



Uncovering viral sabotage of host CRISPR-Cas immune systems

Fact Sheet

Project Information

Anti-CRISPR

Grant agreement ID: 753528

[Project website](#)

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Project closed

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EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions

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€ 177 598,80

Coordinated by

TECHNISCHE UNIVERSITEIT
DELFT



Netherlands

Objective

CRISPR-Cas immune system represents one of the most effective weapons against mobile genetic elements in the host defense arsenal. Bacteriophages (phages) armed with anti-CRISPR proteins can, however, inhibit CRISPR immunity by sabotaging components of the immune system with evolutionary advantages. This proposal sets out to discover novel phage-encoded anti-CRISPR proteins and understand the molecular mechanisms of the inhibitory processes.

I will focus on novel anti-CRISPR proteins for Cas9-containing type II CRISPR-Cas systems in lactic acid bacteria (LAB). I expect anti-CRISPR proteins to be present in phages for LAB, for which the CRISPR system is an important line of defense. It is

highly plausible that LAB-infecting phages have evolved to possess anti-CRISPR proteins. However, none of anti-CRISPR proteins against type II CRISPR have been described so far. To identify novel type II anti-CRISPR proteins encoded by phage genomes and explore novel features of the anti-CRISPR proteins, I will establish high-throughput screening methods using an integrated approach consisting of metagenomics, bioinformatics and mass spectrometry. After identifying candidate anti-CRISPR proteins, I will uncover the underlying molecular mechanisms of these viral anti-CRISPR proteins utilizing state-of-the-art single-molecule fluorescence methodologies.

The fierce virus–host arms race has resulted in high diversity of distinct prokaryotic CRISPR-Cas systems. Therefore, I anticipate that my high-throughput screening will lead to discovery of remarkably diverse anti-CRISPR proteins, specifically anti-CRISPR variants targeting Cas9. The proposed combination of viral diversity screening and single-molecule approaches will reveal novel mechanisms of anti-CRISPR activity that are difficult to obtain by traditional biochemistry, will impact potential applications of Cas9, and will provide unique insights into the host-virus arms race.

Fields of science (EuroSciVoc)

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[natural sciences](#) > [biological sciences](#) > [microbiology](#) > **[bacteriology](#)**

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Programme(s)

[H2020-EU.1.3. - EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions](#)

MAIN PROGRAMME

[H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility](#)

Topic(s)

[MSCA-IF-2016 - Individual Fellowships](#)

Call for proposal

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Funding Scheme

[MSCA-IF-EF-ST - Standard EF](#)

Coordinator



TECHNISCHE UNIVERSITEIT DELFT

Net EU contribution

€ 177 598,80

Total cost

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Activity type

Higher or Secondary Education Establishments

Links

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