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About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Diagnosis of Active TB using Aptamers

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2nd International Conference and Exhibition on Pathology

06th August 2013

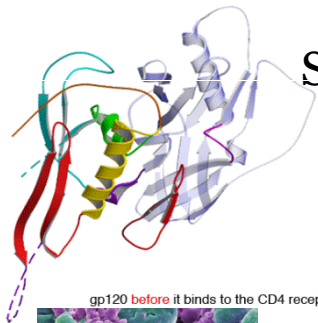
Embassy Suites Las Vegas, Nevada, USA

CSIR

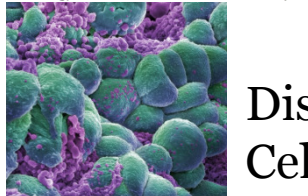
our future through science

What are Aptamers?

- ❑ Aptamers are artificial nucleic acid or peptide ligands selected *in vitro* using the SELEX process.
- ❑ They are single stranded DNA, RNA or peptides capable of assuming well defined 3-D structures that can recognize:



Surface proteins (e.g. gp120)



Diseased Cells (e.g. cancerous cells)



HIV



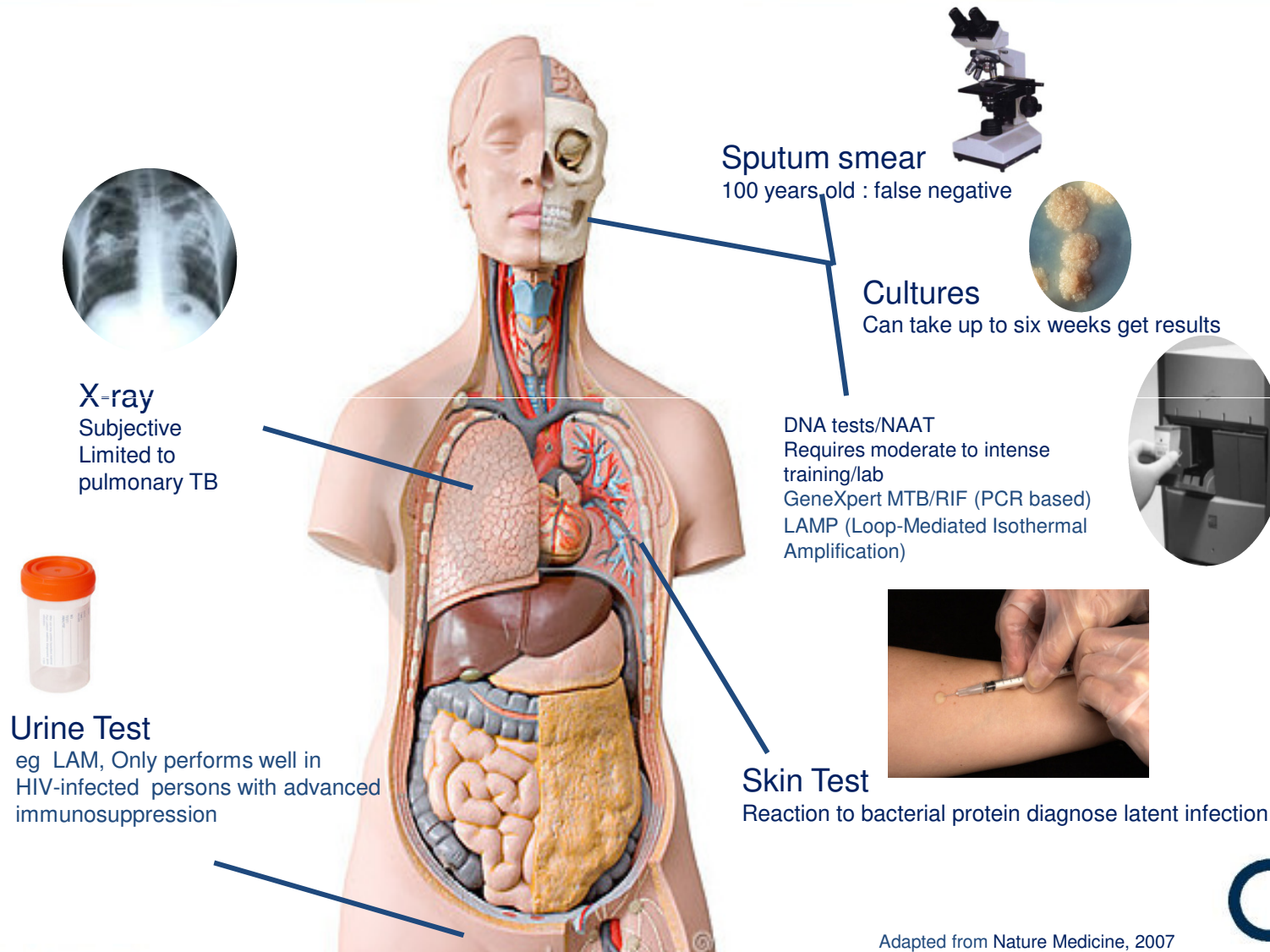
TB bacillus, Malaria or Bilharzias parasites

Khati., **Journal of Clinical Pathology**. 2010 (63): 480-487

Advantages of aptamers over antibodies

	Antibodies	Aptamers
Production	Expensive	Fast, inexpensive
Stability	X	√
Reusability	X	√
Ease of Modification	X	√

Current TB Diagnostics



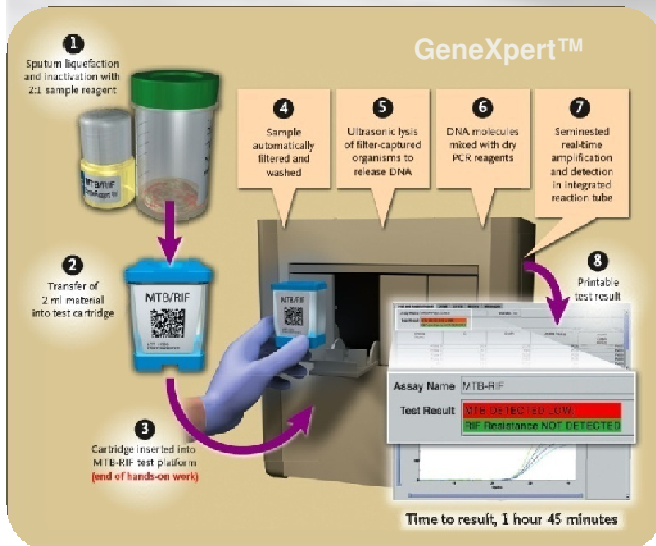
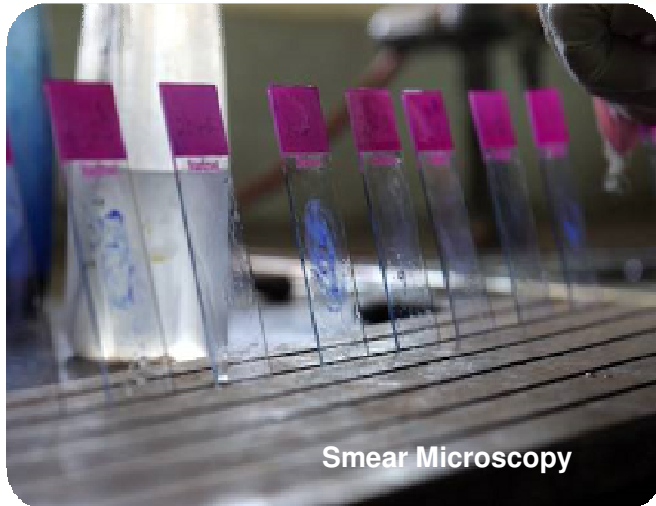
Market need

❑ There is a need for a:

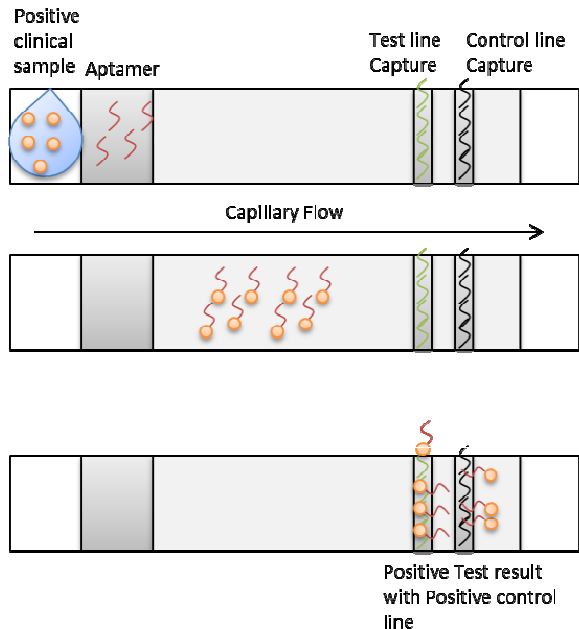
- ✓ Simple
- ✓ Rapid
- ✓ Accurate
- ✓ Affordable

❑ PoC TB Diagnostic

❑ For opportune intervention in high HIV and TB prevalence developing countries.



CSIR address the need using the aptamer technology



Negative



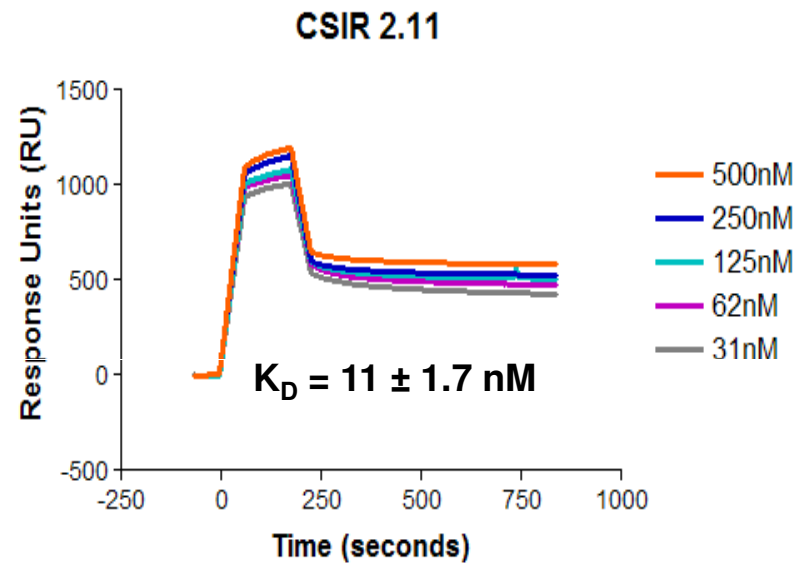
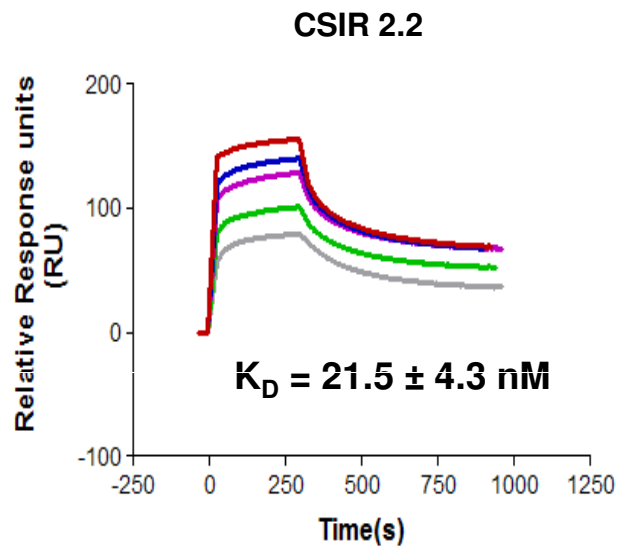
Positive



□ Properties of aptamer-based TB Dx:

- ✓ Simple.
- ✓ Rapid.
- ✓ Accurate.
- ✓ Affordable to the end-user.
- ✓ Requires minimal training.
- ✓ Equipment free.
- ✓ Deliverable to the end-user.
- ✓ Can be used at PoC in rural clinics.
- ✓ Under-cut currently available TB Dx.

Aptamers bind to TB antigens with high affinity



Rotherham et al. 2012, **PLoS ONE** 7(10): e46862. doi:10.1371/journal.pone.0046862

Validation in Clinical Sputum Samples (Rotherham *et al.*, PLoS One, 2012)

Sputum samples used in the proof-of-principle study (n = 68)

Definite TB (n=20)
(MGIT 960 positive for TB)

Non TB patients (n=48)

Tuberculosis status	Aptamer-based Test Result		
	Subjects (n)	Positive for CFP-10	
Sputum samples negative for TB	20	8	Specificity 68.75%
Latent infection	5	2	
Smear negative, culture negative	15	6	
Healthy laboratory volunteers negative for TB	28	7	

Aptamers detect active TB from sputum samples

Tuberculosis status	Youden's cut-point*		
	Subjects (n)	Positive for CFP-10	Sensitivity
Sputum samples positive for TB	20	20	100%
Smear positive, culture positive	15	15	
Smear negative, culture positive	5	5	
			Specificity
Sputum samples negative for TB	20	8	68.75%
Latent infection	5	2	
Smear negative, culture negative	15	6	
Presumably Healthy laboratory volunteers (without TB)	28	7	

Rotherham et al. 2012, **PLoS ONE** 7(10): e46862. doi:10.1371/journal.pone.0046862

Comparison of AptaMax- PoC-TB Dx to Smear Microscopy and GeneXpert™ using ASSURED criteria

Criteria	Smear Microscopy	GeneXpert™	AptaMax TB Dx (ELONA)	AptaMax POC TB Dx
Affordable	\$1/test	>\$10/test	\$1 /test	<\$1/test
Sensitive	35 – 70%	>80%	80 – 100%	90 – 100%)
Specific	> 95%	90 – 100%	68%	>80%
User-friendly	No	Yes	Almost	Yes
Rapid and robust	24 hours	< 2 hours	8 hours	< 2 hours
Equipment-free	No	No	No	Yes
Deliverable to end-users	No	No	No	Yes

The A-Team



Technology Transfer & Commercialization Partner



Aptamax

An undiagnosed person is one too many



Acknowledgements

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- ✓ UP (Jacques Theron)
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- ✓ Harvard University, USA (Eric Rubin & Sarah Fortune)

❑ Reagents

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- ✓ Stellenbosch University (NC Gey van Pittius)
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GATES foundation



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