EFFECTS OF ELEVATED OXYGEN CONCENTRATIONS ON THE REGULATION OF KEY ANTIOXIDANT GENES AND SMALL RNAS OF *ESCHERICHIA COLI*

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An efficient strategy to maintain active aerobic growth of *Escherichia coli* in biotechnological processes is to increase the oxygen concentration in bioreactors by supplying air mixed with pure oxygen. However, products of its possible incomplete reduction can be toxic to the cells by damaging the cell macromolecules.

We studied the expression of genes encoding RyhB and FnrS (two small regulatory RNAs) together with the expression of genes encoding key enzymes of antioxidant defense (Mn-, Fe- and Cu/Zn-superoxide dismutases, catalase, alkyl hydroperoxide reductase, glutaredoxin) under oxygen stress conditions. *E. coli* cultures grew in 5 L bioreactors in defined medium, at continuous mode with dissolved oxygen concentration of 21-63% with corresponding exposure time 10-40 min. It was shown that the levels of RyhB RNA are inversely correlated with the mRNA levels of several metabolic and antioxidant enzymes, and that ferric iron limitation is a signal for RyhB activation at elevated oxygen concentrations when *ryhB* expression increased up to 5.5 fold. These data will allow us to specify the responses of *E. coli* to high oxygen concentrations on molecular level, and will bring new insights into the understanding how cells survive oxygen stresses.

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