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Poster #73: Deoxydinucleotides are potential mediators of bacteria–phage interactions

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Deoxynucleotides are emerging as important mediators of bacterial genotoxic stress response and bacteria–phage interactions. Recent studies suggest that single-stranded DNA, particularly deoxydinucleotides, may function as signaling molecules that activate bacterial defense systems. These discoveries include our identification of a novel family of DEDD nucleases, termed deoxydinucleases (diDNases), which specifically hydrolyze single-stranded DNA dinucleotides and are associated with phage defense islands in Actinobacteria and Clostridia. DiDNases represent a distinct evolutionary branch of dinucleases. Unlike related enzymes involved in RNA degradation, they exhibit strict specificity for DNA dinucleotides, enabled by conserved structural features that exclude RNA substrates. Their inability to complement canonical diribonucleotide-processing enzymes further supports a specialized physiological function. Together, these findings point to a previously unrecognized role for short DNA in bacterial immunity.

Reference #1

Reference #2

Reference #3

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