Plasmodesmal Components Involved in Cell-to-cell Transport of Potyviruses—Focus on HVA22a candidate
Mingshuo Xue, Luc Sofer, Vincent Simon, Roxane Lion, Jens Tilsner², Sylvie German-Retana

To cite this version:
Mingshuo Xue, Luc Sofer, Vincent Simon, Roxane Lion, Jens Tilsner², et al.. Plasmodesmal Components Involved in Cell-to-cell Transport of Potyviruses—Focus on HVA22a candidate. EMBO Workshop- Intercellular communication and plasmodesmata in plant development and disease, Jul 2021, Virtual, France. hal-03305277

HAL Id: hal-03305277
https://hal.inrae.fr/hal-03305277
Submitted on 28 Jul 2021

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.
Plasmodesmal Components Involved in Cell-to-cell Transport of Potyviruses—Focus on HVA22a candidate

Mingshuo Xue¹, Luc Sofer¹, Vincent Simon¹, Roxane Lion¹, Jens Tilsner²-³ and Sylvie German-Retana¹

¹ UMR 1332, Biologie du Fruit et Pathologie, INRAe, Univ. Bordeaux, Equipe de Virologie, 71 Av. E. Bourlaux, CS 20032, 33882 Villenave d’Ornon CEDEX, France
² Biomedical Sciences Research Complex, Univ. St. Andrews, St. Andrews, United Kingdom
³ Cell and Molecular Sciences, James Hutton Institute, Dundee, United Kingdom

Potyvirus is one of the largest genera of plant viruses responsible for serious diseases in vegetable and fruit crops worldwide (Scholthof et al., 2011). The potyviral species Turnip mosaic virus (TuMV) represents one of the rare examples of plant viruses that utilize the host endomembrane system to produce membranous vesicles mobile between cells. The 6K2 protein of TuMV, a small transmembrane protein, induces the formation of endoplasmic reticulum (ER)-derived viral vesicles, important not only for replication but also for intracellular and intercellular movement (Cotton et al., 2009; Laliberté & Zheng, 2014).

In Arabidopsis thaliana, AtHVA22a (Hordeum vulgare abscisic acid responsive gene 22) belongs to a multigenic family of transmembrane proteins, homologous of reticulons and DP1/Yop1 family proteins (Chen et al., 2002), which are responsible for the constriction of ER tubules (Shibata et al., 2008). Reticulons play a role in positive strand RNA virus replication in animals and plants (Diaz et al., 2010). Moreover, semi-quantitative proteomics analysis of plasmodesmata (PD) fractions purified from A. thaliana suspension cells showed that AtHVA22c and AtHVA22a are highly enriched in PD proteome (Brault et al., 2019).

In our study, we showed that TuMV-6K2 interacts with AtHVA22a by split-ubiquitin yeast two hybrid assay (SuY2H) in yeast and further confirmed this interaction in planta by Bimolecular Fluorescence Complementation (BiFC). Overexpression of AtHVA22a increases TuMV propagation in Nicotiana benthamiana. Furthermore, AtHVA22a is partially re-localized at the level of the viral replication complex (VRC) during TuMV infection and the 6K2-induced vesicles at the PD. The interaction between AtHAV22a and 6K2 observed in BiFC is also localized at the VRC during viral infection.

Altogether, our results indicate that HVA22a is a candidate protein potentially involved in replication and cell to cell movement of TuMV.

References:


Grangeon R, Laliberté J-F (2013) 6K2-induced vesicles can move cell to cell during turnip mosaic virus infection. Frontiers in Microbiology 4

