

Impact of terahertz irradiation on the antimicrobial resistance of *Escherichia coli* JM 103

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Motivation and Aim: Nowadays terahertz radiation is widely used in various fields, including application in agriculture and everyday life, especially in medical diagnostics [1]. Also, it is an emerging problem of antimicrobial resistance among both nosocomial and non-nosocomial strains. Nowadays antimicrobial resistance considered the third global cause of death [2]. Previously in our laboratory using RNAseq it was shown, that terahertz radiation has an impact on *E. coli* antimicrobial response genes. Aim of the work was to analyse the impact of terahertz irradiation on the *E. coli* strain, carrying streptomycin resistance gene. **Methods and Algorithms:** Impact of inhibitory and sub-inhibitory concentrations of streptomycin and nalidixic acid were studied. Strain JM 103 with plasmid-mediated streptomycin resistance was grown to the point of log-phase in LB-media. After, cell culture was placed in specially developed cuvette to create 40 µm layer, and irradiated with terahertz laser during 15 minutes. Next, cells were incubated on solid agar at 37 °C. Experiment was carried out with 0, 10, 20, and 30 min incubation in liquid media after the irradiation. On the next morning amount of colonies was counted. **Results:** It was shown that there was an impact of terahertz irradiation on survival of the *E. coli* strain JM 103. With inhibitory concentration of nalidixic acid 400, 800 and 1200 µg/ml no growth was detected, while with concentration of 300 µg/ml bacterial titre corresponded with control sample. For streptomycin with doses of 30, 60 and 90 µg/ml bacterial growth was also shown both in experimental and control samples. **Conclusion:** In our study it was shown that terahertz irradiation has no impact on viability nor plasmid-mediated antimicrobial resistance. Since terahertz radiation is widely used at a present time it is important that it has no impact on antimicrobial resistance levels, especially with the broad application in the field of medical diagnostics.

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References

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