Characterization of Engineered Protein LLHP Repression Through the Induction of DNA Looping

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DNA looping is a method of gene regulation that plays an important role in controlling transcription. Research has shown that DNA looping occurs as a method of gene regulation when transcription factors that are bound to operators interact and tetramerize, causing the DNA to form a loop. Another area that has been explored is how inter-site spacing affects DNA's ability to loop. As the operator spacing changes, the helical shape of DNA affects the proteins bound onto the operator's ability to interact and form a loop. Although it is known that the transcription factor's ability to tetramerize correlates to DNA looping, it has not been explored if the addition of LacI's tetramerization domain to another protein could cause DNA looping. LacI is the only protein in the LacI/GalR family that has the ability to form a tetramer and therefore cause DNA looping. It is my hypothesis that by adding LacI's tetramerization domain to PurR, which does not loop DNA naturally, the resulting protein will be necessary and sufficient to induce looping. By exploring how protein domains work independently of each other, it allows for a greater understanding of how to engineer proteins for desired functions.

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