

CONCERTED ACTION OF MIRNA TARGETS ENABLES DEFENSE REPROGRAMMING UPON PATHOGEN-INDUCED RNA SILENCING

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RNA silencing is an antiviral defense mechanism in plants and animals. In turn, viruses produce silencing suppressors interfering with different steps of that defense mechanism. It has been recently found that production of silencing suppressors is a general infection strategy also employed by pathogens as different as bacteria, oomycetes and fungi. Those distinct pathogens use different vectors and host colonizing strategies interacting with different host cell types throughout infection. The intracellular presence of silencing suppressors does not only disrupt a host's defense mechanism but interferes with other endogenous processes orchestrated by this universal gene regulatory system. Of especial interest is their impact on micro RNA-mediated gene regulation (miRNA, a subclass of small RNAs). Plant miRNAs tend to regulate the expression of genes with pivotal roles in plant development and stress responses. Additionally, the repertoire of miRNAs and their targets is cell-type specific and therefore, host cell reprogramming might differ depending on the host cells targeted by different pathogens for RNA silencing intervention.

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To ascertain the role of miRNA targets in cell-type specific defense upon silencing suppression, we first established the specific cell types targeted by two single stranded RNA (ssRNA) viral and a bacterial pathogen for silencing suppression in *Arabidopsis thaliana* leaves. Later on, we specifically induced the expression of silencing suppressors from those pathogens in those very same cell types and assayed their transcriptional reprogramming by isolating cells under direct reprogramming coupled to RNA-seq. Finally, we focused on determining the contribution of upregulated miRNA targeted transcription factors (TFs) to the overall reprogramming by leveraging ChIP- and RNA-seq approaches.

Our results show that upon pathogen-triggered RNA silencing suppression, the concerted action of miRNA targets enables a new layer of defense to cope with silencing suppressor producing pathogens. Thus, we propose that miRNAs constitute an intracellular surveillance system for the presence of pathogen threats through sensing foreign proteins that interfere with RNA silencing.

Acknowledgments & Funding

The work in the MoRE laboratory is funded by BFU-2014-58361-JIN (funded by MCIN/AEI/ 10.13039/501100011033 and by "ESF Investing in your future"), RYC-2015-19154 (funded by MCIN/AEI/ 10.13039/501100011033 and by "ESF Investing in your future"), RTI2018-097262-B-I00 (funded by MCIN/AEI/ 10.13039/501100011033 and by "ERDF A way of making Europe"); and through the "Severo Ochoa Programme for Centres of Excellence in R&D" 2016-2019 (SEV-2015-0533) and 2020-2023 (CEX2019-000902-S) funded by MCIN/AEI/ 10.13039/501100011033 and the CERCA programme from the Generalitat de Catalunya. L. V-M was supported by BES-2016-076986 (funded by MCIN/AEI/ 10.13039/501100011033 and by "ESF Investing in your future")