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Applications of microbial strains in chromium degradation and removal from contaminated water and wastewater

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The anthropogenic uses and applications of chromium have increased rapidly since the industrial revolution. Chromium exists in a wide range of valency states from -4 to +6 with the hexavalent species (Cr6+) predominant in natural aquifers and its trivalent counterpart (Cr3+) prevailing in the municipal and industrial wastewater. Apart from its toxicity, Cr6+ is also highly soluble and thus mobile and biologically available in the ecosystems. Because of its persistence in the environment, anthropogenic release of Cr6+ executes extravagant toxicity and behemoth threat. The bacterial species are able to grow in the toxic conditions and are generally assumed to be tolerant or resistant to chromium. *Pseudomonas* sp. was the first hexavalent chromium remediating microorganism to be indentified from waste water. A number of chromium-resistant microorganisms were subsequently isolated such as *B. cereus, B. subtilis, P. aeruginosa, P. ambigua, P. fluorescens, E. coli, Achromobacter eurydice, Micrococcus roseus, Enterobacter cloacae, Desulfovibrio desulfuricans* and *D. vulgaris. Bacillus coagulans* isolated from electroplating industry was capable of reducing Cr (VI) by using soluble enzyme and utilizing malate as external electron donor. The sulfate reducing bacteria have the ability to reduce chromium in the soil. Several strains of *Brevibacterium* sp. was isolated from industrial wastewater had ability to reduce Cr (VI) at various concentrations. Fungus acts as bio-absorptive material to remove hexavalent chromium. Biosorption mechanism is done by two methods-metabolism dependent and non-metabolism dependent. Fungal strains of *Aspergillus* sp., *Penicillium* sp., *Fusarium* sp., *Pichia* sp. etc., are also capable for chromium bioremediation in environment. The application of microorganisms to detoxifying metals has been tested in a number of systems but the viability and metabolic activity of cells are still the major limiting factors affecting the detoxification efficiency of the cellular biomass and enzymes involved. Genetically engineered microorganisms have higher activities in transforming and remediating heavy metals like chromium. However, the risk of releasing such organisms into the environment is still under investigation.

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Molecular Modeling and Docking of Target Proteins of Lower Urinary Tract Symptoms (LUTS) and Cystitis

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Lower Urinary Tract Symptoms (LUTS) are the result of bacteria, viruses or undesirable microorganism that invade in to the lower urinary tract and cause infection. LUTS is common in men and although women can get too. In the present study we have taken target proteins for LUTS and cystitis viz. eNOS, PDE5, TRPV1, TRPV4, ERK, NGF, TGF-beta-1 and CDX2 which regulate the functions of smooth muscle cell of lower urinary tract. The target proteins were modeled by different tools for the best 3D - structure prediction. Predicted structures were validated and selected for the docking and virtual screening. The docking and virtual screening was done against the target proteins with Natural compounds and anti-cancer compounds. The anticancer compounds are opted because LUTS can be considered as a preliminary phase of Cancer in lower urinary tract. Out of 5000 natural compounds 2 compounds for eNOS, 2 compounds for PDE5, 2 compounds for TRPV1 and, 1 compound for ERK has been selected. Out of all anticancer compounds Doxorubicin for eNOS, Hydnowightin for PDE5 and TRPV1, and Taxifolin and Apigenin for ERK have been selected.