NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

ON-SITE BIOLOGY COLLOQUIUM

Friday, 7 Feb 2025 | 4 pm | S3 05-02 Conference Room 1

Hosted by Assoc Prof Liou Yih-Cherng

Map to Block S3

Microtubule-associated proteins as targets in cancer chemotherapy

By **Kuo-Chiang Hsia**

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Microtubule- and tubulin-binding agents, like taxane and vinca alkaloids, are crucial for cancer treatment, but resistance reduces their effectiveness. Emerging research suggests that dysregulation of microtubule-associated proteins is linked to drug resistance and tumorigenesis, presenting new therapeutic targets. Our study reveals that (1) HURP (hepatoma up-regulated protein), overexpressed in various cancers, competes with vinorelbine by interacting with the vinca domain on β-tubulin. This interaction hampers vinorelbine's ability to inhibit microtubule growth in vitro and in vivo, elucidating a mechanism of drug resistance in HURP-overexpressing cancer cells. (2) HSET, a non-processive microtubule motor, coalesces condensates formed by the centrosome protein CDK5RAP2 in vivo. HSET transports CDK5RAP2 condensates to the minus ends of microtubules, suggesting its involvement in centrosome clustering essential for cancer cell survival. These findings underscore HURP and HSET as therapeutic targets to improve cancer treatment strategies.

About the Speaker

Kuo-Chiang graduated from Fu-Jen Catholic Univ with a bachelor's degree in biology in 1998. He obtained a master's degree in the Institute of Biochem. And Mol. Bio. at the National Yang-Ming Chiao-Tung Univ in 2000. He then received his Ph.D. in the Cell Bio. Lab in 2009 from Rockefeller Univ, mentored by Dr. Günter Blobel. He did his Posdoc at Rockefeller Univ under the guidance of Dr. Tarun Kapoor. Kuo-Chiang received a Leukemia & Lymphoma Society Scholar Award in 2012.

He joined the Inst. of Mol. Bio., Academia Sinica, in 2015 as an assistant research fellow & became an associate research fellow in 2020. Kuo-Chiang became a research fellow and deputy director in 2025.

His research delves into the intricate organization & functionality of micron-sized microtubule arrays, focusing on their roles in mitosis progression, ciliogenesis, and neuronal maturation. Additionally, he explore the molecular mechanisms behind cancer drug resistance, given tubulin's critical role as a target for anti-cancer drugs.

His objective is to gain a deeper understanding of cancer drug resistance and discover new pathways for developing more effective cancer treatments. His lab utilizes an interdisciplinary approach encompassing biochemical, structural biology, biophysical, & cell biology methods to uncover cellular mechanisms.