The molecular bases of recognition of the M. Oryzae effector protein AVR-Pia by the rice immune receptor RGA5
Diana Ortiz, Karine de Guillen, Véronique Chalvon, André Padilla, Thomas Kroj

To cite this version:
Diana Ortiz, Karine de Guillen, Véronique Chalvon, André Padilla, Thomas Kroj. The molecular bases of recognition of the M. Oryzae effector protein AVR-Pia by the rice immune receptor RGA5. 3. Annual Conference of the COST Action Sustain (FA1208), Feb 2016, Banyuls-sur-Mer, France. 97 p. hal-02739891

HAL Id: hal-02739891
https://hal.inrae.fr/hal-02739891
Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
The molecular bases of recognition of the M. Oryzae effector protein AVR-Pia by the rice immune receptor RGA5

Diana Ortiz¹, Karine de Guillen², Véronique Chalvon¹, Andre Padilla², Thomas Kroj¹

¹ BGPI - INRA - CIRAD - Montpellier SupAgro, UMR 0385 34000 Montpellier, France
² CBS Centre de Biochimie Structurale, INSERM U1054, CNRS UMR5048, University of Montpellier, Montpellier, France

Plant immune receptors of the NLR class are multi domain proteins characterized by an N-terminal TIR or coiled-coil domain, a central nucleotide-binding domain and an N-terminal leucine-rich domain. NLRs act by recognizing pathogen effector proteins in the plant cytosol either by direct binding or in an indirect manner. Despite the cloning of the first plant NLRs more than 20 years ago, the molecular bases of effector recognition remain badly defined. Here we used a structure-aided approach to elucidate the molecular recognition mechanisms of the AVR-Pia effector protein from the blast fungus Magnaporthe oryzae by its cognate NLR receptor RGA5 from rice. AVR-Pia binds directly to an uncommon C-terminal domain of RGA5 that is homologous to the copper chaperone ATX1 (Related to ATX1 domain or RATX1 domain). By using recombinant AVR-Pia and ATX1 proteins, the affinity of binding was determined by in vitro binding experiments and the AVR-Pia binding surface was delimited by NMR titration experiments. Yeast two hybrid and in planta protein-protein interaction studies with AVR-Pia mutant proteins confirmed this interaction surface and identified amino acids of AVR-Pia that are crucial for RATX1 binding. The importance of these amino acids for effector recognition during rice infection was confirmed with transgenic M. oryzae isolates expressing AVR-Pia mutant variants. This study sheds new light on NLR function and opens the way to a molecular understanding of effector recognition in cereals.