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Novel Propionibacterium acnes Phage Leviosa Demonstrates Broad Infectivity

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*Propionibacterium acnes* is an aerotolerant, Gram-positive bacterium that has been implicated as a pathogenic factor in acne vulgaris, a skin disease that affects more than 80% of teenagers and adults. Given increasing rates of antibiotic resistance, phage therapy needs to be explored as an alternative treatment for acne vulgaris. To that end, a novel *P. acnes* bacteriophage, Leviosa, was isolated and characterized to evaluate its potential as a phage therapy candidate. Though no previously isolated *P. acnes* phages contain lysogenic modules, multiple lines of evidence suggest that Leviosa is not a purely lytic phage. Leviosa’s ability to produce plaques with a bullseye morphology, turbid mesas, and clearings in subsequent patch tests are suggestive of either pseudolysogenic or lysogenic behavior. Due to this unexpected behavior, Leviosa’s host range was assessed by spotting the bacteriophage on various *P. acnes* isolates, including highly resistant strains. The phage was able to lyse all but two *P. acnes* isolates that it encountered. This broad infectivity was further examined using BLASTn to compare Leviosa’s genome to CRISPR protospacers from resistant *P. acnes* strains, B101.9 and B66.8. Significant mismatches between Leviosa’s genome and bacterial protospacers would suggest that the bacterial defense mechanism is unable to recognize the phage genome as foreign, rendering the bacteria susceptible to infection. Results from BLASTn showed that there were similar levels of mismatches between Leviosa’s genome and protospacers from B101.9, a strain susceptible to Leviosa, and B66.8, a strain resistant to Leviosa, indicating that CRISPR defense may partially explain Leviosa’s host range. While Leviosa’s non-lytic behavior may pose a problem, its unusual ability to lyse highly resistant *P. acnes* strain B101.9 elevates its potential as a phage therapy candidate.