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Effects of genome position of supercoiling-dependent gene expression

Global transcription regulators are factors that can influence the activity of several bacterial promoters and can thus play a key role during bacterial adaptation to a change in growth environment. These factors include small metabolites, such as ppGpp, abundant nucleoid-associated proteins and DNA topology. The latter two are not equally repartitioned throughout the genome and could thus influence gene expression differently depending on the gene's position along the genome (1,2,3). Our previous work provided evidence for a genome-position dependence of the activity of an H-NS dependent promoter (4). This effect became particularly evident when gene expression was compared as a function of growth rate, growth phase or temperature. Recently we have begun studying the activity of supercoiling-dependent promoters in order to determine whether the effects of DNA topology also depend on genomic position, as suggested by existing data on the binding sites of topoisomerases (5). In this study we have found both local and global effects of genomic position on a supercoiling-dependent promoter, furthermore our results show that the activity of nucleoid proteins can either buffer or amplify these effects depending on the genomic context.

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