

**RAPID, SENSITIVE DETECTION OF
BOTULINUM TOXIN ON A FLEXIBLE
MICROFLUIDICS PLATFORM**

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Abstract:

In this paper we will describe how high affinity reagents and a sensor configuration enabling rapid mass transport can be combined for rapid, sensitive biodetection. The system that we have developed includes a renewable surface immunoassay, which involves on-column detection of a fluorescently labeled secondary antibody in a sandwich immunoassay. Yeast display and directed molecular evolution were used to create high affinity antibodies to the botulinum toxin heavy chain receptor binding domain, AR1 and 3D12. A rotating rod renewable surface microcolumn was used to form a microliter-sized column containing beads functionalized with the capture antibody (AR1), perfuse the column with sample and wash solutions, deliver fluorescently labeled secondary antibody (3D12), and monitor the on-column fluorescence. Detection was accomplished in less than 5 minutes, with a total processing time of about 10 minutes. On-column detection of botulinum toxin was more sensitive and much faster than flow cytometry analysis on microbeads using the same reagents.