Failure to Detect Anti-Viral Activity by Prokaryotic Argonaute Proteins

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Argonaute (Ago) proteins are present in all three domains of life and are involved in nucleic acid guided silencing and interference pathways. The well-studied Eukaryotic Argonautes (eAgo) form the catalytic core of the RNA interference (RNAi) pathway that is involved in gene silencing, transposon silencing and antiviral defense. Limited research on Prokaryotic Argonautes (pAgo) suggests these proteins are involved in defense against foreign genetic elements such as plasmids. pAgos have been hypothesized to defend against bacteriophage, however no direct evidence has been found so far. Here, we report the failure to detect antiviral defense mediated by pAgos against various Escherichia coli bacteriophages. We overexpressed 8 phylogenetically diverse prokaryotic Argonaute proteins in Escherichia coli BL21 (DE3) and challenged them with 7 bacteriophages spanning the Myo-, Sipho-, and Podoviridae families. No antiviral activity was detected that could be attributed towards the pAgo proteins. However, up to 100,000-fold reduction in viral infectivity was observed for 2 phages that correlated with plasmid-based protein expression. The mechanism through which this antiviral activity is mediated is unknown and subject for future study.