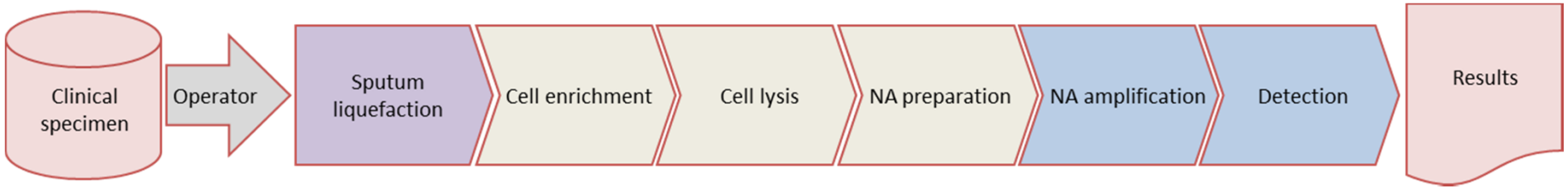

Wikipedia


Guardian

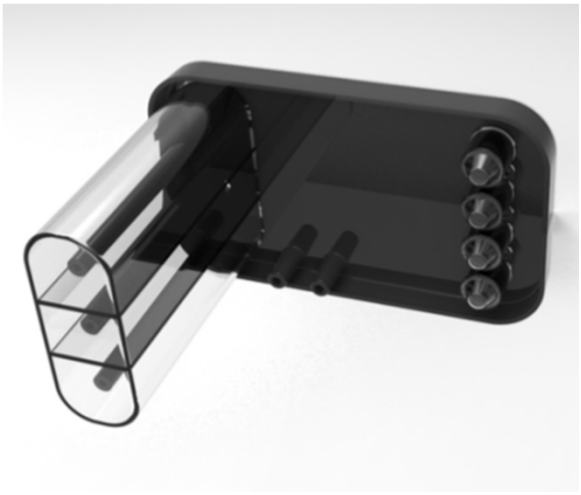
Rethinking TB POC diagnostics – simplicity rules

October 2014 Andy Wende

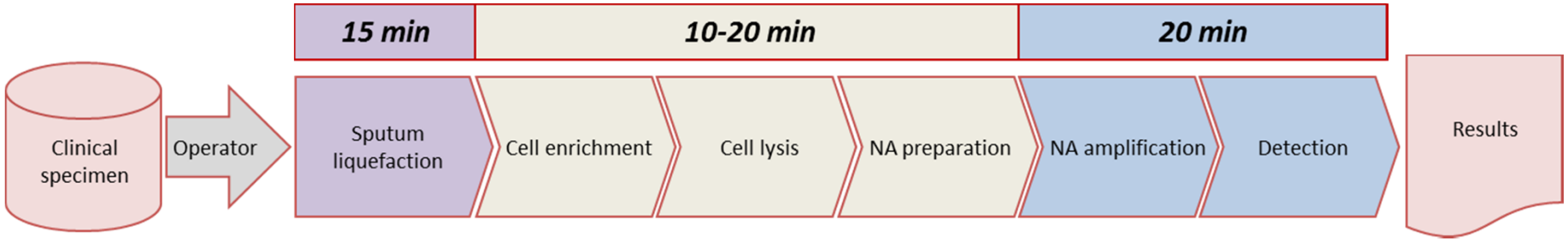
TB POC project - objectives



user-friendly	fully automated processing
cheap	no active valves or metering, few plastic parts, reusable for reflex DST
robust	no moving parts, no microfluidics
versatile	applicable to broad range of cells & viruses in swabs & liquids
rapid	TAT: swabs 30min, liquids 40min (sputum 55min)
sustainable	battery-powered, stand-alone, self-calibrating



TB POC project - Phase 1 - overview



Liquefaction

- NaOH based
- TB inactivation

SpeedXtract

- cell enrichment
- heat lysis
- reverse purification (inhibitor removal)

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HDA + TubeScanner

- isothermal amplification
- PCR-like sensitivity
- real-time multiplex detection

- data management
- self-calibrating instrument
- full range of connectivity

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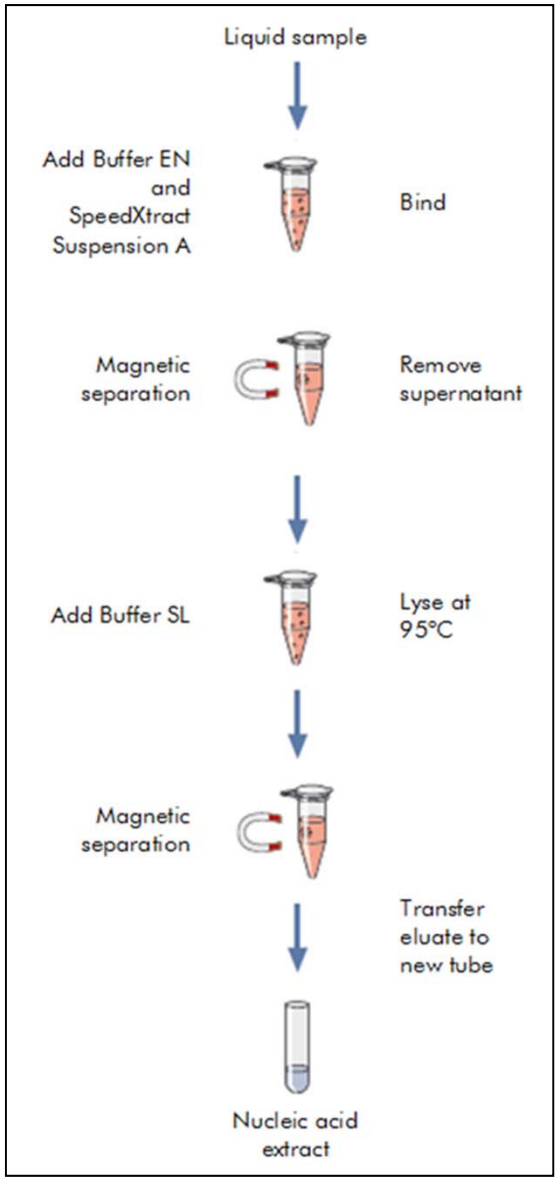
BILL & MELINDA GATES foundation

SpeedXtract – novel generic sample preparation

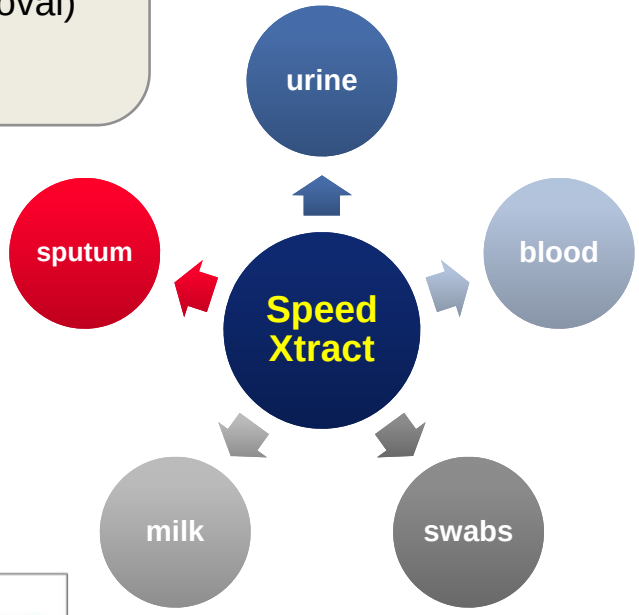


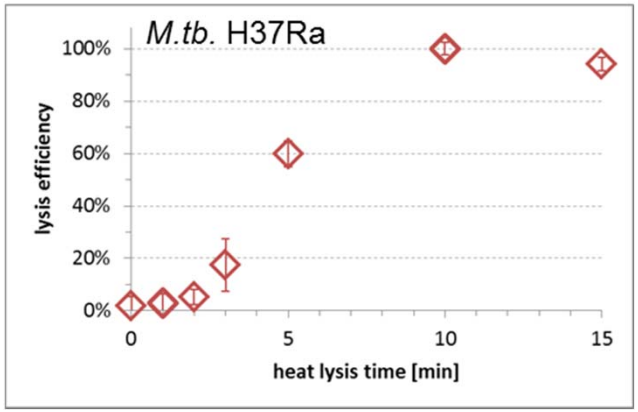
SpeedXtract

- designed for automation
- dual-purpose magnetic beads (enrichment & inhibitor removal)
- efficient heat lysis
- reverse purification

target cell types:

- human cells
- gram-neg. bacteria
- gram-pos. bacteria
- protozoa
- viruses

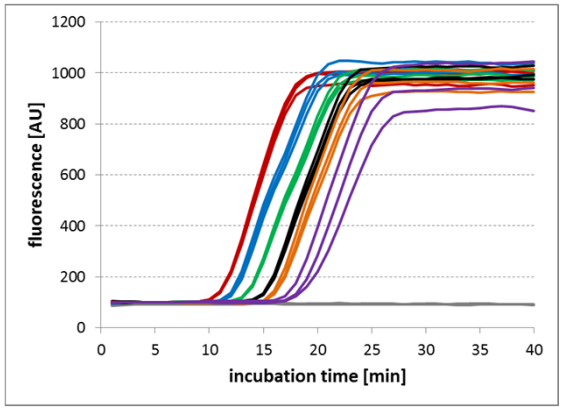


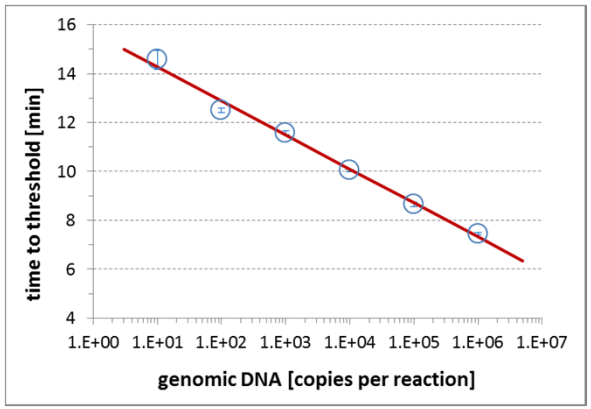


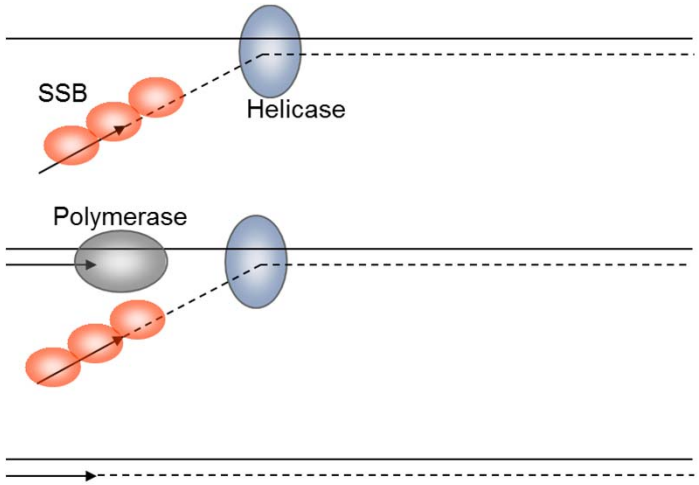
HDA – isothermal real-time PCR

Helicase-dependent amplification

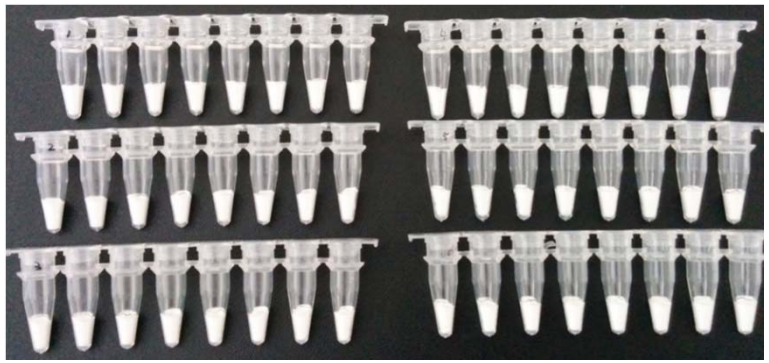
- isothermal amplification
- PCR-like sensitivity
- real-time multiplex detection







reaction temperature: 60-65°C



M. tuberculosis - specific HDA:

- o includes internal amplification control
- o dried reagents available
- o LoD = 10 cp TB / reaction

ESE TubeScanner – powerful yet portable

TubeScanner

- real-time fluorescence detection
- self-calibrating optics
- data management
- full range of connectivity
- modular design concept

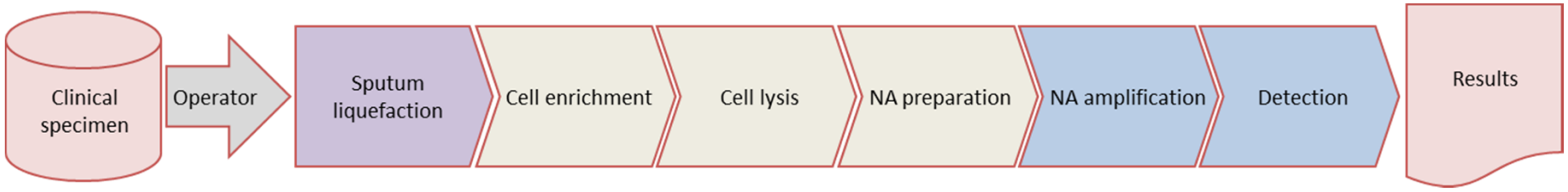
Instrument features

- Up to 12 samples (up to 200 µl volume each)
- 10°C – 95°C sample temperature
- Up to 6 fluorescence channels
- Variety of safety and self-test features
- Internal solid-state fluorescence standards
- Automated result interpretation

- autonomous operation via 7“ touchscreen
- powered by rechargable battery pack
- LAN / WiFi / GSM connectivity
- HIS / LIMS communication (HL7 standardized)
- Barcode / RFID support (internal and external)
- External label printer available
- size 23 x 23 x 14 cm, weight 4 kg

Lateral Flow Reader
(instrument sibling of TS)

TB POC project - Phase 1 - clinical data (N = 100)



Liquefaction ***15 min***

SpeedXtract ***20 min***

HDA @ TubeScanner ***20 min***

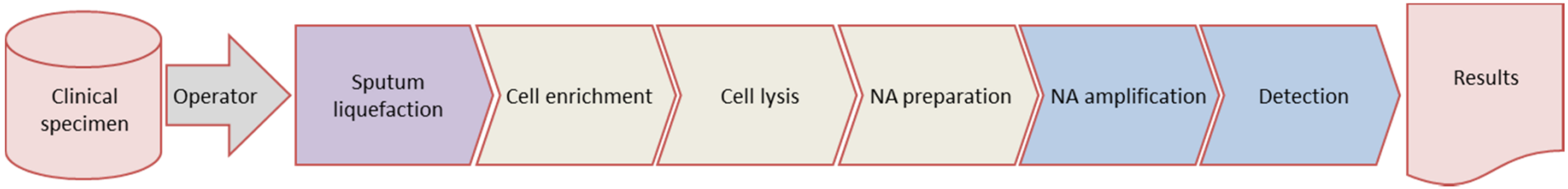
smear

TB-HDA	***N = 79***	pos.	neg.
	pos.	19	9
	neg.	4	47

culture

TB-HDA	***N = 52***	pos.	NTM	neg.
	pos.	5	1	7
	neg.		1	38

TB POC project - Phase 2



- fully automated SpeedXtract
- multiplexed real-time isothermal amplification (HDA) (geometric, fluorescent, melt temperature)
- nucleic acid extract can be reused for reflex DST

- builds on Tubescanner modules
- accomodates up to 3 cartridges
- random access mode
- stand-alone operation
- battery-powered
- print-outs and electronic connectivity

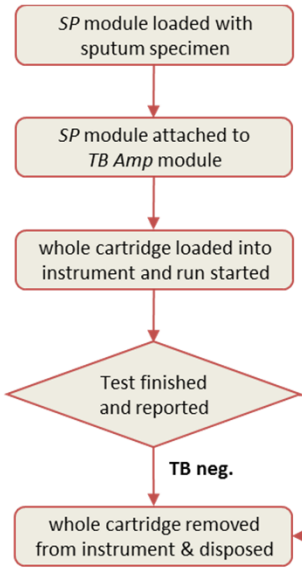
Drug sensitivity testing – economic “on demand”

TB case finding can be separated from **Drug Sensitivity Testing** (DST)

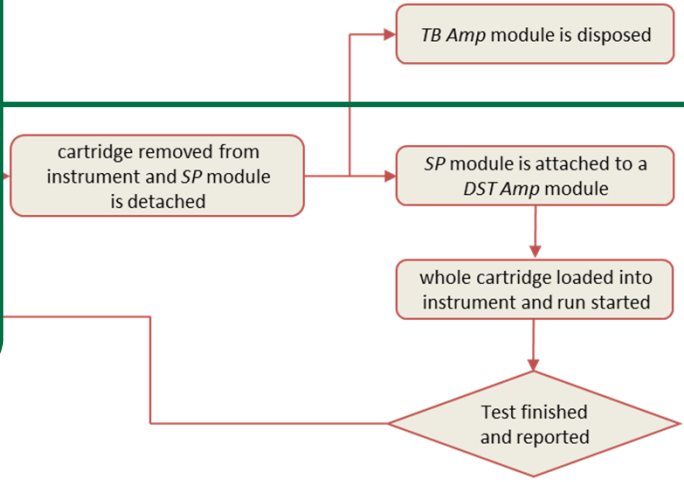
Cartridge & chemistry concept allows re-use of prepared sample for subsequent NA amp. test

TB case finding

- o sensitive
- o fast
- o cheap



TB pos.



Drug sensitivity testing

- o sensitive
- o multiple targets
  - o Rifampicin
  - o Fluoroquinol.
  - o Isoniazide
  - o PAMZ (?)

Back-up slides

Cartridge designs