A Novel Method for the Detection of Microcystin- LR using a DNA-aptamer based Biosensor

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Abstract

Cyanobacteria, or blue green algae, occurs in ponds, lakes and Slow moving streams and creates toxins known as microcystin (Ng et al. 2012). Prolonged exposure to microcystin can lead to liver damage and eventually death and causes recreational and ecological effects (Lin et al. 2012) (Eissa et al. 2014). Microcystin exists in various forms and microcystin-LR (MC-LR) is the most common and he most toxic of these structures and the one that will be the focus of our project (Ng et al. 2012). In this project, we propose the development of a novel method to detect MC-LR in water samples by using a DNA-aptamer based biosensor. We propose the use of optical devices (etalons) that will be functionalized with aptamers, DNA molecules that specifically bind to MC-LR to allow for the optical detection of the toxin in water samples (Li et al. 2015). Etalons will change their physical properties due to interactions with the resolving agent and this will alter the visual signal, % reflectance, that is recorded (Li et al. 2015). The addition of MC-LR should alter this signal in direct correlation with its concentration in the water sample. This method should prove relatively rapid and inexpensive, making it potentially superior to other methods that are currently available for the detection of MC-LR. The ability to rapidly and inexpensively measure MC-LR in water samples is highly relevant due to the high prevalence of blue green algae and toxicity of the molecule.

References

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