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For Immediate Release

Detection of Organophosphates

San Diego, Calif., October, 2017 – Researchers at the Human BioMolecular Research Institute, University of Nebraska, and Center for Disease Control and Prevention have created a way to detect organophosphates and organophosphonates. Organophosphates are often pesticides and organophosphonates often are nerve agents. Writing in October in *Chemical Research in Toxicology* and *Frontiers in Pharmacology*, the team describes two papers how they developed methods to detect organophosphates.

"Because organophosphate and organophosphonate exposure is a continuing problem, worldwide, we need to effectively develop sensitive means to detect them," said John Cashman, Ph.D., President of Human BioMolecular Research Institute and co-author of the studies. "Using immunological and biochemical methods to create sensitive detection is a very appealing approach."

Antibodies can be helpful in detection

In an earlier study, the Human BioMolecular Research Institute team, led by John Cashman, Ph.D., developed a selective monoclonal antibody to detect nerve agents in biological samples. Now, a team from Human BioMolecular Research Institute, University of Nebraska and Center for Disease Control and Prevention has developed an additional approach. They used sophisticated bioanalytical biochemical means to develop the technology.

How the technology works

Organophosphates work by attaching to the active site serine of acetylcholinesterase (AChE), a serum enzyme. This results in inhibition of AChE activity and toxic symptoms. Immunopurification of human red blood cell (RBC) AChE inhibited by organophosphates in quantities adequate for detecting exposure to organophosphates is, in principle, a sensitive way of detection. Immunopurification of organophosphate-inhibited RBC AChE and quantification of organophosphate-inhibited RBC AChE by mass spectrometry showed that exposure to organophosphates could be detected as adducts on the active site serine of RBC AChE.

In another application, using an alternative RBC AChE enrichment strategy by binding RBC AChE to Hupresin affinity gel, a sensitive method was developed. By retaining AChE bound to Hupresin and digesting with pepsin and analyzing by liquid chromatography tandem mass spectrometry a sensitive method was developed to detect the nerve agent soman.

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Media contacts: To arrange on-site, phone, or Skype interviews with the researchers involved in this study, please contact John Cashman at (858) 458-9305 / JCashman@hbri.org.

About Human BioMolecular Research Institute

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 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 through community service and public access by disseminating information and sharing research with collaborators, colleagues and the public. For more information, visit us at www.HBRI.org.

About The University of Nebraska Eppley Institute for Research

The Eppley Institute is a national leader in basic and translational research related to cancer and other diseases. It provides graduate and post-graduate educational opportunities in cancer research and other areas of research. The mission of the Eppley Institute is to develop research programs that will provide a better understanding of the causes of cancer and other diseases, improve the methods for diagnosis of cancer and

improve the methods for the treatment and prevention of cancer and similar disorders. The Eppley Institute provides graduate and post-graduate educational opportunities in cancer research and other areas of research.

About The Center for Disease Control and Prevention

The Center for Disease Control and Prevention (CDC) is near Atlanta, Georgia and is one of the major operating components of the Department of Health and Human Services. The CDC works to protect Americans from health, safety and security threats, both foreign and in the U.S. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same. The CDC increases the health security of our nation. As the nation's health protection agency, CDC saves lives and protects people from health threats. To accomplish their mission, CDC conducts critical science and provides health information that protects our nation against expensive and dangerous health threats, and responds when these arise.

Alicia J. Dafferner, Lawrence M. Schopfer, Gaoping Xiao, John R. Cashman, Udaya Yerramalla, Rudolph C. Johnson, Thomas A. Blake, Oksana Lockridge (2017) Immunopurification of acetylcholinesterase from red blood cells for detection of nerve agent exposure. *Chem Res. Toxicol.* **30** (10) 1897-1910

Seda Onder, Lawrence M. Schopfer, John R. Cashman, Ozden Tacal, Rudolph C. Johnson, Thomas A. Blake, Oksana Lockridge (2017) Use of Hupresin to capture red blood cell acetylcholinesterase for detection of soman exposure. *Front. Pharmacol*. **8**, 713