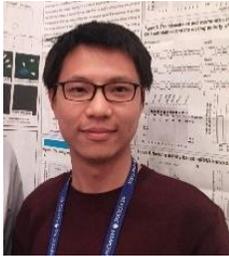




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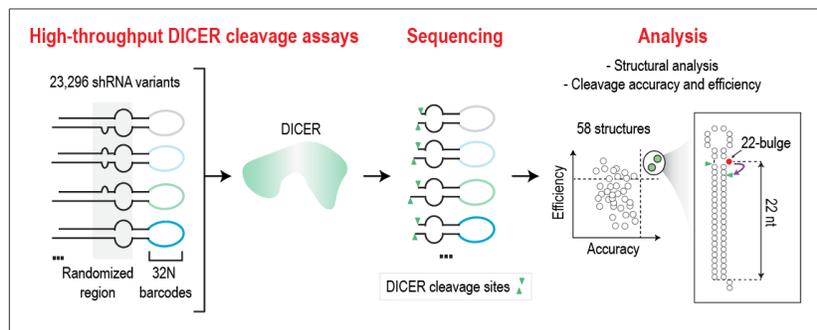


RNA Enthusiast Spotlight (Sep 2022)



Mr. Trung Duc Nguyen is a Ph.D. student in Dr. Tuan Anh Nguyen's laboratory in the Division of Life Science, The Hong Kong University of Science and Technology (HKUST). He is the recipient of the Hong Kong PhD fellowship in 2019. He was awarded the HKUST RedBird Academic Excellence Awards for Continuing PhD Students in 2021 and 2022. He can be reached at tdnguyen@connect.ust.hk.

Duc mainly focuses on studying molecular mechanisms of proteins, especially DROSHA and DICER, involved in the biogenesis of microRNAs (miRNAs). He is interested in performing bioinformatics analysis to identify RNA elements in primary microRNAs (pri-miRNAs) or precursor microRNAs (pre-miRNAs) that govern the cleavage of these two proteins for proper miRNA production.



Recently, Duc and two of his labmates performed the high-throughput DICER cleavage assays for 20,000 different short-hairpin RNA (shRNA) variants carrying varied sequences and structures. By analysing the cleavage patterns of each shRNA structure, the team discovered a single-nucleotide element, called 22-bulge, enhanced both DICER cleavage efficiency and accuracy and consequently increased shRNAs' knock-down efficiency. Therefore, it adds to the current shRNA design an effective approach to obtaining higher knock-down efficiency. Additionally, this RNA element presents in several pre-miRNAs and supports the efficient and accurate cleavage of DICER to properly produce miRNAs in human cells.

Recent representative publications

Trung Duc Nguyen, Tam Anh Trinh, Sheng Bao and Tuan Anh Nguyen (2022) "Secondary structure RNA elements control the cleavage activity of DICER", *Nature Communications* 13(1): 1-16.

Shaohua Li, Thi Nhu-Y Le, **Trung Duc Nguyen**, Tam Anh Trinh, and Tuan Anh Nguyen (2021) "Bulges control pri-miRNA processing in a position and strand-dependent manner". *RNA biology*, 1-11.

Shaohua Li, **Trung Duc Nguyen**, Thuy Linh Nguyen, and Tuan Anh Nguyen (2020) "Mismatched and wobble base pairs govern primary microRNA processing by human Microprocessor". *Nature Communications*, 11(1): 1-17.

Duc's favorite RNA class is miRNAs. miRNA is "micro-size"; however, it has "macro-roles" in multiple cellular functions. An miRNA of only ~22 nucleotides can control the expression of many target messenger RNAs containing few thousand nucleotides. A small change in miRNA sequence can be linked to various human diseases, including cancers.

His favorite quote is "Knowledge will give you power, but character respect" by Bruce Lee. He shared that the spirit of Bruce Lee has been entirely engaged in his mind since his childhood. He added that true respect comes from actions, not knowledge, motivating him to self-improve interpersonal and social skills. Lastly, he enjoys playing sports, especially soccer, with his supervisor and labmates on weekends.



Dr. Tuan Anh Nguyen (Anh) is an assistant professor in the Division of Life Science at the Hong Kong University of Science and Technology (HKUST). In 2018, he was awarded the Croucher Innovation Award.

Dr. Nguyen's group at HKUST studies the molecular mechanism of microRNA (miRNA) biogenesis. His team focus on understanding how different sequencing and secondary RNA elements control the miRNA processing enzymes, including Microprocessor and Dicer, using high-throughput enzymology assays. His group's findings contribute to understanding the primary mechanism of miRNA biogenesis and its relevance to gene regulation and human diseases. In addition, Dr. Nguyen's group is also interested in developing methods for quantifying and sequencing pre-miRNAs/shRNA and designing advanced shRNAs for gene silencing. Please find more information on the website. <https://life-sci.hkust.edu.hk/team/tuan-anh-nguyen/>

Recent representative publications

Nguyen TD*, Trinh TA*, Bao S*, **Nguyen TA.** (2022) Secondary structure RNA elements control the cleavage activity of DICER. *Nature communications*. 13: 2138. *Co-first authors.

Le MN, Le CT, **Nguyen TA.** (2022) Intramolecular ligation method (iLIME) for pre-miRNA quantification and sequencing. *RNA*. 28(7):1028–1038

Nguyen TL, Nguyen TD, **Nguyen TA.** (2021) The conserved single-cleavage mechanism of animal DROSHA enzymes. *Communication Biology*. 4: 1332.

Li S*, Nguyen TD*, Nguyen TL, **Nguyen TA.** (2020) Mismatched and wobble base pairs govern primary microRNA processing by human Microprocessor. *Nature communications* 11: 1926. *Co-first authors.

Nguyen TL, Nguyen TD, Bao S, Li SH, **Nguyen TA.** (2020) The internal loops in the lower stem of primary microRNA transcripts facilitate single cleavage of human Microprocessor. *Nucleic Acids Research* 48: 2579–2593.

Dr. Nguyen is constantly amazed by the ability of enzymes to catalyse immense biological reactions in living systems. He believes that understanding the molecular mechanism of enzymes is one of the most crucial steps to learning about living systems and provides the basics for developing numerous biotechnological and clinical applications.

Dr. Nguyen's favorite quote is “The journey of a thousand miles begins with one step” by Lao Tzu. As a principal investigator and a mentor, he always encourages his passionate students to take many “one step” in doing research and accompanies them on their research journey. He believes RNAs are exciting molecules to study for many years to come and hopes that many talented students/PIs will arrive in Hong Kong and create a strong RNA community here.



Written by Tuan Anh Nguyen, Edited by Kaixin Lyu (HKRNAClub Team)

If you are interested to be featured/give a talk at Hong Kong RNA Club, please contact hkrnaclub@gmail.com

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