Regulation of co-encoded Anti-CRISPR mediated inhibition in Type V-A CRISPR system

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ABSTRACT

CRISPR-Cas system in bacteria employs target-specific DNA cleavage to eliminate genomic DNA and mobile genetic elements introduced by bacteriophage. To counteract this event bacteriophages, encode anti-CRISPR (Acr) proteins that use diverse mechanisms to inhibit CRISPR-Cas mediated DNA cleavage. Here we show that co-encoding Acr in type VA system can regulate the inhibition activity by forming a stable complex that can be dissociated in the event of interaction with Cas12a RNP. The crystal structure of the AcrVA4-AcrVA5 complex at 3.2 Å reveals that AcrVA4 binds to an apo state of AcrVA5. The interaction of the AcrVA4-AcrVA5 complex with LbCas12a RNP results in the release of AcrVA5. This novel regulation mechanism employed here to inhibit the CRISPR-Cas system possibly allows the survival of both bacteriophage and the host bacteria during the event of infection.