## 6<sup>th</sup> Clinical Microbiology Conference

October 20-22, 2016 Rome, Italy

## Significance of key glycolytic enzymes in cariogenic biofilm formation

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**Background:** In therapeutic context, glycolytic pathway is an interesting field of research also for studying dental diseases. Metabolism of biofilm-forming Streptococcus mutans—main factor of caries progression—is based on glycolysis even in the presence of oxygen. In a such condition, an increase in the expression of genes coding key glycolytic enzymes, pyruvate kinase (PK) and phosphofructokinase (PFK), is observed. Modification of enzyme activity of PK and PFK gives an ability to inhibit bacterial growth and biofilm formation—a potential approach for caries prevention and therapy.

**Material and Methods:** Activity of PK and PFK from double- and mixed-species biofilm was estimated spectrophotometrically. Biofilm assay was carried out according to Current Protocols in Microbiology using ATCC and clinical strains (Streptococcus mutans,Streptococcus sobrinus, Lactobacillus acidophilus,and Actinomycesviscosus). In this study, we measured the activity of PK and PFK in various pH values and formation time of double and mixed-species biofilms.

**Results:** The activity of PK and PFK increased after 6 and 12 hours of a double-species biofilm formation (1.43 mU/mg of protein vs. 1.52 mU/mg of protein) compared to 18 and 24 hourswhen we observed a slight decrease in the activity of the glycolytic enzymes (1.37 mU/mg of protein vs. 1.48 mU/mg of protein). In case offorming the mixed-cariogenic biofilm, the activity of glycolytic enzymes also grew after 18 and 24 hours of mixed-species biofilm formation and the differences were statistically significant (p<0.001).

**Conclusions:** The increase in the activity of glycolytic enzymes (PK and PFK) during the biofilm formation (due to the effect of low pH), can be explained by the need to overcome the inhibitory effect of acidification on the metabolic activity of the microorganisms in the biofilm. Bacterial cells adapt to new conditions better in mixed-species biofilm than in the mono- or double-species biofilms—the increase of theglycolysis rate associated with increased activity of glycolytic enzymes reflects this phenomenon very well.

## Biography

Palina Vyhouskaya has a master degree in LaboratoryMedicine, and currently she is a PhDstudent at the Jagiellonian University, Poland. She is anactive member of The Scientific Students Association of Laboratory Diagnosticians and Clinical Microbiology, where she experiences and practices modern research techniques in Medicine. She has been involved in various research programs, and her work was published in international journals.

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