

TITLE: How rifampicin changes the transcriptome of *E. coli* over time

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ABSTRACT: Some Antibiotics disrupt essential cellular processes by interfering directly with the functioning of bacterial gene networks. In this study, we investigated the impact of rifampicin on the functioning of *E. coli*'s gene network. From RNA-seq and flow cytometry measurements we found that the gene network responses change over time, with many genes showing repression, activation, and switching responses. Several regulatory mechanisms, including promoter sequences, transcription factors, σ factors, and local levels of DNA supercoiling were found to contribute to the responses. We conclude that *E. coli* gene networks can modulate the effects of rifampicin. This ability might enhance their survival in the absence of resistance mechanisms. Finally, we show that the evolutionary distant *K. pneumonia* has similar transcriptome changes in response to rifampicin, suggesting that the results for *E. coli* may be applicable to many bacteria.