39.

ANTIGEN DETECTION USING MICROELECTRODE ARRAY MICROCHIPS. ***K. Dill,*** *D. D. Montgomery, M. H. Ainsworth, A. V. Oleinikov, A. L. Ghindilis, and K. R. Schwarzkopf, CombiMatrix Corporation, Harbour Pointe Tech Center, 6500 Harbour Heights Parkway, Suite 301, Mukilteo, WA 98275, Fax: 425-493-2010, kdill@combimatrix.com*

CombiMatrix produces VLSI arrays of individually addressable electrodes using conventional CMOS integrated circuitry. First generation electrode ArrayChips™ provide over 1,000 electrodes per square centimeter. These chips are coated with a porous material that is modified electrochemically to attach specific affinity tags proximate to selected electrode sites.

ArrayChips™ are used to develop spatially multiplexed assay formats for biological entities over a wide size range, from proteins to cells. Sandwich immunoassays are used for larger entities and competitive immunoassays for smaller molecules. Antibodies are tagged with coded affinity labels and then allowed to self assemble on the appropriate electrode assay sites. Each analyte-specific antibody is chaperoned to individual, predetermined locations by the self-assembly process. The resulting chip can perform numerous different analyte-specific immunoassays simultaneously.

Detection of analytes is accomplished using fluorophore-tagged antibodies and an epifluorescent microscopy. Additionally, we will present new detection technologies based upon the use of the active individually addressable electrodes on the chip. Results from a wide range of analytes will be presented.

Partial funding provided by DoD Phase II SBIR grant DAAD13-00-C-0033.

40.

APPLICATION OF AN ENZYME-LINKED IMMUNOSORBENT ASSAY FOR GLIAL FIBRILLARY ACIDIC PROTEIN AS AN INDICATOR OF THE PRESENCE OF BRAIN OR SPINAL CORD IN MEAT. ***G. R. Schmidt***[1]*, R. S. Yemm*[1]*, K. D. Childs*[1]*, J. P. O'Callaghan*[2]*, and K. L. Hossner*[1]*. (1) Department of Animal Sciences, Colorado State University, Fort Collins, CO 80523-1171, Fax: 970-491-0278, gschmidt@ceres.agsci.colostate.edu, (2) Center for Disease Control and Prevention, National Institute for Occupational Safety and Health*

The presence of brain or spinal cord as an inadvertent contaminant of meat may result from the stunning of livestock or the preparation of advanced meat recovery meat from vertebral column. If the bovine spongiform encephalopathy (BSE) agent was present in the animals being processed, this could be a food safety concern. The current methods to detect central nervous system (CNS) tissue in blood, lungs, or meat are cumbersome, time consuming and costly. The objective of this study was to use glial fibrillary acidic protein (GFAP), which is restricted to the CNS, in an enzyme-linked immunosorbent assay (ELISA) for the detection of CNS tissue in blood and meat products from beef cattle. We report the development and validation of a fluorescent ELISA for GFAP which can be used as a rapid and sensitive method to detect the presence of CNS tissue in meat products. The fluorometric assay was sensitive to 0.2 ng GFAP, has an intra-assay coefficient of variation (CV) of 2.0% and an inter-assay CV of 14.1%. Less than 1.0 ng GFAP/mg tissue was found on most beef subprimals and advanced meat recovery (AMR) product. The presence of sausage ingredients or heating the product to 80°C for 60 minutes did not affect GFAP detection. However, heating the product to 115°C for 100 minutes eliminated the detectability of the GFAP.

41.

APPLICATIONS OF IMMUNOASSAYS IN AGRICULTURAL BIOTECHNOLOGY FOR DETECTION OF NOVEL PROTEINS. ***Charles A. Mihaliak,*** *Dow AgroSciences, LLC 9330 Zionsville Road, Indianapolis, IN 46268-1053, Fax: 317-337-3255, cmihaliak@dowagro.com, and James W. Stave, Strategic Diagnostics, Inc*

In recent years, numerous crop plants have been engineered to express novel proteins that impart traits such as insect resistance or herbicide tolerance to the plants. Development and validation of immunoassay methods for detection of the novel proteins that are expressed in these crops is critical to successful product development and commercialization. Immunoassay methods are used in all phases of product development including transformation, event selection and registration. Different types of immunoassays are employed during various stages in the development and commercialization of a biotech-derived crop. The range of application of these tests will be reviewed. Testing for the presence of novel proteins in biotechnology-derived seed, grain and foods has also increased throughout the grain and food distribution channel. The implementation of testing procedures for these applications will also be discussed.

42.

IMMUNOAFFINITY CHROMATOGRAPHY: A POWERFUL SAMPLE CLEAN-UP TECHNIQUE FOR LOW-LEVEL RESIDUE DETERMINATION IN COMPLEX MATRICES. ***Samy Ben Rejeb***[1]*, Chantal Cleroux*[2]*, Michael Abbott*[2]*, David Davies*[2]*, Jessica Querry*[3]*, Christine Streng*[3]*, and Francois Le-Goffic*[3]*. (1) Food Research Division, Bureau of Chemical Safety, Health Products and Food Branch, Health Canada, Sir Frederick Banting Research Centre, Ross Street, PL 2203D, Ottawa, ON K1A 0L2, Canada, Fax: +1-613-941-4775, Samy_Benrejeb@hc-sc.gc.ca, (2) Food Research Division, Bureau of Chemical Safety, HPFB, Health Canada, (3) Technology Transfer Unit, DRI/ENSCP, Ecole Nationale Supérieure de Chimie de Paris*

The chemical complexity of food and environmental matrices leads to lengthy sample preparation procedures in order to eliminate interferences that may hinder the identification and further quantification of the analyte of interest. Multi-step procedures are generally applied with substantial amounts of organic solvents used for sample clean-up. Immunoaffinity chromatography has been introduced to simplify sample handling techniques by exploiting the specific interactions of an antibody antibody against specific target analytes. This paper presents our latest research findings aimed at extending this technique to several food and environmental contaminants and to generalize its use in routine monitoring. Immunoaffinity columns (IAC) were evaluated for the detection of pesticides in fruit and vegetables, microcystins in blue green algae, and of veterinary growth promoters in animal tissues. Emphasis has been made to reach single-step sample preparation procedures allowing the detection of analytes with classical and inexpensive analytical instrumentation, i.e., liquid chromatography with UV or fluorescence detectors. Multi-residue determination was also achieved using mixtures of antibodies and their cross-reactivity towards structurally related compounds. Efforts are being made to allow the availability of the developed columns to regular laboratory users.

43.

EVOLUTION OF ENVIRONMENTAL IMMUNOCHEMISTRY. ***Jeanette M. Van Emon,*** *NERL, U.S. EPA, P.O. Box 93478, Las Vegas, NV 89193-3478, Fax: 702-798-2243, vanemon.jeanette@epa.gov*

Enzyme-linked immunosorbent assays (ELISAs), initially developed for clinical applications, have made a tremendous impact as clinical diagnostic indicators. Pesticide chemists became attracted to the potential of these sensitive and selective methods in the 1970s. Thus, began the transition of immunochemical technology to environmental monitoring. Immunoassays are now providing cost-effective analysis for many compounds of environmental and human health concern. Methods range from highly quantitative laboratory procedures to rapid field analysis. Immunoassay methods are available for numerous pesticides (i.e., paraquat; chlorpyrifos; 2,4-D), pesticide metabolites, and environmental contaminants (i.e., pentachlorophenol, and polychlorinated biphenyls). Immunoassay data are used to assist in monitoring cleanup activities at waste sites, and to support human exposure assessment studies. A brief history of environmental immunoassays, current applications developed or evaluated by the EPA, National Exposure Research Laboratory-Las Vegas, and future research needs and possibilities will be presented. Notice: This work has been funded wholly or in part by the U.S. Environmental Protection Agency and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

44.

ENVIRONMENTAL ANALYSIS OF INORGANIC ANIONS AND PERCHLORATE BY ION CHROMATOGRAPHY. ***Peter E. Jackson,*** *Kirk Chassaniol, and Dave Thomas, Dionex Corporation, 500 Mercury Drive, Sunnyvale, CA 94088, Fax: 408-737-2470, Peter.Jackson@dionex.com*

Ion chromatography (IC) has been approved for the analysis of common inorganic anions in environmental waters since the mid-1980s. Recent advances in instrumentation, columns and detection technology have expanded the scope of IC methods for analytes other than common anions, e.g., disinfection byproduct anions, chromate and perchlorate. A number of new U.S. EPA methods based on IC which incorporate these advances, such as 300.1, 314.0, 317.0 and 321.8, have recently been published. In this paper, we review

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