

Project 1011983

Field-Portable Immunoassay Instruments and Reagents to Measure Chelators and Mobile Forms of Uranium

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RESULTS TO DATE: The goals for the 3-year project period are 1) to test and validate the present uranium sensor and develop protocols for its use at the NABIR Field Research Center; 2) to develop new reagents that will provide superior performance for the present hand-held immunosensor; and 3) to develop new antibodies that will permit this sensor to also measure other environmental contaminants (chromium, mercury, and/or DTPA). Sensor design modifications are underway via international collaborations. New reagents that will provide superior performance for the present hand-held immunosensor are being prepared and tested. New methods have been developed, to produce recombinant forms of metal-specific monoclonal antibodies for use with the sensor. Site-directed mutagenesis experiments are underway to determine the mechanisms of binding. Immunization experiments with sheep and rabbits to develop new recombinant forms of antibodies to metal-chelate complexes (chromium, mercury, and/or DTPA) have been initiated.

DELIVERABLES: Most recent products delivered:

Presentations since last report

R.M. Jones, H. Yu, and D.A. Blake (2001) "Monoclonal and recombinant antibodies for the analysis of cadmium in environmental waters", IBC's 12th Annual International Conference on Antibody Engineering, San Diego, CA, Dec. 2-6.

D.A. Blake (2002) "Biosensors for real-time monitoring", presented at Environmental Stewardship: Promising Solutions to Uncertainty, A DOE-sponsored Symposium on Monitoring, Risk Assessment, and Information Sciences. New Orleans, LA, Feb. 5-7, 2002.

D.A. Blake and H. Yu (2002) "The Uranium Immunosensor: Functional Assessment and Reagents to Enhance Performance". DOE-NABIR PI Workshop, Warrenton, VA, Mar. 18-20.

D.A. Blake, R.C. Blake II, and H. Yu (2002) "Antibody-based sensors for hexavalent uranium", 223rd ACS National Meeting, Orlando FL, April 7-11.

A.M. Kriegel, H. Yu, J.B. Delehanty, R.M. Jones, and D.A. Blake (2002) "Antibody-based sensors for metals: Present studies and future directions", Board of Regents' NSF/LA EpSCOR 2002 Conference, Baton Rouge, LA, April 10-11.

A.M. Kriegel and D.A. Blake (2002) "Cd-EDTA-BSA specific scFv isolated from a human recombinant antibody library" Experimental Biology 2002, New Orleans LA, April 20-24.

D.A. Blake, R.C. Blake II, and H. Yu (2002) "A portable immunosensor for hexavalent uranium", Seventh World Congress on Biosensors, Kyoto, Japan, April 17-19.

Publications

R.M. Jones, H. Yu, J.B. Delehanty, and D.A. Blake (2002) "Monoclonal antibodies that recognize minimal differences in the 3-dimensional structures of metal-chelate complexes", Bioconj. Chem., 13: 408-415.

Publications submitted

R.C. Blake II, J.B. Delehanty, M. Khosraviani, H. Yu, R.M. Jones, and D.A. Blake (2002) "Allosteric binding properties of a monoclonal antibody directed toward metal-chelate complexes", *Biochemistry*, submitted.