

CROSSLINKED DIMERIC SUPERFAMILY 1A HELICASE FOR IMPROVING POLYMERASE CHAIN REACTION

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Value Proposition: *Novel covalent dimerization of UvrD helicase that enhances DNA unwinding processivity and isothermal polymerase chain reaction.*

Technology Description

Researchers at Washington University in St. Louis have developed a modified Superfamily 1A helicase (E. coli UvrD) capable of forming covalent dimers that exhibit increased processivity compared to non-covalent dimers or monomers. Superfamily 1A (SF1A) helicases, such as E. coli UvrD, are critical enzymes involved in DNA replication, repair, recombination, and transcription. The UvrD helicase is known for its role in DNA mismatch repair and nucleotide excision repair, essential for maintaining genetic stability.

This novel dimer can significantly enhance DNA unwinding efficiency, offering advancements in isothermal PCR technology as well as applications in single molecule DNA sequencing. Additionally, this modified helicase can substantially improve the performance of genetic analysis tools, potentially leading to more accurate diagnostics and research outcomes.

Stage of Research

Preclinical and clinical testing has been conducted. Structural mechanisms of dimerization have been confirmed through cryo-electron microscopy. Have demonstrated increased processivity in DNA unwinding.

Publications

- Chadda A, Nguyen B, Lohman TM, Galburt EA. [Structural Basis for Dimerization and Activation of UvrD-family Helicases](#). bioRxiv [Preprint]. 2024 Sep 6:2024.09.05.611425. doi: 10.1101/2024.09.05.611425. Update in: Proc Natl Acad Sci U S A. 2025 Mar 11;122(10):e2422330122. doi: 10.1073/pnas.2422330122. PMID: 39282289; PMCID: PMC11398504.
- Binh Nguyen, Kacey N. Mersch, Ankita Chadda, Eric A. Galburt, Timothy M. Lohman. [A Conserved Mechanism for Dimerization and Activation of Superfamily 1A UvrD-family Helicases](#). bioRxiv 2026.05.20.726581; doi: <https://doi.org/10.64898/2026.05.20.726581>

Applications

- Enhancing DNA unwinding processivity

- Single molecule DNA sequencing
- Isothermal PCR technologies

Key Advantages

- Novel method using covalent linkage for dimerization
- Enhanced DNA unwinding processivity
- Potential applications in modern sequencing methods and PCR technologies

Patents

Patent pending

Related Web Links – [Timothy Lohman Profile](#); [Lohman Lab](#)