Technology Offer

Novel decapping enzyme for cofactor- and “canonically”-capped RNA species

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Besides its four canonical nucleotides, RNA molecules can be capped with diverse canonical (N7-methylguanosine (m7G)) and non-canonical chemical modifications (including NAD, FAD, Coenzyme A and Ap(n)A). In ligation-based methods such as 5′ RACE and RNA-seq, decapping of RNAs is useful for detection and identification of RNA containing non-canonical initiating nucleotides. Nudix hydrolases, such as Dcp2 or NudC, are key decapping enzymes that hydrolyze phosphodiester bonds within these caps. Specifically, NudC cleaves the pyrophosphate group in non-canonical caps such as NAD, producing 5′-monophosphorylated RNA suitable for ligation-based assays or targeted degradation. Moreover, NudC hydrolyzes small molecules containing an ADP moiety such as NADH, NAD+, Appp(p)A, ADP-ribose, ADP-glucose and metabolic co-factors such as FAD, Coenzyme A and Acetyl-CoA.

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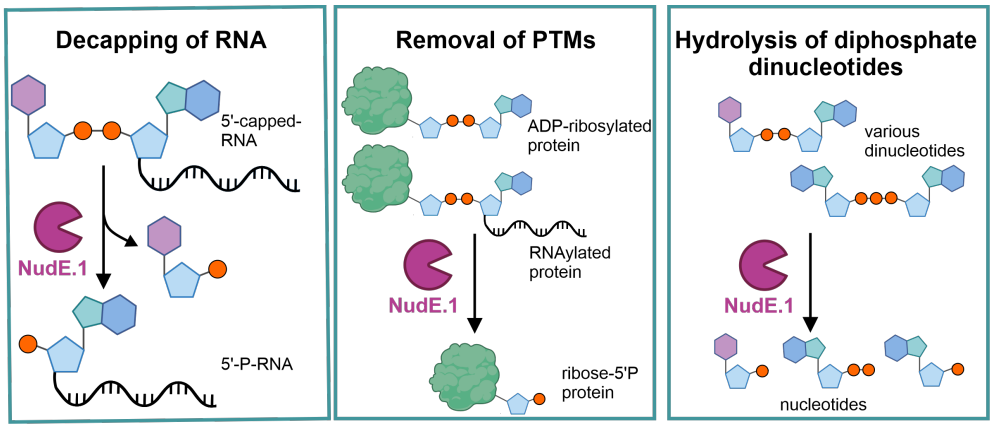
Scientists from the Max-Planck-Institute for Terrestrial Microbiology have identified the bacteriophage T4-encoded Nudix hydrolase NudE.1 — named based on its sequence homology to *E. coli* Nudix hydrolase NudE. NudE.1 was found to be more efficient than NudC in

- Decapping of NAD-capped RNA (9 times more efficient than NudC)
- Hydrolysis of NAD and AMP (2 times more efficient than NudC)
- Decapping of m7G-capped RNA
- Hydrolysis of diphosphate dinucleotides and metabolic co-factors containing an ADP moiety such as Ap(n)A, FAD, Coenzyme A
- Removal of posttranslational protein modifications (PTMs) such as ADP-ribosylation and RNAylation



Patent Information

A priority establishing patent application was filed on February, 12th 2024.

Publication

Wolfram-Schauerte *et al.*, https://www.biorxiv.org/content/10.1101/2024.04.04.588121v1
Pozhydaieva *et al.*, Current Opinion in Microbiology 2024. https://doi.org/10.1016/j.mib.2023.102417

Contact

Dr. Ingrid Kapser-Fischer
Patent- & License Manager
Nutritionist, M.Sc.
Phone: +49 89 / 29 09 19-19
Email:
kapser-fischer@max-planck-innovation.de

Max-Planck-Innovation GmbH
Arnulfstr. 58
80335 München
www.max-planck-innovation.de