



apopo

Saving lives from disaster and disease by training HeroRATS



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Our Mission:

To become the Centre of Excellence in detection rats technology,
to enhance the impact of life saving actions in vulnerable communities



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A man in a white lab coat is looking into a biosafety cabinet. Inside the cabinet, a rat is sitting on a surface, holding a small object in its mouth. The background shows laboratory equipment and a window.

Why rats?

The African Giant Pouched Rat

- is an intelligent creature, easily conditioned, loves to do repetitive tasks if rewarded with food
- has a highly developed sense of smell
- has an 8-year lifespan with several productive years after initial 1 year of training
- is lightweight, so cannot set off a mine
- compared to dogs: cheaper to breed, feed, house, maintain and transport, does not get attached to one trainer
- can screen 40 Tuberculosis samples in 7 minutes (vs. a human lab technician, who needs a full day to assess 40 samples)



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A person wearing a blue jacket and a helmet is kneeling outdoors, holding a small, light-colored rat. The rat is standing on a pile of soil and wood. The background shows green vegetation and a cloudy sky.

What trained rats can do ?

Search 100m² of suspected land in 20 minutes,
what would take a manual deminer 2 full days;

Screen 40 sputum samples for TB in 7 minutes,
what would take a lab technician 1 full day.

Generic technology: wide variety of spin-off applications



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- Reduced cost price to \$1.18 per square metre
- Affected 44,547 people by mine clearance activities
- Trained 60 HeroRATs, internally accredited according IMAS
- Returned 1.312.027 sqm of suspected land to Mozambican population
- Cleared 169 landmines, 181 UXO's and 3.871 small arms and ammunition



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- Proof of principle for TB diagnosis by means of HeroRATs published in IJTLD
- Sensitivity 86.6% and Specificity 89.1% on 817 culture confirmed sputum samples, 67(+)
- 577 TB patients missed by microscopes but found by HeroRATs
- 21% increased case detection rate in 4 co-operating DOTS centers (N = 15.401 patients)



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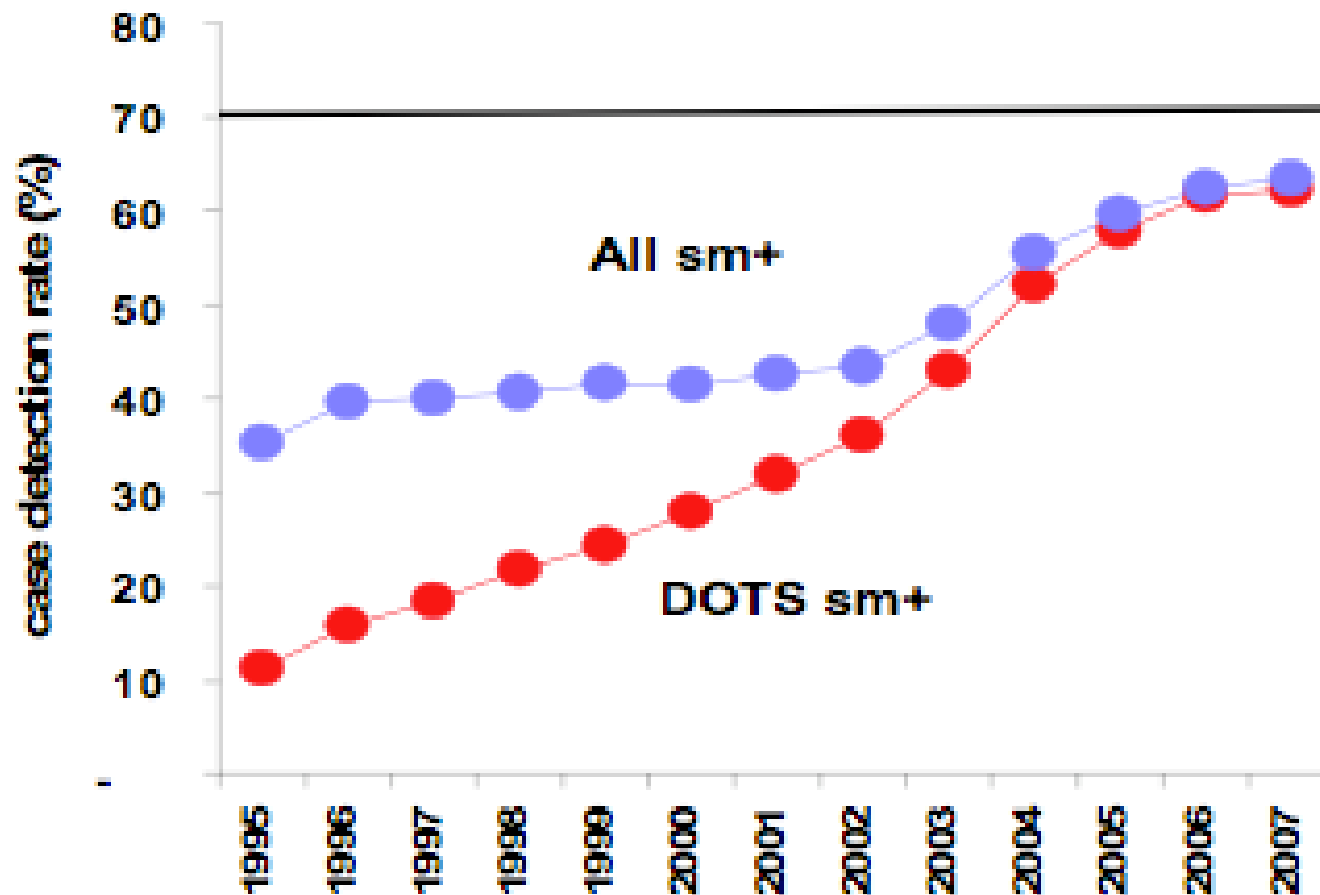
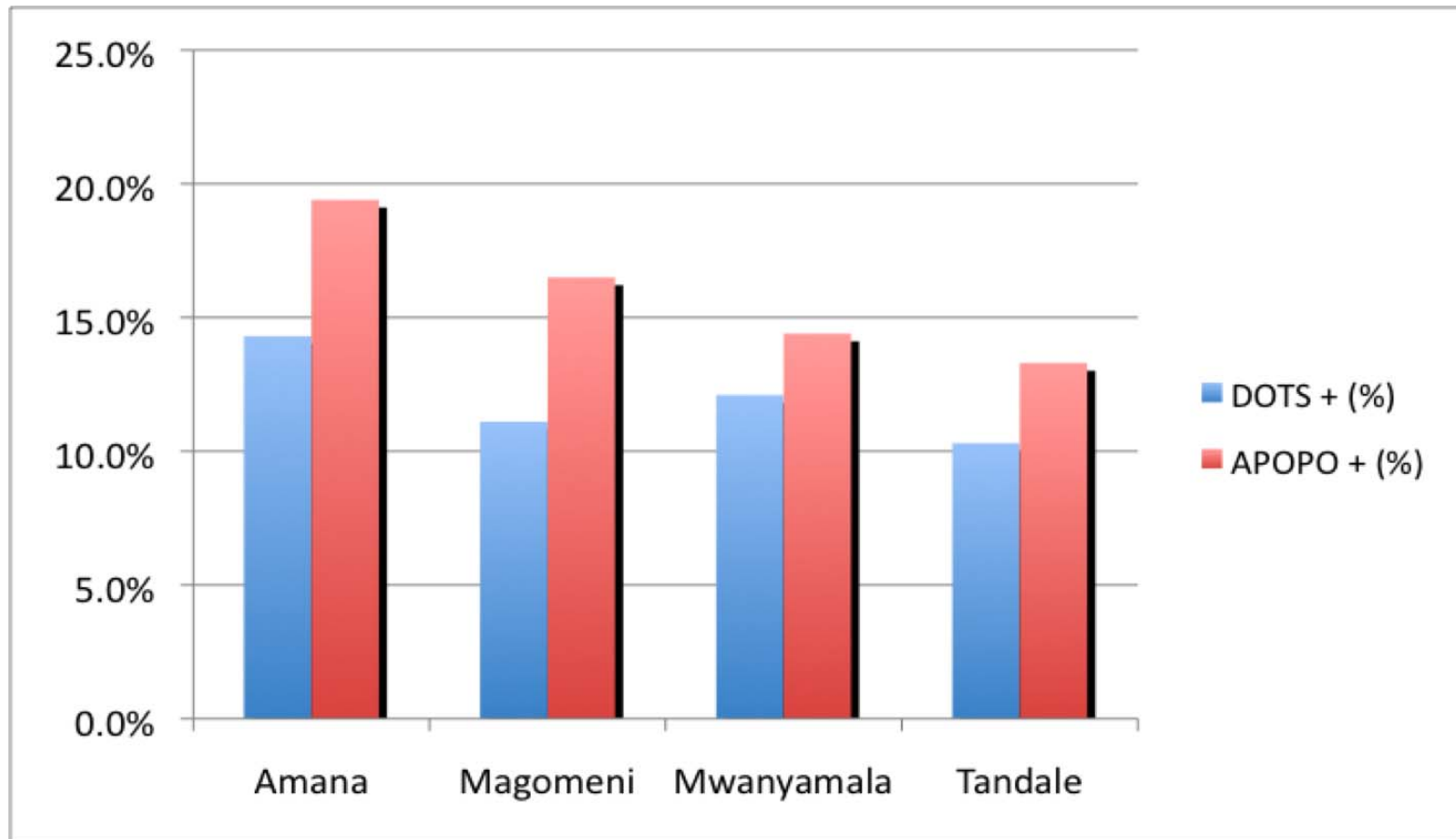


Figure 1. Trend in case-detection rate (DOTS and non-DOTS) for new sputum smear positive cases, 1995-2007. Horizontal line indicates the 2005 global case detection target⁹ (WHO 2009)



Samples from 15,041 patients were evaluated by microscopy at the DOTS centers and by the rats.

DOTS: TB in 1,838 of the patients (12.2%)

Rats: TB in 2,415 patients (16.1%)

Cases detected by Rats but missed by DOTS centers (n = 577) increased TB detection by 31.4%



Experiment 1: Determining the Sensitivity and Specificity of TB Detection by Rats as Currently Trained Relative to Reference Standards

Experiment 2: Determining the impact of sample preparation and presentation on the performance of the rats

Experiment 3: Effects of Training with Sputum Samples with Low *M. tuberculosis*

Experiment 4: Isolating TB-Positive Samples for First-Line Screening

Experiment 5: Determining the impact of the prevalence of positive patients on the performance of the rats

Experiment 6: Development and Assessment of an Automated Training and Evaluation Cage

Experiment 7: Double blinded evaluation trial on detection of pulmonary TB in sputum samples by rats



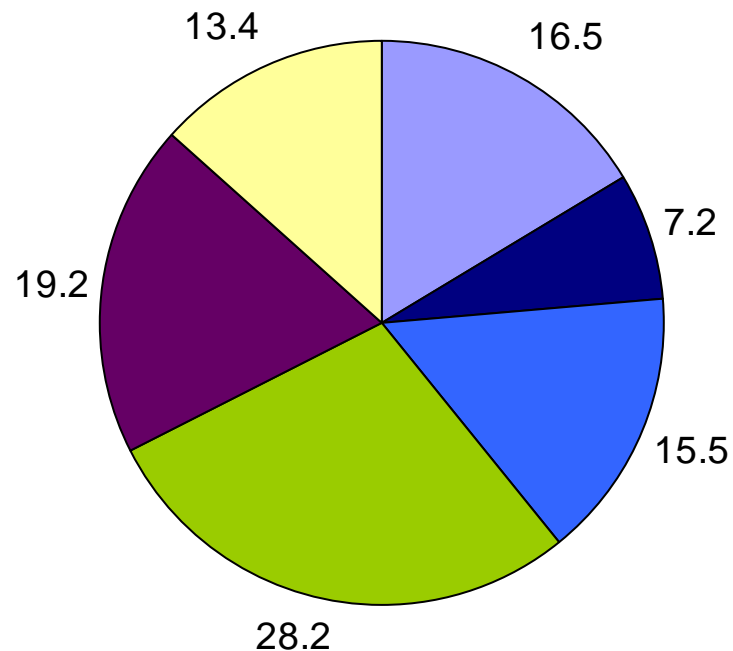
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Consecutive recruitment of patients suspected of having pulmonary TB in Mbeya, Tanzania

Classification:

n=291



- A : smear-positive, culture-positive for M. tuberculosis
- B : smear-negative, culture-positive for M. tuberculosis
- B NTM : smear-negative, culture-positive for non-tuberculous mycobacteria
- C : controls / all smears and cultures negative and sustained recovery under antibiotic treatment at day 56
- D : all cultures negative, chest x-ray and clinical symptoms very suspicious for TB
- I : any other possible combination of results and loss to follow up after recruitment

Adapted from: Reither K et al. Low sensitivity of a urine LAM-ELISA in the diagnosis of pulmonary tuberculosis. BMC Infect. Dis 2009;9:141.

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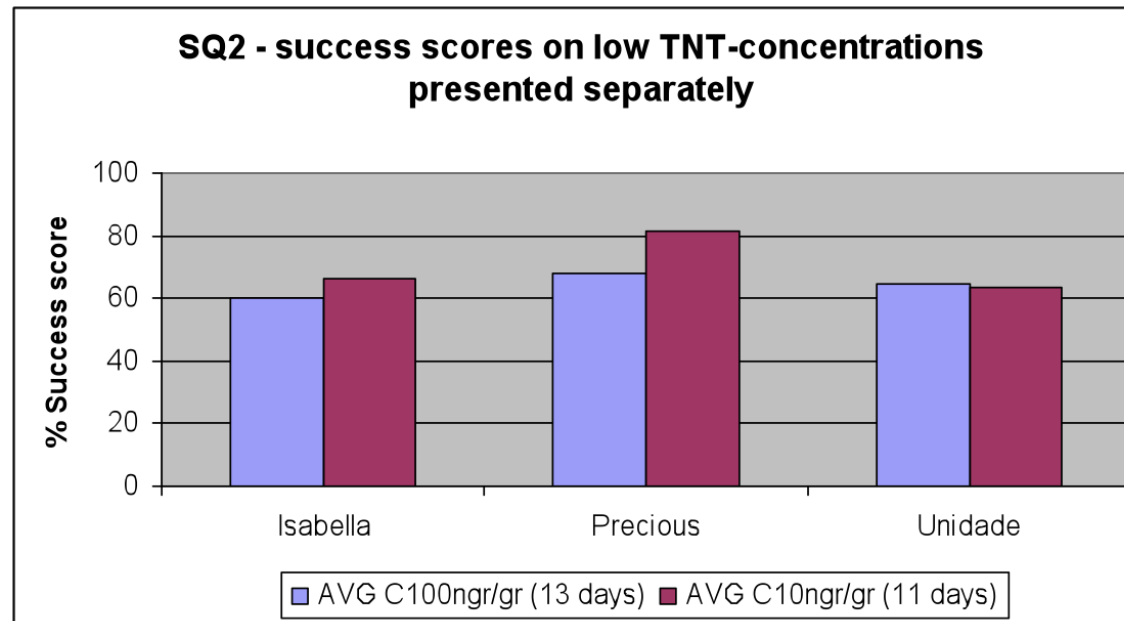
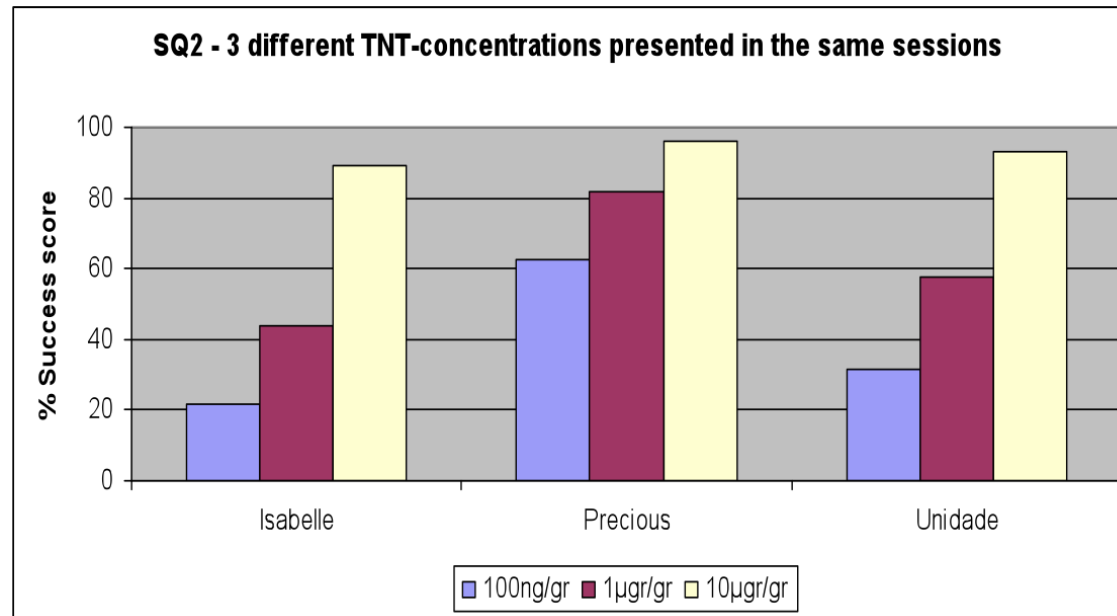
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Public governments and institutions

Geneva International Centre for Humanitarian Demining (GICHD)
Belgian Federal, regional and local governments
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National Institutes of Health (USA)

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King Baudouin Foundation (Belgium & USA)
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Partners

Antwerp University, Belgium
Sokoine University, Tanzania
Tanzanian Peoples' Defense Forces
International Conference for the Great Lakes Region
Max Planck Institute, Germany
National Institute for Medical Research, Tanzania



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