

The minimal medium irradiated with terahertz radiation induces proteins of homeostasis of transition metal ions and represses proteins of amino acid metabolism when *Escherichia coli* cells are cultivated on it

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Motivation and Aim: It was shown that genosensors cells are activated in response to non-thermal terahertz irradiation, as well as in response to exposure to the irradiated medium [1]. The aim of this work was to study the proteomic response of *E. coli/pKat-gfp*, *E. coli/pCopA-gfp*, and *E.coli/pemrR-gfp* genosensor cells to cultivation in an irradiated medium.

Methods and Algorithms: The minimal medium M9 was irradiated with terahertz radiation with a power density of 0.8 W/cm² for 15 minutes at a wavelength of 130 μm. The irradiated medium was stored overnight at +4 °C. *E. coli/pKat-gfp*, *E. coli/pCopA-gfp*, and *E. coli/pemrR-gfp* genosensor cells were cultured overnight in LB, then pelleted and resuspended in M9 mixed with an equal volume of irradiated medium, non-irradiated medium, and non-irradiated media with the addition of a genosensor inductor. The non-irradiated medium was also stored overnight at +4 °C. The cells were cultured for 5 hours, after which the protein was isolated and separated by two-dimensional electrophoresis in polyacrylamide gel, the gels were stained with the fluorescent dye Sypro Ruby, and the images of the gels were visualized and analyzed using the PDQuest program. Protein fractions were identified by their peptide mass map by MALDI-TOF mass spectrometry.

Results: Comparison of 2D gel electropherogram of sample cultured in irradiated minimal media, non-irradiated media, and media with genosensor inducers revealed differentially expressed protein fractions between samples by at least 1.3 times.

Conclusion: Bioinformatic analysis of proteins differentially expressed after cultivation of *E.coli* cells on irradiated minimal medium revealed activation of homeostasis of transition metal ions and inactivation of amino acid biosynthesis in *E. coli* cells.

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References

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