Rapid degradation of Streptococcus pyogenes biofilms by PlyC, a bacteriophage-encoded endolysin.

OBJECTIVES: Streptococcus pyogenes, or Group A streptococcus (GAS), has a propensity to colonize human tissues and form biofilms. These biofilms contribute to chronic infections and are often resistant to antimicrobial agents. PlyC, a bacteriophage-encoded endolysin, is known to lyse planktonic streptococci. This study investigates the ability of PlyC to degrade GAS biofilms.

METHODS: PlyC was benchmarked against antibiotics for MIC, MBC and minimum biofilm eradication concentration (MBEC). A combination of growth chamber biofilm cultures, laser scanning confocal microscopy, and shear stress were used to study the effects of PlyC on static and dynamic biofilms of GAS.

RESULTS: PlyC and antibiotics had similar MIC (range 0.02-0.08 mg/L) and MBC (range 0.02-1.25 mg/L) values on planktonic streptococci. However, PlyC was significantly more effective at eradicating biofilms. Laser scanning confocal microscopy revealed that PlyC destroys the biofilm as it diffuses through the matrix in a time-dependent fashion.

CONCLUSIONS: Our findings indicate that while streptococcal cells within a biofilm rapidly become refractory to traditional antibiotics, the biofilm matrix is readily destroyed by the lytic actions of PlyC.