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## Catalytic oxidation and enhanced production of oxidoreductases for polymer degradation

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Oxidative enzymes play significant role in biodegradation of recalcitrant materials. Fungi are important among microorganisms for production of extracellular enzymes. Limited production and slow release of the particular enzymes are the limiting factor. The present study aimed for enhanced production, molecular characterization of oxidoreductases. Molecular examination as well as the heterologous expression of ligninolytic enzymes i.e., laccase and lignin peroxidase were carried out. These enzymes are mainly produced under nutrient starved condition i.e., carbon or nitrogen limited medium. Microscopic examination of these enzymes producing organism showed that they are filamentous, coenocytic, aseptate and spore producing organisms. An experiment was set up by adding the PVC polymer in the MSM media and inoculating the respective enzymes after screening and purification. The Fourier transform infrared (FTIR) spectroscopy of enzyme treated plastic films revealed the structural changes as compared to control (without enzyme treatment. Enzyme assay of both enzymes such as laccase and lignin peroxidase were carried out with vertryl alcohol and DMP as substrates. The extracted DNA fragments of both enzymes were then amplified by PCR with Lip and Lac primers. The amplified PCR product 530 bp and 890 bp then ligated with pTZ57R/T plasmid. Competent cells were developed through both chemical and electroporation. The competent cells used for the expression purpose were the DHα5 strain of *E. coli* bacterium. Confirmation of the cloned fragment was done through restriction endonuclease enzymes Eco R1 and Hind111.

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## Effect of *Staphylococcus aureus* PSMα3 toxin on Human Platelets

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Community-Associated MRSA (CA-MRSA) is serious human pathogen because its ability to resist and evade the host immune defences and is commonly antibiotic resistance. In the last decade, CA-MRSA infection has become a major worldwide problem and causes a significant increase in the rate of human mortality. Skin and soft tissues are the most common sites for CA- MRSA infections, but CA-MRSA also has the ability to cause acute infections such as meningitis, myositis and endocarditis due to production of toxins such as Phenol-Soluble Modulins (PSMs) which are considered as an important virulence factor of CA-MRSA. PSMs are detected via formyl peptide receptors that are found on immune cells. PSMs toxins play important roles in pathogenesis of *S. aureus* through attack the innate immune of the host cells and inhibit their functions. Other researchers have also found PSMs to be powerful chemoattractants for neutrophils. This research aims to study the effect of Staphylococcus aureus phenol-soluble modulins α3 (PSMα3) toxin on human platelet activity, what effect *S. aureus* PSMα3 have on platelet functions and to identify the mechanism of interaction between *S. aureus* PSMα3 and human platelets.The experimental data from this study show that *Staphylococcus aureus* PSMα3 toxin to be an inhibitor of platelet activation via increasing the levels of cAMP that activate the PKA which enhances the inhibitory mechanism in platelets that prevents any further activation of platelets.

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