

RNA G-Quadruplex Structures: Key Regulators in Biology and Promising Targets for Disease

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RNA G-quadruplexes (rG4s) are unique four-stranded structures formed by guanine-rich RNA sequences, playing crucial roles in various biological processes, including transcription, RNA processing, and translation. This talk will explore examples of rG4s found in both coding and non-coding RNAs, highlighting their interactions with specific protein partners and their diverse functional implications in mammalian cells. We will discuss how rG4s serve as key regulatory elements influencing gene expression and RNA stability, as well as our lab's innovative efforts to selectively target these structures using novel L-RNA aptamers. Given their association with diseases such as cancers and neurological disorders, these molecular and chemical tools hold significant potential for therapeutic applications. Specific case studies and some unpublished data will be presented to underscore the importance of understanding RNA G-quadruplexes in both basic biology and medicine.

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Dr. Kit Kwok obtained his B.Sc. in Chemistry (2009) from the Chinese University of Hong Kong, after completing an exchange program at University of California, Los Angeles in 2007-2008. He completed his PhD in Pennsylvania State University (2014), mentored by Professor Philip C. Bevilacqua and Professor Sarah M. Assmann. In Apr 2014, Dr. Kwok worked as a Croucher Postdoctoral Fellow in University of Cambridge under Professor Sir Shankar Balasubramanian. In Oct 2016, Dr. Kwok's joined the City University of Hong Kong (CityU) as an Assistant professor and has been promoted to Associate professor in July 2021. Over the years, Dr. Kwok have received numerous awards, including CityU President Award (2019), Croucher Innovation Award (2019), Hong Kong Institute for Advanced Study Rising Star in Chemistry (2021), CityU Outstanding Research Award (2022), NSFC Excellent Young Scientist Fund (優青) (2022), RNA Society Early-Career Award (2024), and RGC Research Fellowship (2025). In 2022, he has been recognized as an elected member of Hong Kong Young Academy of Science (YASHK).

Dr. Kwok's current research focus is to explore the roles of RNA structures and interactions in biology, especially the functions of G-quadruplex structures/interactions in diverse classes of RNAs, as well as characterizing their formation, dynamics, interactions, and functions in different species and their relevance to gene regulation, RNA metabolism and diseases. Two other ongoing research directions in the Kwok lab are to develop aptamer-based and peptide-based targeting tools for detection, imaging, intervention of these important RNA structures and interactions, as well as to invent innovative nucleic acid-based technologies for sensing chemical pollutants and pathogens.

To cultivate a stimulating learning environment for students and to establish the RNA community in Hong Kong, Dr. Kwok, together with Dr. Minh Le, has founded the Hong Kong RNA Club in Aug 2017 and organized RNA seminar and symposium events regularly (<http://www.kitkwok.com/hk-rna-club.html>). The Hong Kong RNA Club has been recognized and supported by the International RNA Society and various industrial companies. Dr. Kwok is currently one of the RNA Society's Asia RNA research ambassadors.