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Biological magnetic isotope and magnetic field effects of Mg²⁺ and Zn²⁺ on *E.coli* cells

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Biological magnetic isotope effects are the new class of magnetic effects. The rate of enzymatic ATP synthesis *in vitro* was shown to be 2-4 times faster in presence of the magnetic isotopes ²⁵Mg, ⁶⁷Zn, ⁴³Ca in enzyme active site comparing with non-magnetic isotopes [1-3]. Biological magnetic magnesium isotope effect *in vivo* was found firstly on *Escherichia coli* cells growth [4-5]. The main aim of this work is to investigate magnesium and zinc magnetic isotope effects on *E.coli* growth, metabolism and cell survival in zero and static magnetic field.

Experimental results which proved magnetic ²⁵Mg isotope and static magnetic field effects on the growth and metabolism of *E.coli* cells were obtained. The magnetic isotope ²⁵Mg presence in liquid nutrient media increases the growth rate constant and the bacteria reproducible potential comparing with effects of non-magnetic isotopes ^{24,26}Mg. Internal (due to the nuclear magnetic moment of ²⁵Mg) and external static magnetic field are able to change metabolic processes and elements content in *Escherichia coli*. The similar magnetic isotope effect on *E.coli* cells growth was observed for ⁶⁷Zn isotope in zero magnetic fields. Experimental data have proved the sensitivity of living organisms to nuclear magnetic properties of inorganic enzyme cofactors.

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