Lipids to detect tuberculosis?

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Stop TB Partnership

New Diagnostics Working Group

Mycolic acids

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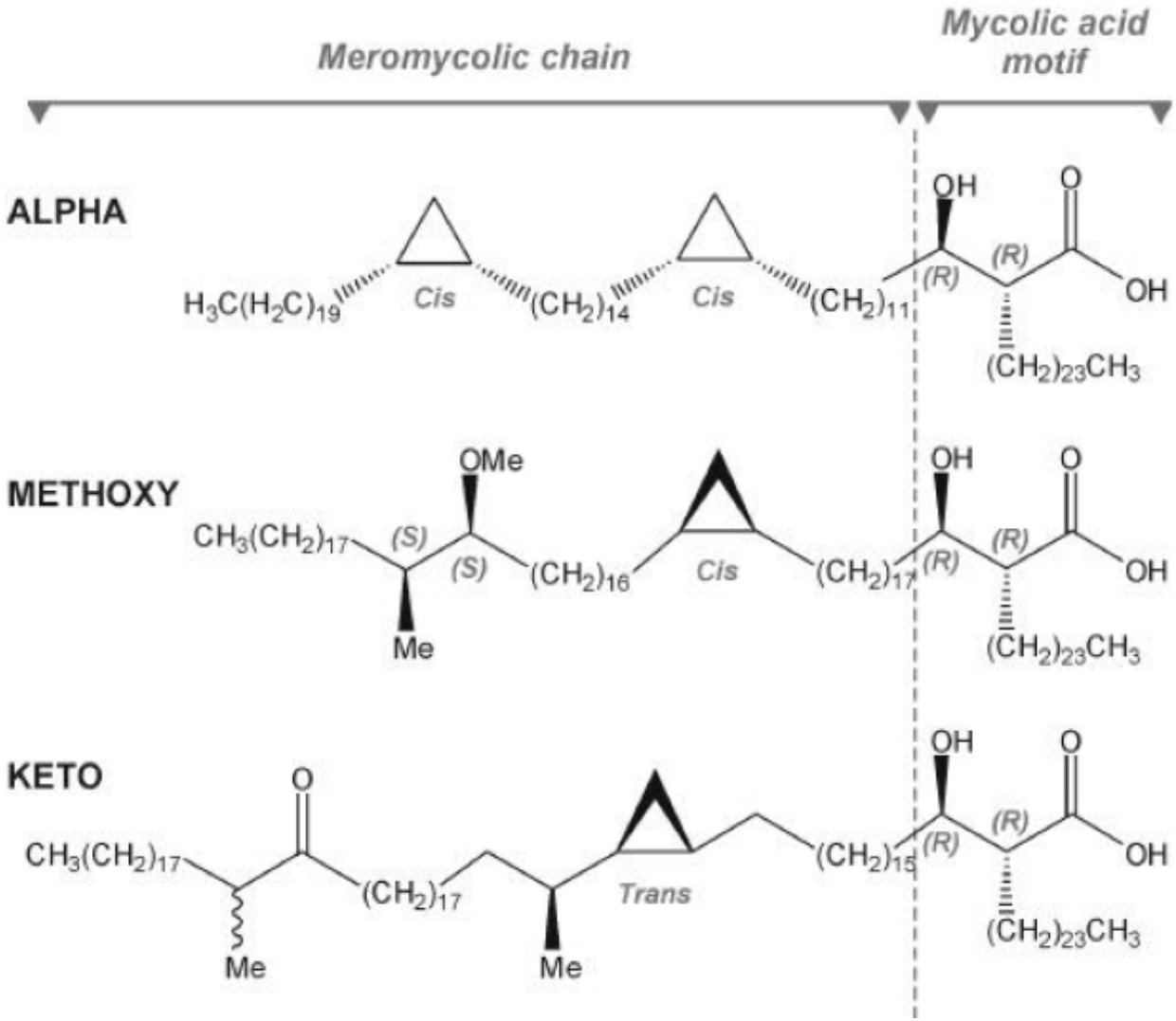
Different Mycobacteria have their own unique Mycolic Acid (MA) compositions

Mycolic acids

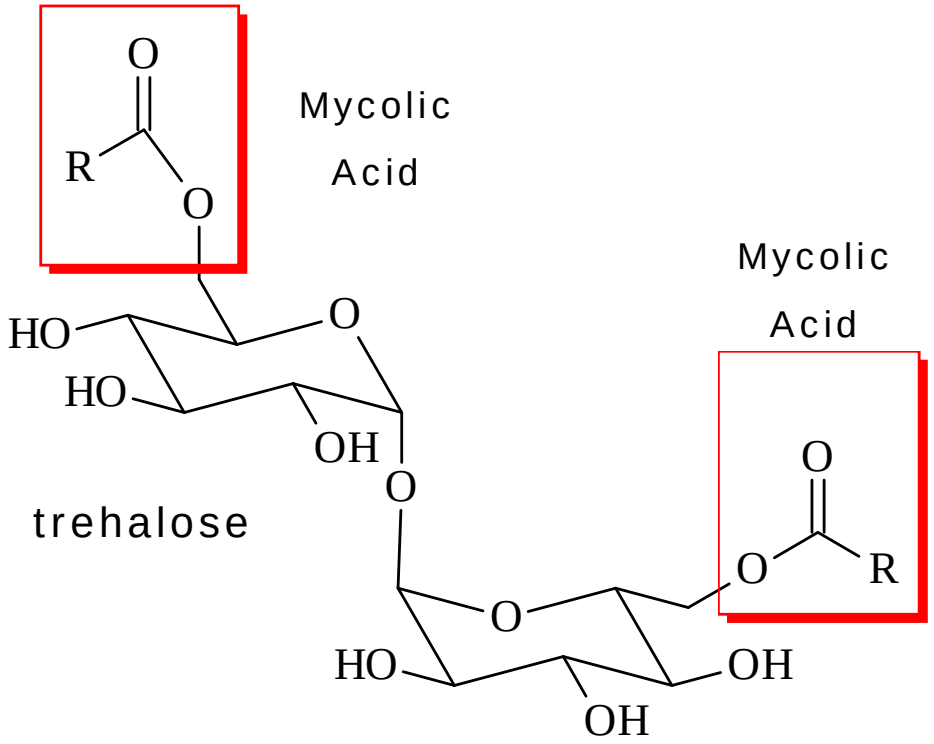
Three main classes of MA for *M. Tuberculosis*



Cord Factors (sugar esters)

(trehalose dimycolate, TDM)

Dr. Pritchard



Dr. Dulayymi

We now have > 60 individual isomers to test!

Encouraging literature

Complex natural mixtures of cord factors can be used as an antigen for TB

(Yano *et al* 1991)

Isolated MA sub-classes are recognised by IgG antibodies

(Pan *et al* 1999)

Natural MA can be used as an antigen for TB in the presence of HIV-AIDS

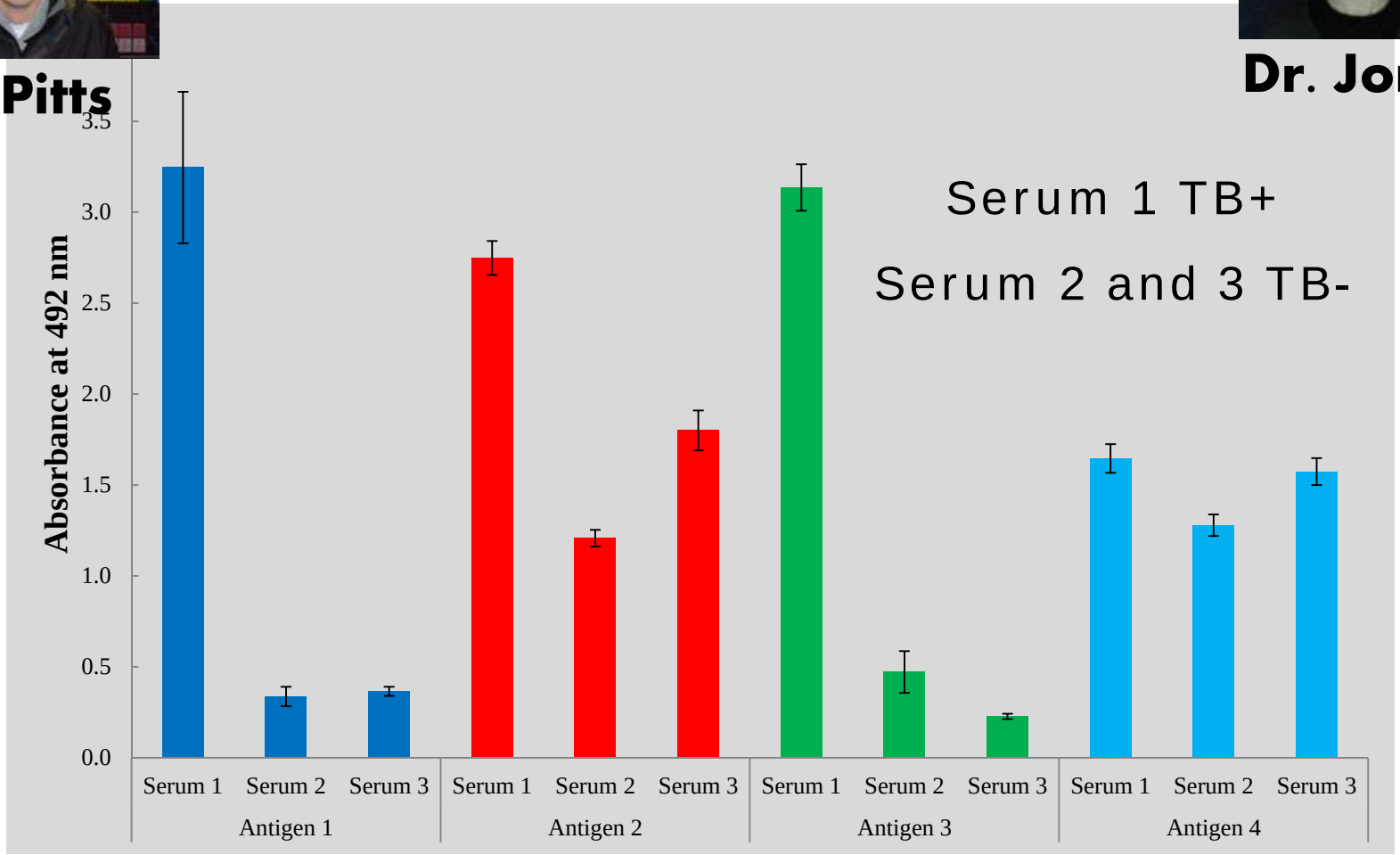
(Verschoor *et al* 2002)

Can we improve on this with synthetic single isomers?

Different antigens give selective responses

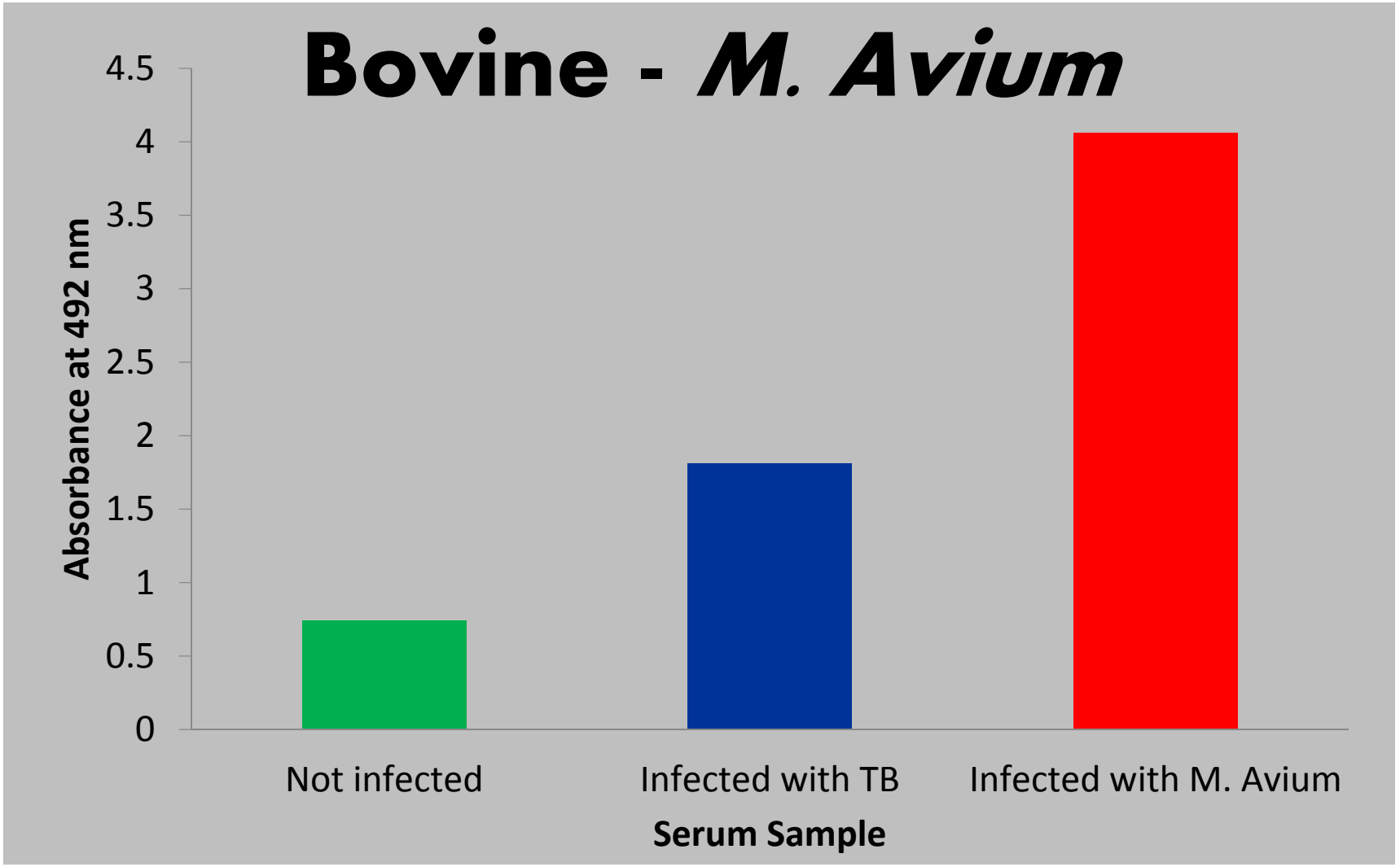
Dr. Pitts

Dr. Jones



Patent No. WO 2012/153111 A1

Other microbial infections



ELISA results from a blind study of 350 WHO TB indigenous samples

Vaccination does not interfere

Different single synthetic MA and their derivatives give differential responses

Our best antigen gave
85% Sensitivity and 85% Specificity

UK negatives are much cleaner

Country variations!

By using two antigens with a set of Gambia samples we used a ‘traffic light’ system that gave

100 % Sensitivity

91 % Specificity

From a clinical setting to the field

We have taken 4 additional approaches

1. Evanesce

On 350 blind samples

73 % Sensitivity - 81 % Specificity

2. Impedance

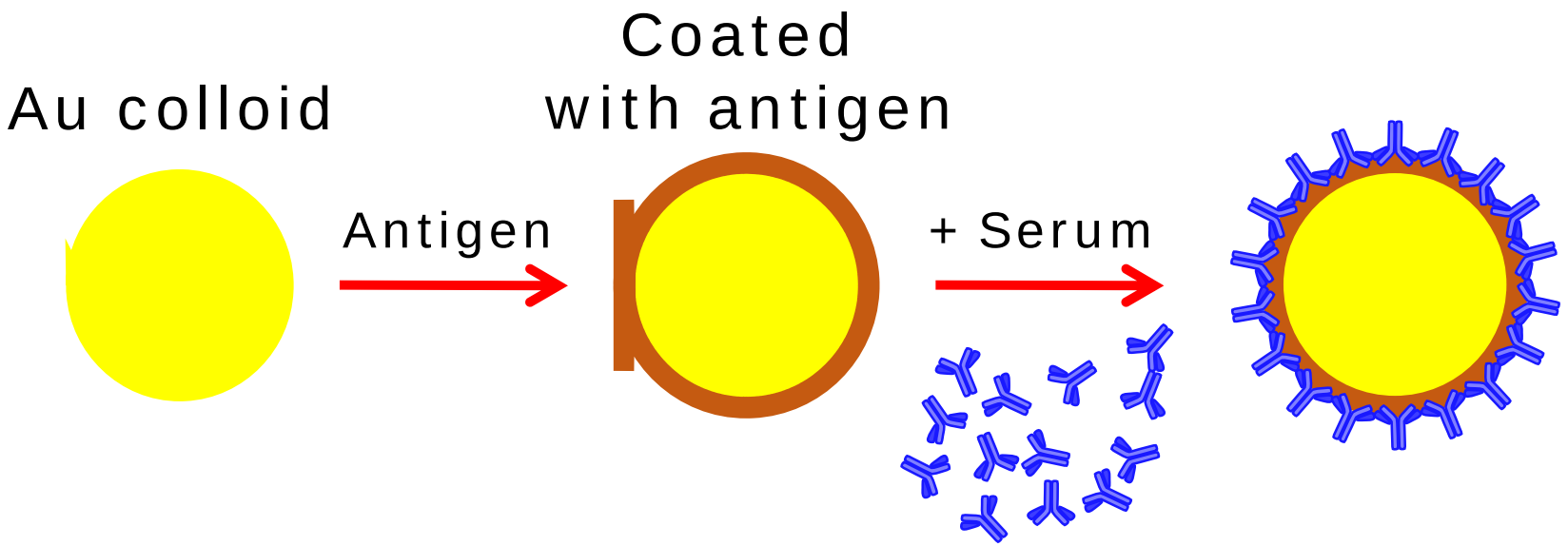
Plus two PoC systems

Patent No. 1101021.2 – Filed 2013

Patent No. WO 2012/131394 A1

Assay development

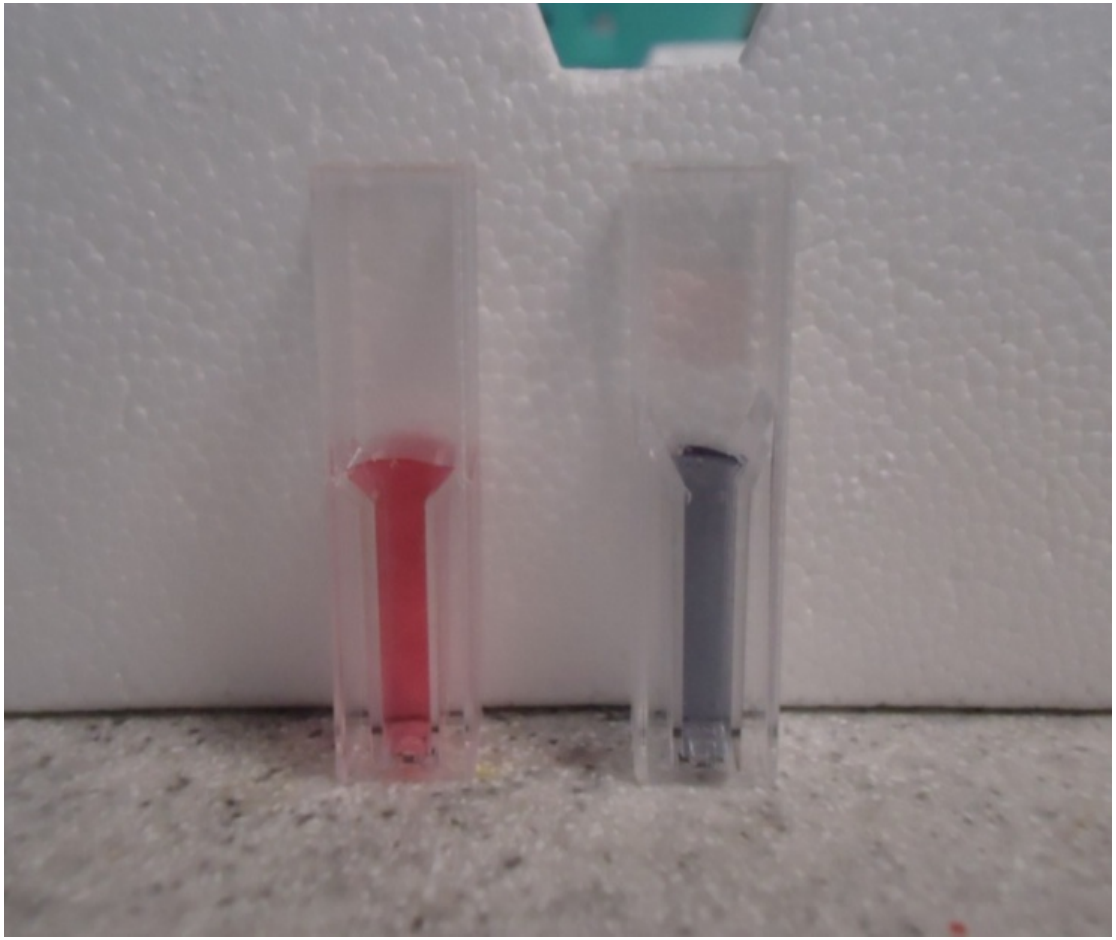
Dr. Pitts



Look for a change in the absorbance

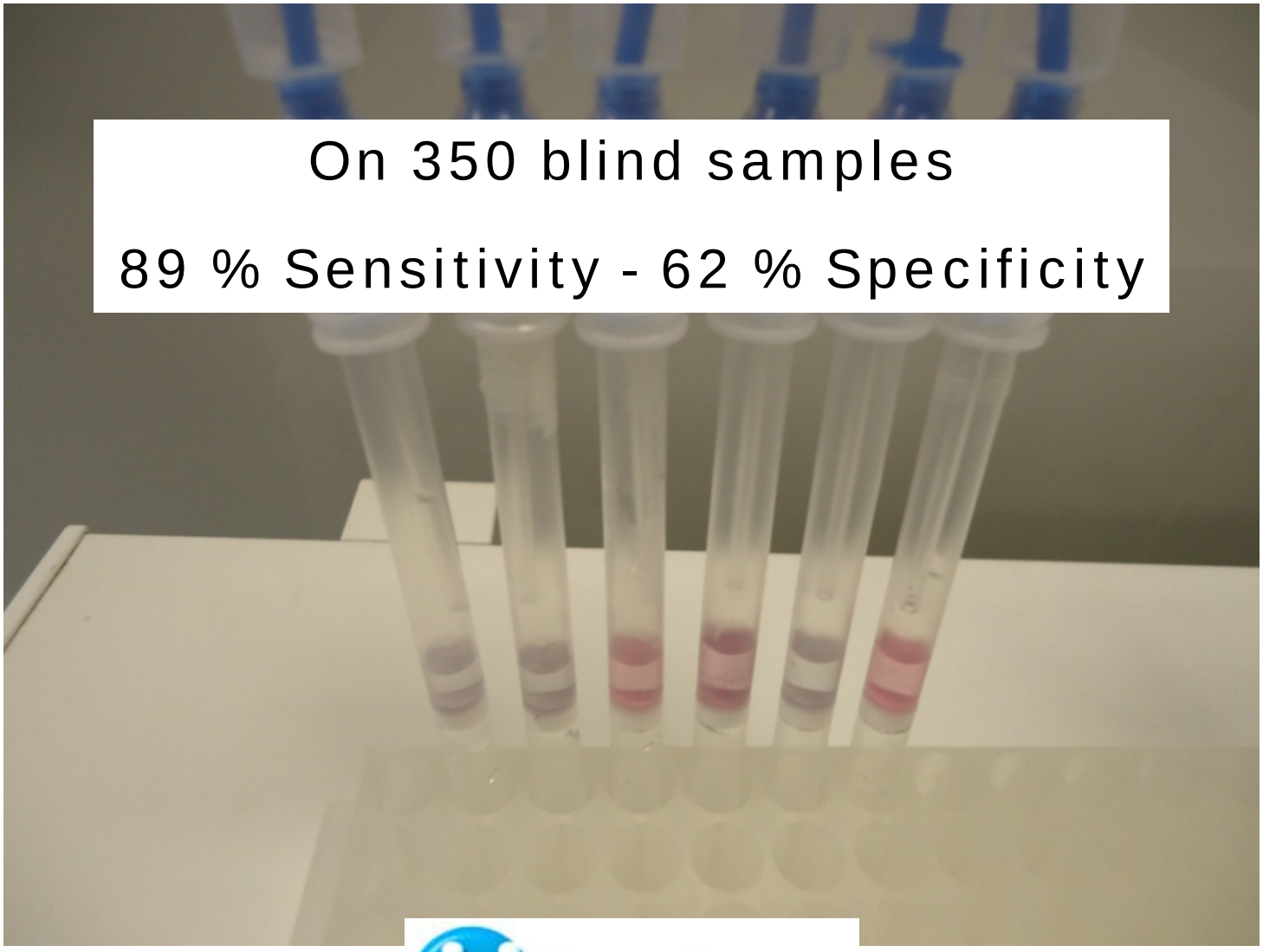
Patent No. WO 2012/153111 A1

Colour response within minutes



Positive Negative

Sensor development

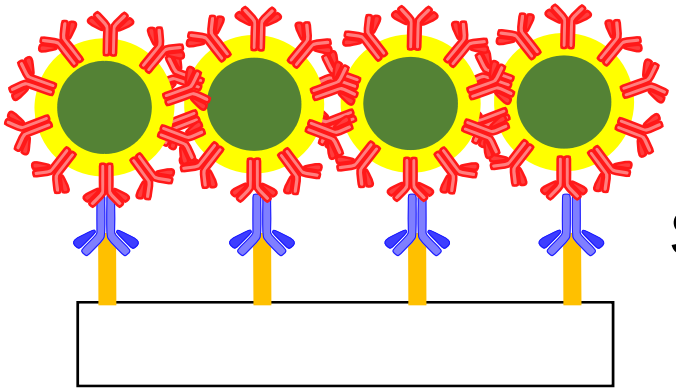


hygiena

Paper based device

Particle secondary antibody conjugate

Lipid Antigens



Sera containing the antibodies of interest are added

Patent No. 1414369.7 – Filed 2014

Paper based device

Paper based device

TB positive serum | TB negative serum | Control (no serum)

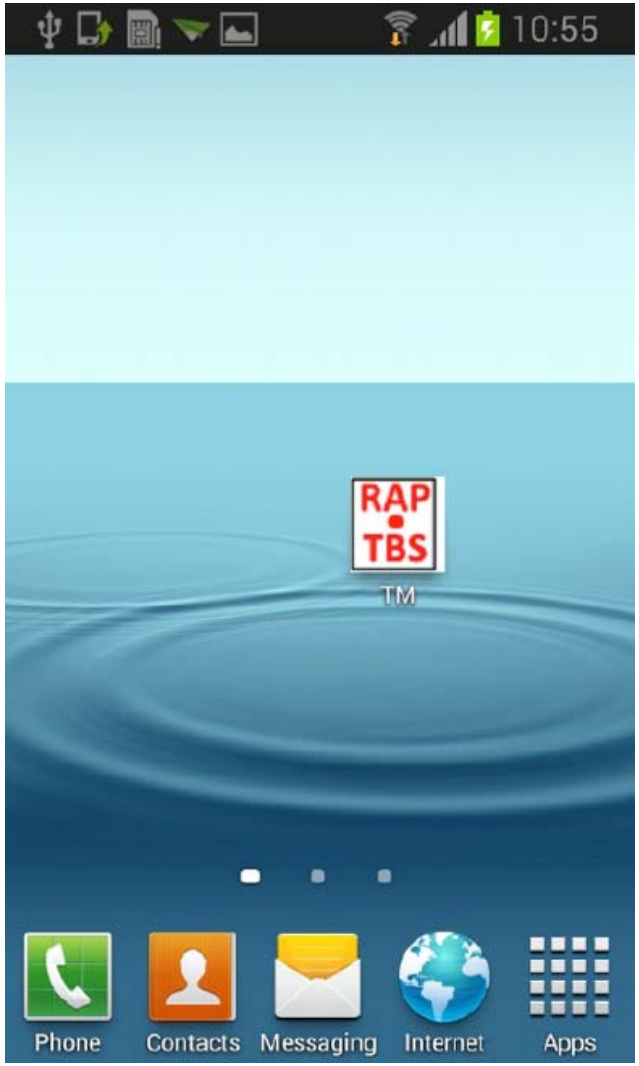
Paper based device

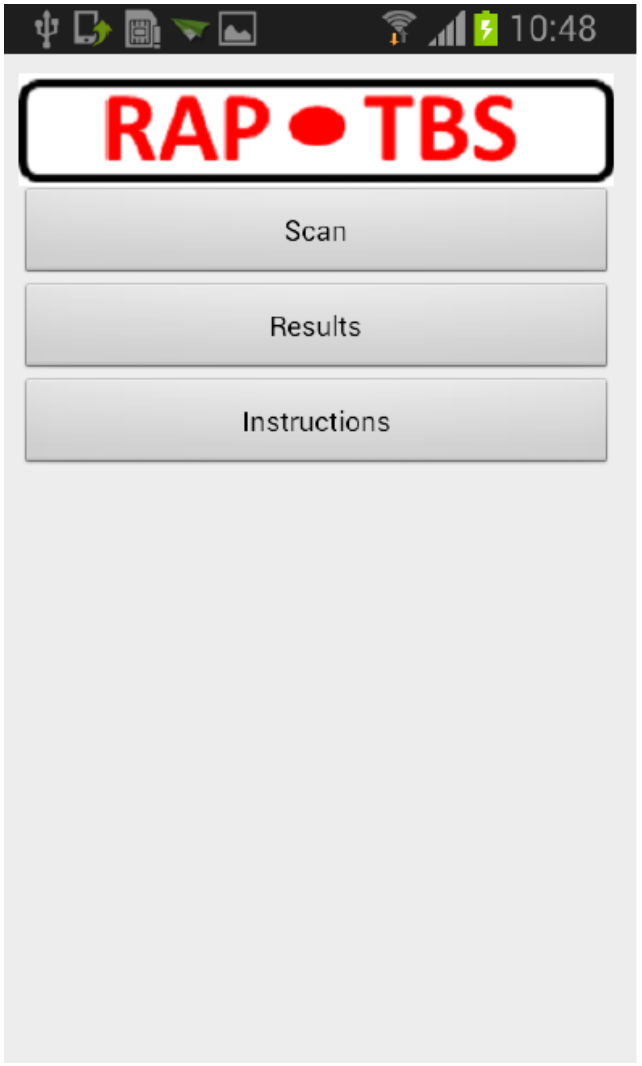
TB positive serum

TB negative serum

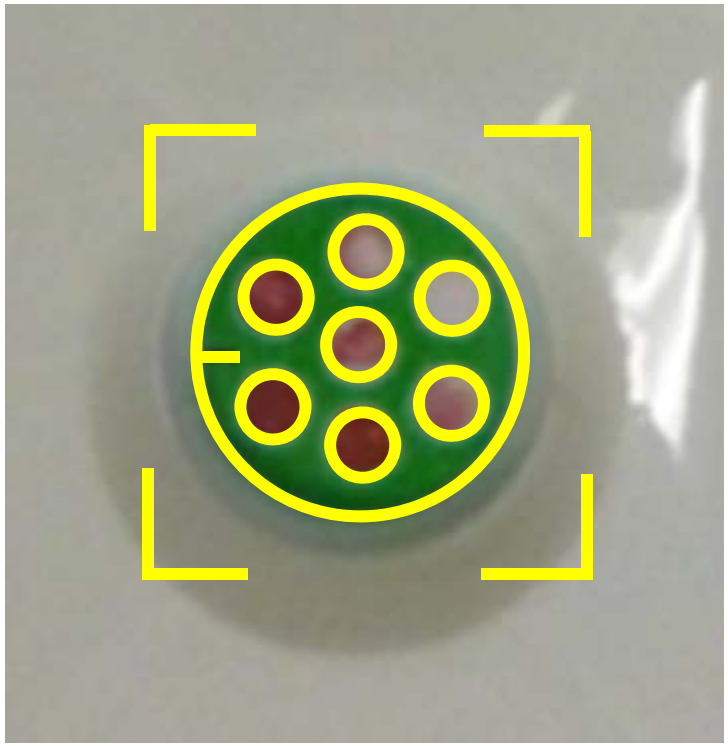
Control (no serum)

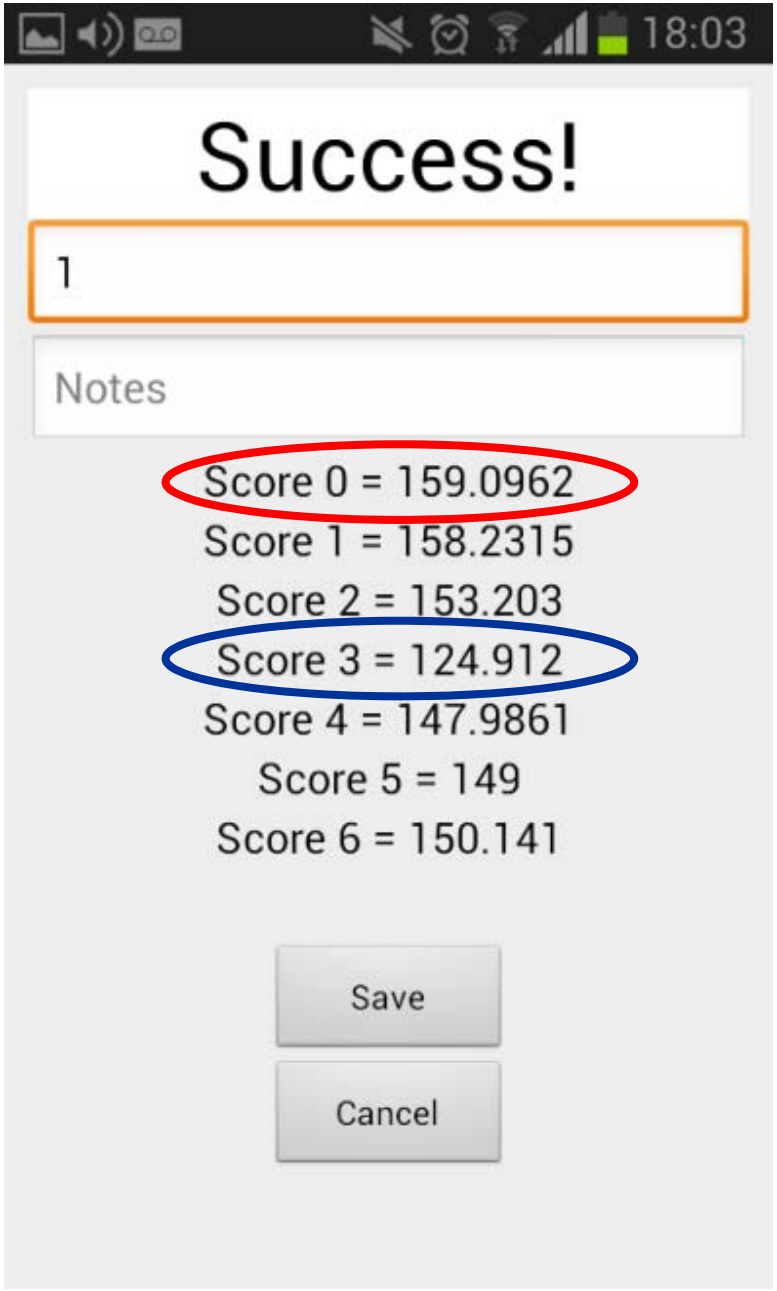
novarum
mobile reader solutions



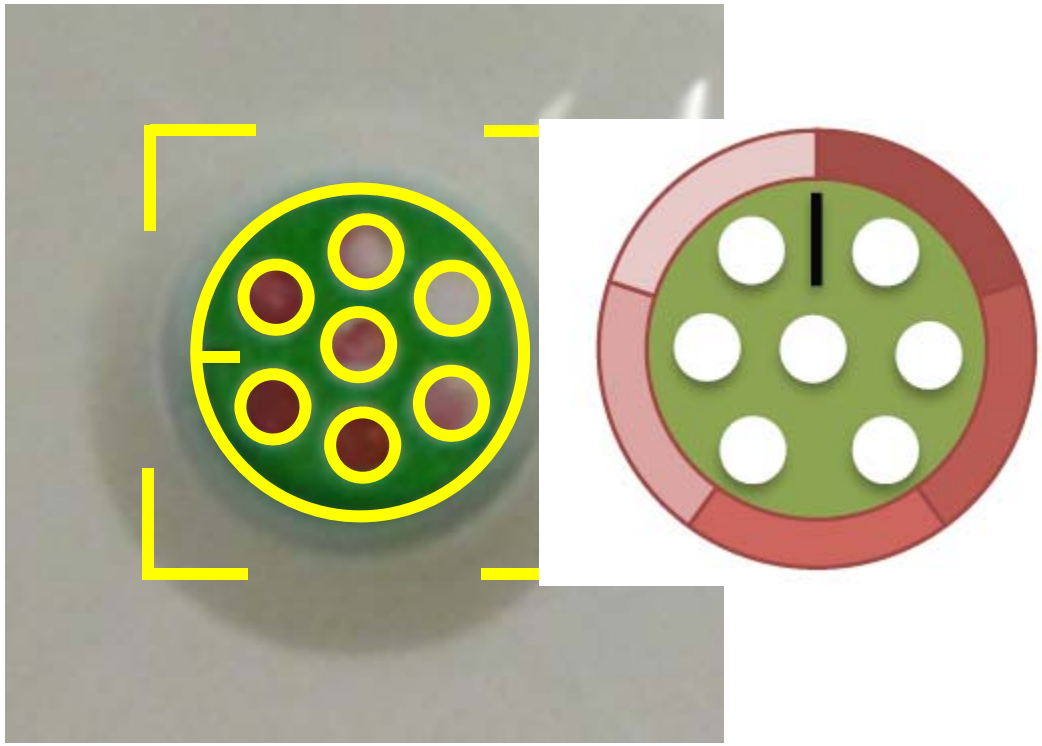


Paper based device




18:03
Success!
1
Notes
Score 0 = 159.0962
Score 1 = 158.2315
Score 2 = 153.203
Score 3 = 124.912
Score 4 = 147.9861
Score 5 = 149
Score 6 = 150.141
Save
Cancel

Paper based device



The second stage of the development will have extra controls built into the application to take account of variations in lighting

Imminent work

The flow through device needs optimizing in conjunction with the phone application

We will then test the known 350 WHO serum samples

Most likely re-optimize

Then test 200 of FINDs blind serum samples

Conclusions

Lipid antigens do detect TB antibodies

We get different responses for different mycobacterial infections

The response is dependant on which lipid antigens are used

We can get a result in under 10 mins, which is readable by eye and/or by phone for under 10$

Needs no external power supply

The response is not affected by BCG and does not appear to give a signal from latent TB

PRIFYSGOL BANGOR UNIVERSITY

Thanks you for your attention

ERDF
Llywodraeth Cymru Welsh Government
Ewrop & Chymru: Buddsoddi yn eich dyfodol
Cronfa Datblygu Rhanbarthol Ewrop
Europe & Wales: Investing in your future
European Regional Development Fund

Chris Gwenin
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http://gwenin.com/

GWENT GROUP
ADVANCED MATERIAL SYSTEMS

Stop TB Partnership

New Diagnostics Working Group

Bio-Check uk