



Title: Investigation of Molecular Interactions Between 4-Ethylphenyl Sulfate (4-EPS) and Bovine Serum Albumin Through Spectroscopic Analysis and Detection of 4-EPS Using Electrochemical Aptasensor.

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Abstract:

A protein bound uremic toxin, 4-ethylphenyl sulfate (4-EPS) is found in the serum of chronic kidney diseased individuals (CKD) and in autism spectrum disorder (ASD) patients. 4-EPS is synthesized by the microbial degradation of the aromatic amino acids including tyrosine and phenylalanine. After its synthesis, it enters blood and crosses the blood brain barrier, thus, promotes neuro-related problems. In other aspects, it is believed that 4-EPS retains inside body by metabolic transformation of ethyl chain. The amphipathic nature of 4-EP makes it capable to bind with serum albumin thereby preventing its excretion from the kidney leading to CKD. Thus, a model study is presented where molecular interaction of BSA with 4-EPS was studied using spectroscopic techniques. Absorption spectroscopy result demonstrated decrease in absorbance of the BSA upon interaction with increasing concentration of 4-EPS in a range from 2 μM to 100 μM . Additionally, fluorescence spectroscopy provided quantitative analysis of binding affinity and quenching effects, indicating strong interaction between BSA and 4-ethylphenyl sulfate. Moreover, the change secondary structure was demonstrated by circular dichroism, synchronous fluorescence and Fourier transform infra-red spectroscopy. This study can provide an insight for devising a chemical compound which competes in binding with serum albumin in order to facilitate 4-EPS clearance from the kidney. Besides this, timely detection of elevated serum concentration of 4-EPS is also analysed by electrochemical

aptasensor. The highly specific and selective aptamers were screened by capture SELEX strategy. These findings have significant implications in diagnostics by targeting 4-EPS, a possible biomarker of ASD and CKD.

Biography

Dr. Payal Gulati has done her Ph.D. in nanotechnology from Jamia Millia Islamia in 2019. Currently, working as MK Bhan - young researcher fellow at NII. She has 11 years of experience in fabrication of various types of biosensors including optical, electrical and electrochemical for detection of cancers, chronic kidney disease, cardiovascular disease and Autism. She has experience in synthesis of nanomaterials and nanoparticles using various approaches, followed by its characterization using microscopy and spectroscopies. She has expertise in handling sophisticated instruments such as FESEM, RAMAN, FTIR, BLI, UV-VIS, PL, Spin coater, sputtering unit, etc. She has experience in screened of aptamers using different strategies of SELEX.