Differential gene expression in Escherichia coli chronically exposed to simulated microgravity

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Exposure to simulated microgravity changes the physiology and gene expression in bacteria. We used a set of *Escherichia coli* strains grown in a 2D clinostat for up to 24 days to measure the differential expression of a series of biofilm and pH and oxidative stress response-related genes using RT-qPCR. For this purpose, we grew *E. coli* from glycerol stocks at 30 C in nutrient broth for 24 h. The cells were then separated from the media and resuspended in an RNA preservative to stop metabolic activity and maintain the integrity of the RNA. We then extracted the RNA and synthesized cDNA in preparation for real-time PCR. We amplified segments of genes that had previously shown regulated on a transcriptome analysis and used them as markers to study their differential expression in cells grown from four distinct timepoints during the microgravity experiment. Our results show that some of the genes were either up or downregulated in response to simulated microgravity, suggesting that the constant free-falling or weightlessness state created by our microgravity analog changes transcriptional events in bacteria.

Keywords: Escherichia coli, Gene Expression, Microgravity, real-time PCR