

Long Noncoding RNA Modulates Alternative Splicing Regulators in *Arabidopsis*

Bardou F¹, Ariel F¹, Simpson CG², Romero-Barrios N¹, Laporte P¹, Balzergue S³, Brown JW⁴, Crespi M⁵.

1. Institut des Sciences du Végétal, Centre National de la Recherche Scientifique, Saclay Plant Sciences, F-91198 Gif-sur-Yvette Cedex, France.
2. Cell and Molecular Sciences, The James Hutton Institute, Invergowrie, Dundee DD2 5DA, Scotland, UK.
3. Génomique Fonctionnelle d'Arabidopsis, Unité de Recherche en Génomique Végétale (URGV), UMR INRA 1165, Université d'Evry Val d'Essonne, ERL CNRS 8196, 91000 Evry, France.
4. Cell and Molecular Sciences, The James Hutton Institute, Invergowrie, Dundee DD2 5DA, Scotland, UK; Plant Sciences Division, College of Life Sciences, University of Dundee at the James Hutton Institute, Invergowrie, Dundee DD2 5DA, Scotland, UK.
5. Institut des Sciences du Végétal, Centre National de la Recherche Scientifique, Saclay Plant Sciences, F-91198 Gif-sur-Yvette Cedex, France

Abstract:

Alternative splicing (AS) of pre-mRNA represents a major mechanism underlying increased transcriptome and proteome complexity. Here, we show that the nuclear speckle RNA-binding protein (NSR) and the AS competitor long noncoding RNA (or ASCO-lncRNA) constitute an AS regulatory module. AtNSR-GFP translational fusions are expressed in primary and lateral root (LR) meristems. Double Atnsr mutants and ASCO overexpressors exhibit an altered ability to form LRs after auxin treatment. Interestingly, auxin induces a major change in AS patterns of many genes, a response largely dependent on NSRs. RNA immunoprecipitation assays demonstrate that AtNSRs interact not only with their alternatively spliced mRNA targets but also with the ASCO-RNA *in vivo*. The ASCO-RNA displaces an AS target from an NSR-containing complex *in vitro*. Expression of ASCO-RNA in *Arabidopsis* affects the splicing patterns of several NSR-regulated mRNA targets. Hence, lncRNA can hijack nuclear AS regulators to modulate AS patterns during development.

Full text: <http://dx.doi.org/10.1016/j.devcel.2014.06.017>

