinica	Postdoctoral fellow	2017/09~ 2018/01
Microbiology and Immunology, National Cheng Kung University	Postdoctoral fellow	2016/3-2017/07

Team Members:**Collaborating Investigators:**

Pao-Lin Kuo, M.D.

Professor

Department of Obstetrics and Gynecology

Assistants:

Han-Yu Wang Postdoctoral fellow

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

Project titles	PI	Source	Duration
A study on how maternal obesity reprograms developmental trajectory of fetal brain	Pao-Lin Kuo	NSTC	2023/08/01~2026/07/31
Application of high-fat-diet induced obese mice to discover medications that can improve childhood neurodevelopmental outcomes	Kuan-Ru Chen	NSTC	2023/08/01~2024/07/31
Prenatal drug prevention for the maternal obesity-related neurodevelopmental abnormalities	Pao-Lin Kuo	NSTC	2022/08/01~2023/07/31
A study on the role of SEPT14 in spermatogenesis and embryogenesis	Pao-Lin Kuo	NSTC	2021/08/01~2023/07/31

Selected Publications (2018~present) (Annotations: # Co-1st author; *Corresponding author)

1. **Chen KR #**, Yu T, Lien YJ, Chou YY, Kuo PL. Childhood neurodevelopmental disorders and maternal diabetes: A population-based cohort study. *Dev Med Child Neurol*. 2022 Dec 21. doi: 10.1111/dmcn.15488. Epub ahead of print. PMID: 36541040.
2. **Chen KR#**, Wang H-Y, Liao Y-H, Sun L-H, Huang Y-H, Yu L and Kuo P-L. Effects of Septin-14 Gene Deletion on Adult Cognitive/Emotional Behavior. *Front. Mol. Neurosci*. (2022) 15:880858.
3. Chun-Yang Lin, Meng-Cen Shih, Hung-Chun Chang, Kuan-Jung Lin, Lin-Fang Chen, Sheng-Wen Huang, Mei-Lin Yang, Sheng-Kai Ma, Ai-Li Shiau, Jen-Ren Wang, **Kuan-Ru Chen*** & Pin Ling. Influenza A virus NS1 resembles a TRAF3-interacting motif to target the RNA sensing-TRAF3-type I IFN axis and impair antiviral innate immunity. *J Biomed Sci* 28, 66 (2021).
4. **Chen KR#**, Yu T, Kang L, Lien YJ, Kuo PL. Childhood neurodevelopmental disorders and maternal hypertensive disorder of pregnancy. *Dev Med Child Neurol*. 2021 Apr 21. doi: 10.1111/dmcn.14893. Epub ahead of print. PMID: 33884610.
5. **Chen, K. R. #**, Ling, P. Interplays between Enterovirus A71 and the innate immune system. *J Biomed Sci* 26, 95 (2019)

6. Tsai, P. Y., **K. R. Chen**, Y. C. Li, and P. L. Kuo. NLRP7 Is Involved in the Differentiation of the Decidual Macrophages. *Int. J. Mol. Sci.* 2019, 20(23)
7. **Chen, K.-R.** #, Yu, C.-K., Kung, S.-H., Chen, S.-H., Chang, C.-F. , Ho, T.-C. , Lee, Y.-P. , Chang, H.-C. , Huang, L.-Y. , Lo, S.-Y. , Chang, J.-C. , Ling, P. Toll-Like Receptor 3 Is Involved in Detection of Enterovirus A71 Infection and Targeted by Viral 2A Protease. *Viruses* 2018, 10, 689