



University of Minho  
School of Engineering

CENTRE OF  
**BIOLOGICAL  
ENGINEERING**

# DNA aptamers towards *Yersinia Enterocolitica* and *Moraxella Catarrhalis* adhesins in novel POC diagnostics

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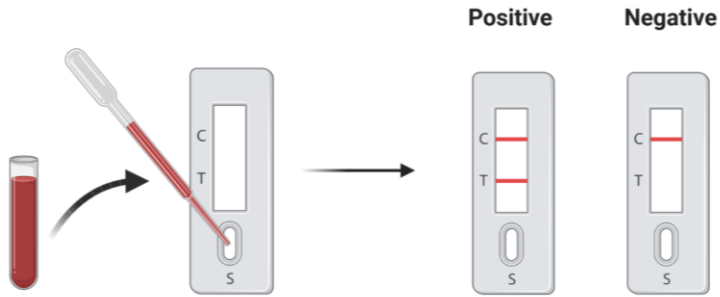
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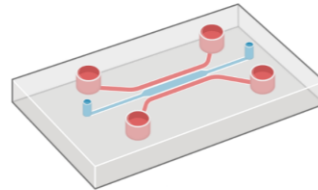
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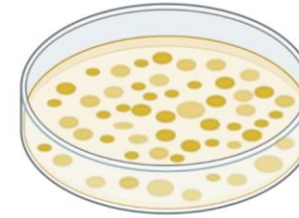
# Background



Lateral flow test



Microfluidic chip



Point of care (POC) rapid diagnosis of pathogenic infections

Conventional diagnostics

✓ Affordable, sensitive, specific, rapid and robust, equipment-free and deliverable to end-users

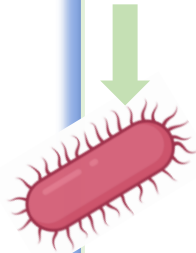


✗ Slow, expensive, complex, laboratory equipment, high limit of detection



## AIM

Selection of **novel aptamers** towards outer-membrane protein adhesins **YadA** of *Yersinia enterocolitica* and **UspA2** of *Moraxella catarrhalis* by computer-aided **cell-SELEX**.

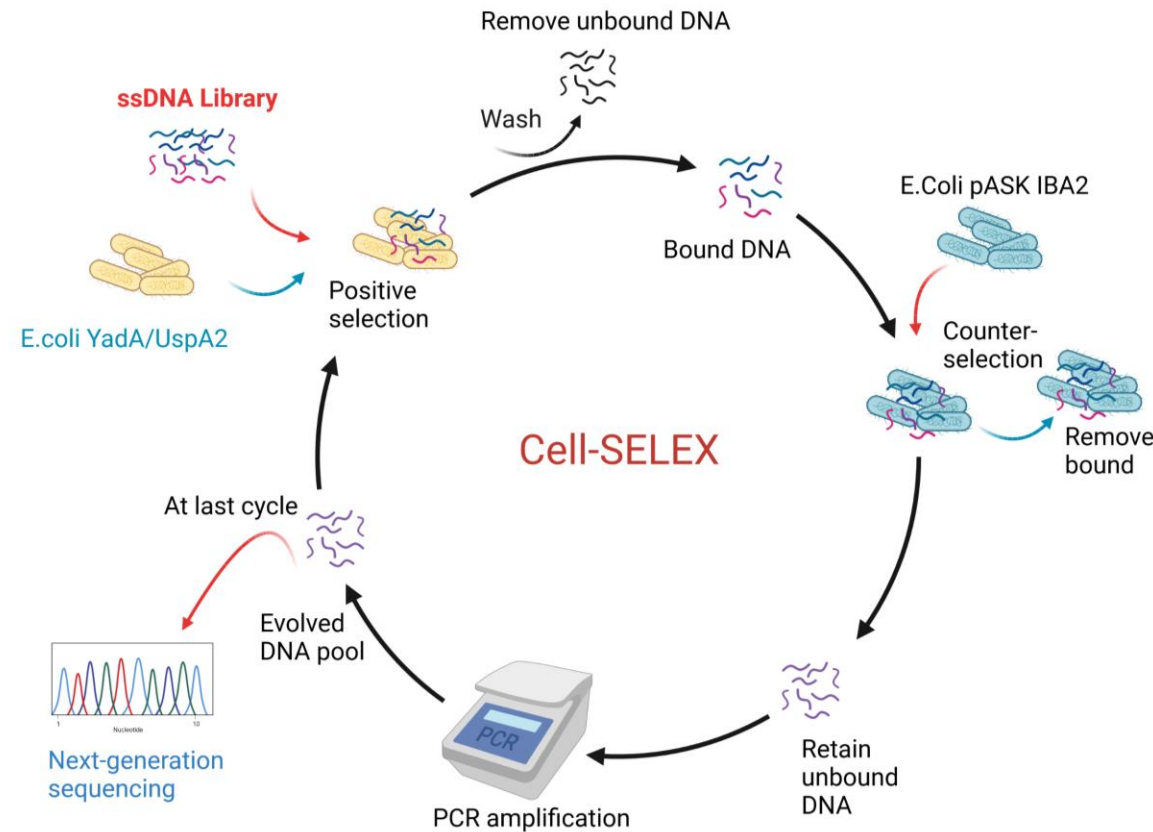
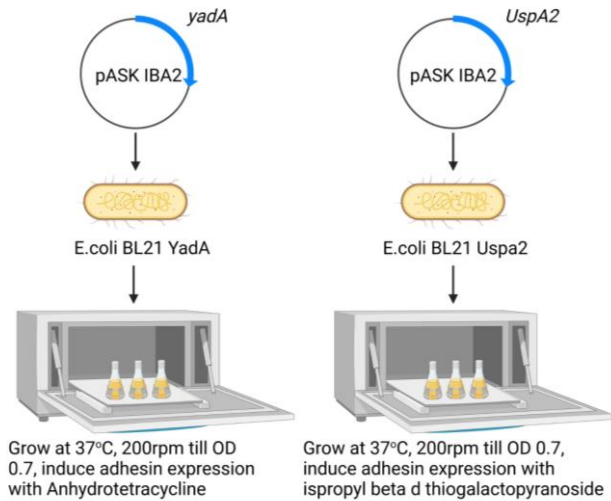


Develop an **electrochemical sensor** with the aptamers to detect the bacterial pathogens



# Methods

## Molecular cloning of YadA and UspA2 for expression in *Escherichia coli*



Final aptamer selection using computational analysis

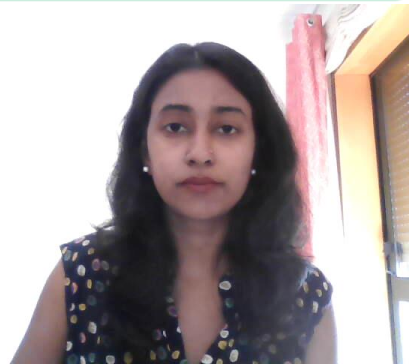
Eight cycles of selection (each)

The final aptamer pool(s) were next-generation sequenced

Analysis of

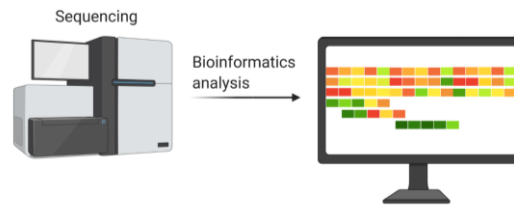
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In silico and in vivo

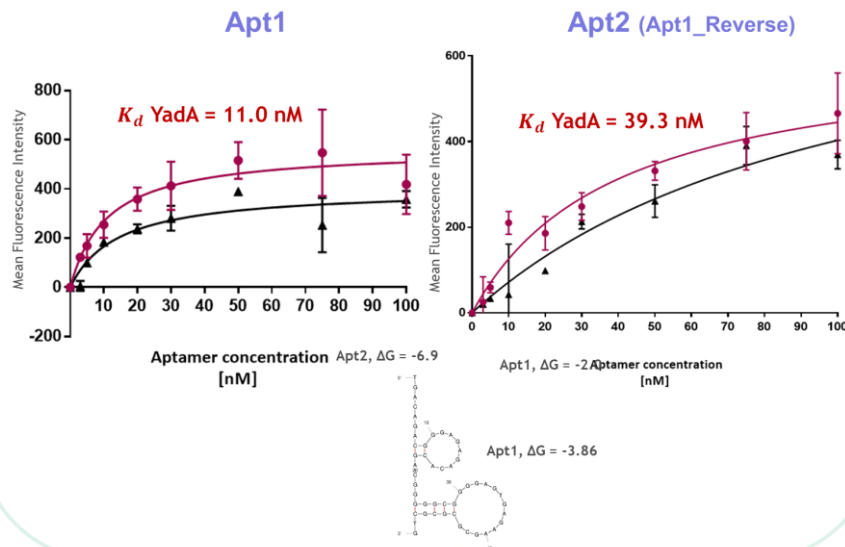


# Results

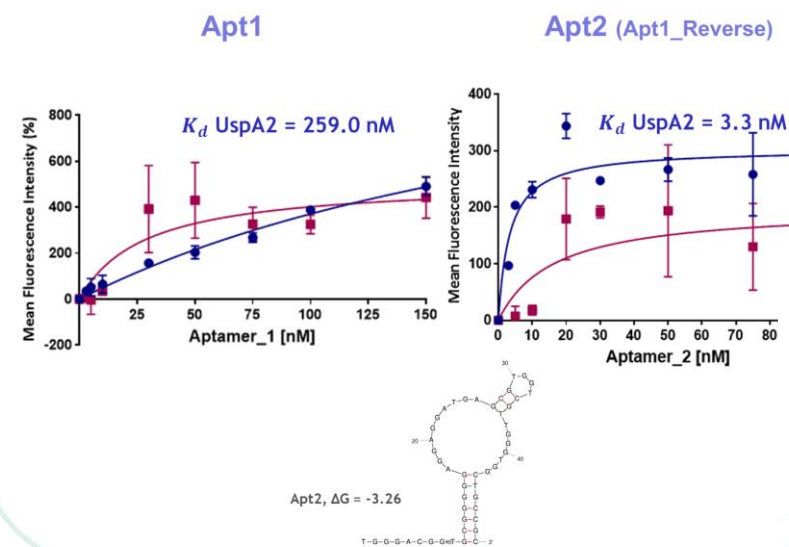
Successfully identified aptamer candidates towards YadA and UspA2 adhesins by Cell-SELEX and aided by next generation sequencing and bioinformatics tools



Affinity properties of the Apt1 and Apt2 towards YadA



Affinity properties of the Apt1 and Apt2 towards UspA2



# Conclusion and next steps!

The results suggest that Apt1 YadA and Apt2 UspA2 are promising candidates for application in a diagnostic workflow to identify pathogens *Yersinia enterocolitica* and *Moraxella catarrhalis* respectively with high specificity

## Electrochemical sensor

Functionalise gold screen printed electrodes with the selected aptamers to develop POC electrochemical sensors for diagnosis of bacterial infections

