Talk

Heterologous models for the detection of subcellular targets of rhizobacterial effector proteins: A multidisciplinary approach to problem-solving.

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ABSTRACT

Many soil bacteria have evolved to interact with root plants in a special environment called rhizosphere. This interaction is mediated by different bacterial molecules as surface polysaccharides or proteins that bacteria secrete through distinct mechanisms. Among them, secretion system types III, IV and VI are specialized in inject proteins named effectors directly in the cytoplasm of the eukaryotic host cell, whose role is involved in the interference of different plant cell molecular pathways. The compatibility of plant-bacteria interaction is mainly determined by the plant recognition of molecular signals of a friendly or a phytopathogen bacteria, being the effectors one of the most determinant bacterial signals. Some effectors can be recognized by plant defenses what induces a blocking in the bacterial invasion, while others have evolved to counteract the immune response of the plant promoting therefore the plant invasion.

Rhizobia, as many other plant interacting bacteria, use distinct protein secretion systems to translocate proteins into legumes root cells, what contribute to the invasion of vegetal tissues to establish a mutual beneficial interaction known as nodulation. In this mutualism while the plant provides bacteria with nutrients and a safe non-competitive environment, bacteria promote the fixation of atmospheric nitrogen that is directly transferred to the legume. Rhizobial effectors secreted by type three secretion system has two possible effects in the establishment of the legume symbiosis. They can be recognized by plant receptors that block the nodulation process, but in other cases they are necessary to induce the nodulation. This duality is strictly related to the specificity of plant-bacteria relationship, arguing some clues in the co-evolution of rhizobia and legumes, and explaining the nodulation range of bacteria.

At molecular level, the study of the rhizobial effectors inside root cells is difficult to face, and therefore the use of heterologous models to contribute to its study is desirable. In this work, we use a rhizobial effector (NopL) to illustrate by a multidisciplinary approach where does it localizes in heterologous hosts as tobacco leave cells, and even in transfected and/or Salmonella-infected animal cells. The consistency of these results serves as example to study the location inside eukaryotic cells of effectors in distinct hosts with different handling technics that can be used in almost every research laboratory.

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