**DIBUTYL PHOSPHATE PEPTIDES - A MARKER FOR A NUCLEAR ENRICHMENT PROCESS**

Donee’ McAllister¹³, Sara D’Angelo², Jurgen Schmidt,² and Julianna Fessenden²

¹Center for Bioinformatics & Computational Biology, Department of Biology, Jackson State University, Jackson MS 39217,
²Los Alamos National Laboratory (LANL), Health Research Laboratory, B-9 Division, Los Alamos, New Mexico
³2009 Summer Intern at LANL

**Abstract:** Tributyl phosphate is commonly known as TBP, phosphoric acid, or tributyl ester. It is a chemical compound containing carbon-phosphorus bonds. Tributyl phosphate is a colorless and odorless liquid. If TBP is inhaled, it causes irritation to the respiratory tract, headaches, and it may mildly affect blood cholinesterase levels which will affect the operations of the central nervous system. If it is ingested it may cause abdominal pain and/or vomiting. Tributyl phosphate may be mutagenic or it may have reproductive effects. It is widely detected in air, water, sediment, and biological tissues. Tributyl phosphate has been detected by testing samples from paper manufacturing plants, sediment samples, infant and adult sample diets, and autopsy samples from humans. It is an extractant as well as a plasticizer. This chemical is very important in the area of nuclear fuel reprocessing. TBP is used in the liquid-liquid extraction of uranium, plutonium, and thorium from nitric acid. TBP can be degraded to dibutyl phosphate (DBP) which can be used as a hydrolysis product of TBP and monobutyl phosphate (MBP). Because of its toxicity, it has to be monitored and its concentrations kept as low as possible. We hypothesize that tributyl phosphate can be incorporated into enzymatic markers and those enzymatic markers can be screened to see if people have been using TBP. In this study we tested the hypothesis by attaching phosphates to biotinylated modified and unmodified peptides. We then used phage display for the testing of reagents on TBP exposed markers. For this experiment, peptides were synthesized. Sequences corresponding to the tryptic digest of butyl cholinesterase were synthesized in biotinylated, for immobilization, or unmodified form for elution in the phage selection. The peptides were prepared by standard fluorenyloxycoarbonyl (Fmoc) solid phase synthesis on an ABI 433 A at 0.25 mM scale with double coupling of the first attached residue on Fmoc Ser Wang resin (substitution 0.8 mmol/g, Nova Biochem) or Fmoc Lys (Biotin) – Wang resin (substitution 0.5 mmol/g, ACT), respectively. The N terminal serine attachment site was introduced as Fmoc-Ser (OTrt) to allow selective deprotection. Tertbutoxycarbonyl (tBoc) phenylalanine was chosen as the N-terminal residue to allow the final removal of all protecting groups under acidic conditions. The obtained resins were split into equal portions of 0.02 micro molar. Phage display was performed to develop an antibody that recognizes modified peptides. Two phage selection cycles were performed onto the modified peptides. These results are preliminary results and a third selection cycle is required before proceeding with the ELISA Assay to identify potential antibodies and evaluate how specific they are for the modification. PCR and DNA fingerprinting was also performed which yielded acceptable results.

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