

Biology Seminar



Western
UNIVERSITY · CANADA

12:30 - 1:30 pm
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BGS 0165



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CNGC-mediated Ca²⁺ signaling at the nexus of immunity and development

Calcium ions (Ca²⁺) are universal second messengers in eukaryotic signaling that control many phenomena, such as neuronal transmission in animals. Similarly, Ca²⁺ plays a central role in plants. However, Ca²⁺ channels, their signal transduction, and biological roles are still enigmatic. Plant Cyclic Nucleotide-Gated Channels (CNGCs) are a large family of Ca²⁺-conducting plant ion channels. Recent reports indicated that CNGCs are involved in a variety of physiological responses from immunity to development.

The Arabidopsis CNGC family has 20 members, and among them CNGC2 has been implicated in plant immunity due to the autoimmune phenotypes and impaired immune responses in various mutants (i.e. *cngc2/dnd1*). However, *cngc2* mutants display pleiotropic phenotypes such as flowering and developmental defects, indicating multi-functionality of CNGC2. Here, we show that CNGC2 is involved in auxin signaling by affecting auxin biosynthesis. *cngc2* mutants exhibit impaired sensitivity to auxin. These auxin signaling defects and the autoimmune phenotype of *cngc2* could be suppressed by knocking-out the auxin biosynthesis genes YUCCA6 (YUC6) and TRYPTOPHAN AMINOTRANSFERASE OF ARABIDOPSIS (TAA1/WEI8). Ca²⁺ signal visualization analysis also revealed that *cngc2* has a defect to generate Ca²⁺ signals upon auxin treatment, indicating a role of CNGC2 beyond immunity, likely controlling overall plant Ca²⁺ homeostasis. On the other hand, recent data indicate that a pair of other CNGCs, CNGC10 and CNGC13 are redundantly involved in immunity against fungal infection and likely herbivory.

Taken together, our current studies indicate plant CNGCs at a nexus of immunity and development signal transduction.

