

SATURDAY - 739 / SATURDAY - 739 - The Modelling of Lipase Protein Structures Based on Newly Isolated Thermophilic Bacilli Gene Sequences

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📍 Exhibit Hall D, Exhibit and Poster Hall

Authors

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Disclosures

G. Shahinyan: None. **A. Margaryan:** None. **H. Panosyan:** None. **A. Trchounian:** None.

Abstract

Background: Thermostable lipolytic enzymes, derived from thermophilic microbes, have promising applications in organic chemistry and pharmaceutical processes, detergent production, biosurfactants synthesis etc., due to their high stability in harsh conditions. **Methods:** In this study lipase producing bacilli strains of *Bacillus licheniformis* Akhurik 107, *Geobacillus* sp. T4 and *Anoxybacillus flavithermus* Karvachar QB2 isolated from Akhurik, Tatev (Armenian) and Karvachar (Nagorno-Karabakh) geothermal springs, respectively, were used as test objects. The lipase coding genes of the newly isolated active lipase producers were identified by using pre-designed primer sets. **Results:** The PCR amplification revealed a presence of genes with 1167 b.p., 727 b.p. and 605 b.p. sizes in *Geobacillus* sp. T4, *A. flavithermus* Karvachar QB2 and *B. licheniformis* Akhurik 107 strains, correspondingly. Nucleotide sequences of lipase coding genes were used to build the primary and the secondary structures of the lipase proteins using bioinformatic tools. Protein sequence alignment, conserved region, clustal distance matrix have been analysed. It was demonstrated that the lipase protein structure of *A. flavithermus* Karvachar QB2 and *B. licheniformis* Akhurik 107 strains are similar to GDSL family lipase. The structure of *Geobacillus* sp. T4 lipase is 97.55% close to true lipases (I family lipase) and contains Ca(II) and Zn(II) ligands, which are shown to have strengthening properties for the molecular structures, also contributing in lipase activity at high temperatures. Protein structure modelling displayed that the lipases consist of an α/β hydrolase fold and a lid domain. **Conclusion:** The results indicate the importance of lipases from isolated bacilli strains as promising sources of industrial thermozymes used in biotechnological productions.