PS28

BASIC ASPECTS OF BACTERIAL TRANSFORMATION

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Actuality. To survive under different environmental stresses, such as antibiotic stress and DNA damage, bacteria have evolved a mechanism to naturally convert and take up potentially useful foreign genes from nearby strains. Goal. To evaluate the natural mechanism of bacterial transformation and and its applicative value. Material and Methods. The research is based on bibliographic sources that were analyzed using PubMed, Google Scholar, Oxford Academic and Medline, published within the period of 2013-2024. Results. Natural bacterial transformation involves the exogenous DNA and a recipient cell. Transformation is defined as the uptake of foreign DNA as a single strand, which was formed from the exogenous double-stranded DNA (dsDNA) and its integration into the bacterial chromosome by homologous recombination. One strand of dsDNA is degraded, the other is internalized in single-stranded form through the ComEC transmembrane channel in a 3'–5' orientation. Then, internalized single-stranded DNA (ssDNA) is bound by the DNA processing A protein, which loads the recombinase protein RecA onto ssDNA. In turn, RecA polymerizes on the ssDNA and promotes a homology search in the host chromosome. When a homologous sequence is found, the ssDNA and a homologous strand chromosomal DNA is pairing, forms the transformation heteroduplex, the recombination is over. Conclusion. Natural bacterial transformation enables bacteria to acquire new genetic traits and to adapt to changing environmental conditions, promoting, for example, resistance to antibiotics and evasion of vaccines.

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