

# A role for the ATP-dependent DNA ligase Lig E of *Neisseria gonorrhoeae* in biofilm formation

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## Abstract

The ATP-dependent DNA ligase Lig E is present as an accessory DNA ligase in numerous proteobacterial pathogen genomes, including many disease-causing species. Here we have constructed a genomic Lig E knock-out in the obligate human pathogen *Neisseria gonorrhoeae* and characterised its growth and infection characteristics. This demonstrates that *N. gonorrhoeae* Lig E is a non-essential gene and its deletion does not cause defects in replication or survival of DNA-damaging stressors. Knock-out strains were partially defective in biofilm formation on an artificial surface as well as adhesion to epithelial cells which coupled with the predicted extracellular/ periplasmic location of Lig E indicates a role in extracellular DNA joining. In addition to *in vivo* characterisation, we have recombinantly expressed and assayed *N. gonorrhoeae* Lig E and determined the crystal structure of the enzyme-adenylate engaged with DNA substrate in an open non-catalytic conformation, providing insight into the binding dynamics of these minimal DNA ligases.

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