The Itch to Twitch: The Effects of DNA, DNase, and Degraded DNA on Twitching Motility in Acinetobacter baylyi

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Acintobacter baylyi, a gram-negative soil bacterium, is highly competent for natural transformation and exhibits twitching motility. It was previously observed that the addition of DNase (a degrading enzyme) resulted in reduced or lack of twitching. The purpose of the study was to explore the effects of DNase, DNA, and degraded DNA (DNA+DNase) on twitching motility. LB broth was inoculated with ADP1 Wild Type Cultures. Petri dishes with LB and LBK soft agar were inoculated with 2µL Wild Type cells plus each of: 2µL Sterile Water Control, 1µL Sterile water+1µL DNase, 1µLSterile Water+1µL DNA, 1µLDNase+1µL DNA. Two broth cultures were tested to improve reliability of results. DNA, DNase, and both DNA and DNase were added to WT cells and cultured on LB and LBK soft agars. Petri dishes with 10 mL, 15 mL, and 20 mL of agar were tested. Two cultures were tested to increase the reliability of results. Test substances were pipetted onto the agar and incubated for 5 ½- 6 hours at 37ºC. Two perpendicular diameters were measured and averaged. Statistics were performed to determine the significance of the data. The hypothesis that degraded DNA would have the greatest impact on twitching in A. baylyi was unsupported. DNA, DNase, and DNA+DNase all significantly reduced twitching. This passive response to degraded DNA and DNA suggests that A. baylyi could possibly actively react to DNA, suggesting that A. baylyi may have chemotaxis capabilities, or have a mechanical force response mechanism. The results also suggest that competence and twitching may share a common mechanism.

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