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Scientists Develop Novel Research Tools for Detecting Organophosphates

San Diego, Calif. (October 1, 2010) – Scientists at the Human BioMolecular Research Institute (HBRI) in San Diego, CA, with funding from the National Institutes of Health (NINDS) CounterACT Program, have reported on a novel and efficient way of synthesizing phosphonylated peptides that mimic proteins modified by organophosphate (OP). A recent paper (MacDonald M, Lanier M, and Cashman J (2010) Solid-Phase Synthesis of Phosphonylated Peptides. *Synlett* **13**:1951-1954) showed these reagents may provide important tools to more efficiently lead to analytical methods expected to accelerate development of nerve agent and pesticide detection technologies.

Organophosphates are a component of nerve agents that have been used in chemical warfare and terrorist attacks. Chemically similar compounds are also frequently used in pesticides, posing serious health risks to agricultural workers over-exposed to pesticides. Organophosphate toxicity results from binding to and interfering with the functions of key enzymes in the body including acetylcholinesterase, one of the enzymes that controls the concentration of the neurotransmitter acetylcholine.

Rapid and sensitive detection of organophosphate exposure is therefore an important objective for protecting military personnel and civilians. Scientists at HBRI have developed a new and more efficient method of preparing phosphonylated peptides utilizing organophosphate-modified amino acids that retain the structural features that distinguish between individual organophosphate agents. The resulting phosphonylated peptides resemble the region of modified proteins following organophosphate exposure. The findings represent an advance over current

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synthetic strategies and help to overcome current limitations. The technology affords organophosphate-modified biological samples for research use.

Current methods for detecting nerve agents and pesticides are lengthy and require cumbersome equipment. The novel method reported by the HBRI for synthesizing phosphonylated peptides offers greater access to valuable research tools for developing more sensitive organophosphate detection technologies. For example, the HBRI is currently using these reagents to develop portable instrumentation for rapid detection of exposure to organophosphate nerve agents and pesticides of utility in both civilian and non-civilian settings.

About HBRI: The Human BioMolecular Research Institute is a non-profit research institute conducting basic research focused on unlocking biological and chemical principles related to diseases of the human brain, cardiovascular disease and cancer. The Human BioMolecular Research Institute conducts fundamental studies of central nervous system disorders, heart disease and cancer including stem cell approaches and translates findings into new drug development to address human illness. In addition, the institute promotes scientific learning and training through community service and public access by disseminating information and sharing research with collaborators, colleagues and the public. For more information, visit www.HBRI.org.