

2023 ACADEMIA SINICA
EARLY-CAREER INVESTIGATOR
RESEARCH ACHIEVEMENT AWARD



夏國強

中央研究院分子生物研究所副研究員

代表著作：

- Shih, P.Y., Shankar, S., Lee, S.P., Fang, Y.L., Chen, H., Wang, T.F., **Hsia, K.C.***, Hsueh, Y.P.* (2022). Zinc-Induced Phase Transition Modulates Synaptic Distribution of Autism-Linked CTTNBP2. *Nature Communications* 13 (1): 2664.
- Huang, T.L., Wang, H.J., Wang, S.W., **Hsia, K.C.*** (2020) Promiscuous Binding of Microprotein Mozart1 to γ -TuRC Mediates Specific Subcellular Localization to Control Microtubule Array Formation. *Cell Reports* 31 (13), 107836.
- Chang, C.C., Chen, C.J., Grauffel, C., Pien, Y.C., Lim, C., Tsai, S.Y.*, **Hsia, K.C.*** (2019) Ran Pathway-Independent Regulation of Mitotic Golgi Disassembly by Importin- α . *Nature Communications* 10 (1): 4307.

簡評：

結合結構、生化與細胞生物學技術，發現細胞中調控不同微管陣列形成之機制，對轉譯醫學提供新的觀點。

簡歷：

夏國強博士在輔仁大學生物系取得學士學位，接著在陽明交通大學生化暨分子生物研究所獲得碩士學位。之後夏博士赴美國洛克菲勒大學攻讀博士學位，並且於 Günter Blobel 教授主持的細胞生物實驗室，研究生物巨分子進出細胞核之分子機轉。取得博士學位之後，夏博士為開拓研究方向，加入了同樣位於洛克菲勒大學中由 Tarun Kapoor 教授主持之細胞生物暨化學實驗室，並研究細胞骨架中微管在有絲分裂時形成紡錘體的分子機制。夏博士於 2015 年返回臺灣，在中央研究院分子生物研究所擔任助研究員，成立實驗室，並於 2020 年升等為長聘副研究員。主要研究為了解微管如何組織不同陣列，並調控有絲分裂進展、纖毛生成和神經元成熟。此外，也探討細胞核轉運蛋白在微管陣列組成時所扮演的角色。

Dr. Kuo-Chiang Hsia earned his bachelor's degree in biology from Fu-Jen Catholic University. He later pursued a master's degree at the Institute of Biochemistry and Molecular Biology at the National Yang-Ming Chiao-Tung University. Subsequently, Dr. Hsia continued his academic journey in the United States, where he completed his doctoral studies at Rockefeller University. During his time there, he conducted research on the molecular mechanisms involved in nucleocytoplasmic transport under the guidance of Professor Günter Blobel. After obtaining his Ph.D., Dr. Hsia remained at Rockefeller University and joined the Laboratory of Cell Biology and Chemistry, led by Professor Tarun Kapoor. He focused on studying the molecular mechanisms modulating bipolar spindle assembly during mitosis. In 2015, Dr. Hsia returned to Taiwan, and worked as an Assistant Research Fellow at the Institute of Molecular Biology, Academia Sinica. He established his own laboratory and was later promoted to a tenured Associate Research Fellow in 2020. His primary research interest lies

in understanding how microtubules organize into different arrays, contributing to processes like mitotic progression, ciliogenesis, and neuronal maturation. Additionally, Dr. Hsia's research also explores the involvement of nuclear transport receptors in the formation of microtubule arrays.

代表作簡介：

細胞骨架在調控細胞質的空間分配與其組成扮演了重要的角色。我特別感興趣於微管如何形成不同的微米級陣列與如何有助於有絲分裂進展、纖毛生成和神經元成熟。我們實驗室應用跨學科方法回答相關問題並揭示其分子機制，其中包括結構生物學、生物物理學和細胞生物學等方法。這些方法學的結合讓我們能夠對問題提供新的見解與方向。因此，我們已發表的作品除了提供在該領域中意想不到的發現外，並提出新的機制模型，例如 γ -TuRC 蛋白複合物除了促進微管形成之外，還能促進纖毛分解。細胞核運輸蛋白除了能夠從事細胞核運輸外，它也參與了細胞分裂與基因調控的過程。最後，我們的研究結果除了推進我們對於細胞生物學領域的了解，也期待對轉譯醫學有所貢獻。

The cytoskeleton plays a pivotal role in governing the spatial arrangement and composition of the cytoplasm. My particular focus is to understand how microtubules are organized into various micron-scale arrays, which significantly contribute to processes such as mitotic progression, ciliogenesis, and neuronal maturation. In our laboratory, we employ an interdisciplinary approach that combines techniques from structural biology, biophysics, and cell biology to tackle pertinent questions and unveil the underlying molecular mechanisms. Through the application of these methodologies, we aim to offer novel insights and fresh perspectives on these issues. Our published research not only yields unexpected findings in this realm but also proposes innovative mechanistic models. For example, our work highlights the multifaceted role of the γ -TuRC

protein complex, not only in microtubule formation but also in promoting ciliary disassembly. Furthermore, our investigations reveal that nuclear transport proteins have broader implications beyond nuclear transport itself. They play roles in processes related to cell division and gene regulation. Ultimately, our findings not only advance the frontiers of knowledge in the field of cell biology but also hold the promise of making significant contributions to translational medicine.

得獎感言：

得到中研院年輕學者研究成果獎，是對我與研究團隊是極大的肯定與榮譽。我由衷感謝過去與現在研究團隊中的每個學生、助理和博士後研究員。也誠摯感謝所有指導過我的老師們。感謝他（她）們一路對我的指導，訓練與幫助。我也要感謝中研院分生所和國內外在研究上的合作者，讓研究能夠做得更深入也更有創意。最後我想深深感謝我的家人：包含母親，女兒和兒子。更要感謝我的太太，她無論是工作和生活都是我最可以倚靠的神隊友！

Receiving the Academia Sinica Early-Career Investigator Research Achievement Award is a momentous recognition and a great honor for both my research team and me. I extend my heartfelt appreciation to every student, assistant, and postdoctoral researcher who has been part of our research teams, both past and present. Their dedication and contributions have been invaluable. I am also deeply grateful to all the mentors and teachers who have provided guidance, training, and support throughout my academic journey. I also express my gratitude to my colleagues at the Institute of Molecular Biology and our domestic and international collaborators so that our research can delve more deeply and foster creativity. Last but not least, I want to convey my profound appreciation to my family, including my mother, daughter, and son. I am particularly thankful for my wife, who has consistently been my most dependable teammate in both my professional and personal life!