

Michael Tyurin. Ph.D. - Thesis Abstract

Ph.D. in Microbiology (Antibiotics & Chemotherapy: Microbiology / Molecular / Cell Biology, and Molecular Pharmacology): USSR Research Institute for Antibiotics, Moscow, USSR, 1990.

Ph.D. Thesis: "*Antibiotic Resistance and Antagonistic Activity of Lactobacilli*"

Lactobacilli are the component of normal oral, intestinal and vaginal microflora in humans and animals. Lactobacilli are the component of natural colonization resistance rendered *in situ* due to production of organic acids, esters of organic acids, small amounts of hydrogen peroxide and antimicrobial peptides/polypeptides with high antimicrobial activity at pH < 6.00 (none of known commercially used antibiotics is active at such pH). Lactobacilli may acquire antibiotic resistance via horizontal gene transfer (plasmids and transposons) and develop single or multi-drug antibiotic resistance mutations. The last one is more likely if there is a repetitive exposure to steady concentrations of antibiotics (for instance microflora of persons working with antibiotics manufacture). Lactobacilli often harbor one or more plasmids. If several plasmids are detected then most likely such plasmids possess cluster structure when structure of the smallest plasmid is duplicated in the plasmids of larger size corresponding to the equation: Plasmid size, kb = $n \times (0.51 \text{ kb} + 2x)$, where n is the number of plasmids revealed and x is the size of the smallest plasmid molecule. Some hetero-fermentative lactobacilli possess natural competence for plasmid DNA uptake and subsequent genetic transformation. Plasmid transfer requires tight cell-to-cell contact and may be rendered either via incubation on filters or in pellet formed by centrifugation. Some lactobacilli may contain conjugative transposons rendering antibiotic resistance (Cm, Em, Lm). Large plasmid DNA molecules may encode antimicrobial peptides and lipophilic compounds with wide spectrum of antibacterial activity not comprising other lactobacilli and bifidobacteria. A set of five probiotics was developed for human applications and to substitute of food antibiotic additives used for cattle and poultry manufacture. Cluster organization of the genomes for these and some other Gram(+) organisms was proposed.