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Rapid and accurate diagnosis of Pertussis using a microfluidic point of care biochip

Pertussis is the only vaccine-preventable infection that is still endemic in the US and worldwide. Despite high vaccination coverage in many countries, *Bordetella pertussis* continues to circulate. The purpose of this research is to develop and validate a low-cost, instrument-free, paper-based microfluidic point of care device (POCD) for rapid, diagnosis of pertussis. Our hypothesis is that the integration of paper-based microfluidic technology with DNA testing can provide a fast and accurate diagnosis that can be used in various venues such as medical offices, schools and in the field. Our instrument-free detection method comprises a polydimethylsiloxane (PDMS)/paper hybrid microfluidic system integrated with DNA amplification. The system has been created consisting of 3 layers. The top PDMS layer is for reagent delivery and the middle PDMS layer contains multiple wells for DNA amplification. A piece of paper is inserted in each well to pre-store DNA primers. Our instrument-free system is able to detect specifically *B. pertussis* successfully, from both isolated organisms and clinical samples. The detection is by fluorescence using a portable UV light pen. The degree of fluorescence can be easily differentiated between the positive and negative controls. We have tested 100 clinical samples and our results are 100% sensitive and 96% specific with an overall agreement of 98% compared to real-time PCR test results. The impact of this research is broad. The POCD has great potential for the quick diagnosis of a broad range of infectious diseases and other applications such as food and environmental analyses.

Biography

Delfina C Dominguez completed her PhD in Molecular Biology from New Mexico State University and postdoctoral studies from the University of Virginia, Medical School Division of Infectious Diseases, Charlottesville, VA. She is a Professor at The University of Texas at El Paso. Her research interests include Molecular diagnostics, antimicrobial resistance and calcium signaling in Bacteria.

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