



MESTECH Research Project



Project Title: Algal-toxin sensing

Project Researcher: Caroline Murphy and Richard O’Kennedy

Funding Body: Beaufort Marine Research Awards

Project Summary:

The need for on-site algal-toxin monitoring has become increasingly urgent due to the increased demand for fresh-water and for safe, ‘toxin-free’ shellfish and fish stocks. Along with routine testing of shellfish stocks for biotoxins, the EU also requires routine monitoring for the presence of the causative algal species.

This project saw the successful development of highly-sensitive antibody biosensors to cyanobacterial toxin microcystin-LR and six of its structural variants. Using phage-display and biopanning techniques a highly sensitive antibody was developed. The antibody, along with bespoke microcystin-LR toxin conjugates were incorporated onto a fluorescence-based planar waveguide biosensing platform. The system can detect the presence of toxin in a competitive immunoassay in just 20 minutes and can detect the level of toxin in water below the World Health Organization’s recommended limit of $1 \mu\text{g L}^{-1}$ with high assay repeatability.

Key Outputs:

International poster presentations:

Caroline Murphy, Edwina Stack, Chad Greef, Mike Lochhead, Greg Husar, Shauna Devlin, Chris Elliott and Richard O’Kennedy. *Detection of cyanobacterial toxin microcystin-LR using a novel recombinant antibody-based planar waveguide detection system.* **Asset 2014 Food Integrity and Traceability Conference, Belfast, Northern Ireland.**

Caroline Murphy, Edwina Stack, Chad Greef, Mike Lochhead, Greg Husar, Shauna Devlin, Chris Elliott and Richard O’Kennedy. *Detection of cyanobacterial toxin microcystin-LR using a novel recombinant antibody-based planar waveguide detection system.* **Biosensors 2014, 24th Anniversary World Congress on Biosensors, May 2014, Melbourne Australia.**