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

SEMINAR

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Hosted by Dr Chae Eunyoung

Mechanism of systemic RNAi in plants



By **Bernard Carroll**

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We have been using Arabidopsis to study the mechanism of systemic RNAi in plants. RNAi involves amplification of double-stranded RNA (dsRNA) by RNA-dependent RNA polymerase 6 (RDR6), followed by its processing into abundant 21 nt siRNAs and low abundance 22 nt siRNAs by DCL4 and DCL2, respectively. However, 22 nt siRNAs are more efficient than 21 nt siRNAs in the further recruitment of RDR6 and amplification of dsRNA. We have shown that dcl2 but not dcl4 mutants are defective in systemic RNAi, indicating that DCL2-dependent 22 nt siRNAs are crucial for efficient transmission of RDR6-dependent RNAi throughout the plant. Furthermore, dcl4 roots produce more 22 nt siRNAs than wild type, and show enhanced systemic RNAi. Thus, even though DCL4 outcompetes DCL2 for dsRNA at the cellular level, low abundance DCL2-dependent 22 nt siRNAs are more efficient than abundant DCL4-dependent 21 nt siRNAs at promoting systemic PTGS because they facilitate the efficient recruitment of RDR6 to produce dsRNA from target RNA. The potential of using topical application of dsRNA to induce systemic RNAi in plants will also be discussed.

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Artwork by Ann Nee, DBS, NUS