Update on the LoaScope Test and Not Treat study

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October 3rd – 4sh 2018,

Kampala Uganda

CRFilMT
Centre for Research on Filariasis & other Tropical Diseases

IRD Institut de Recherche pour le Développement FRANCE
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The TaNT study in Cameroon

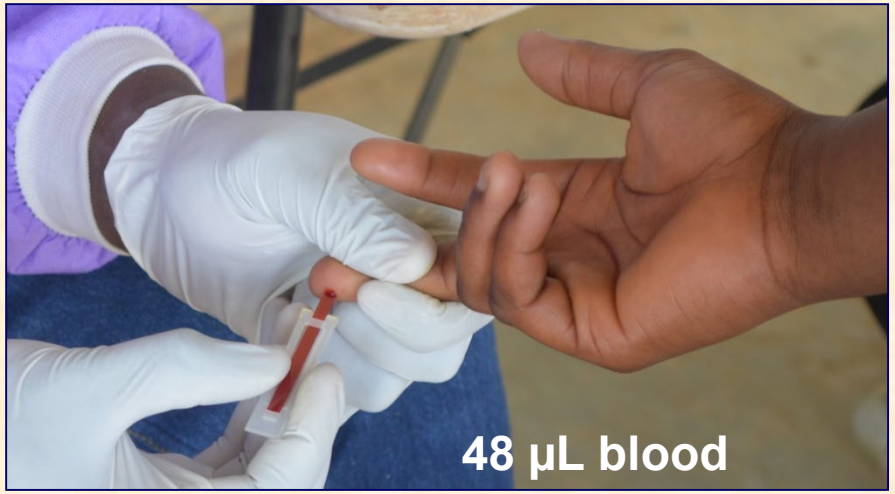
- During treatment of onchocerciasis in *Loa* co-endemic areas, patients with high mf load can develop Severe Adverse Event (SAEs)

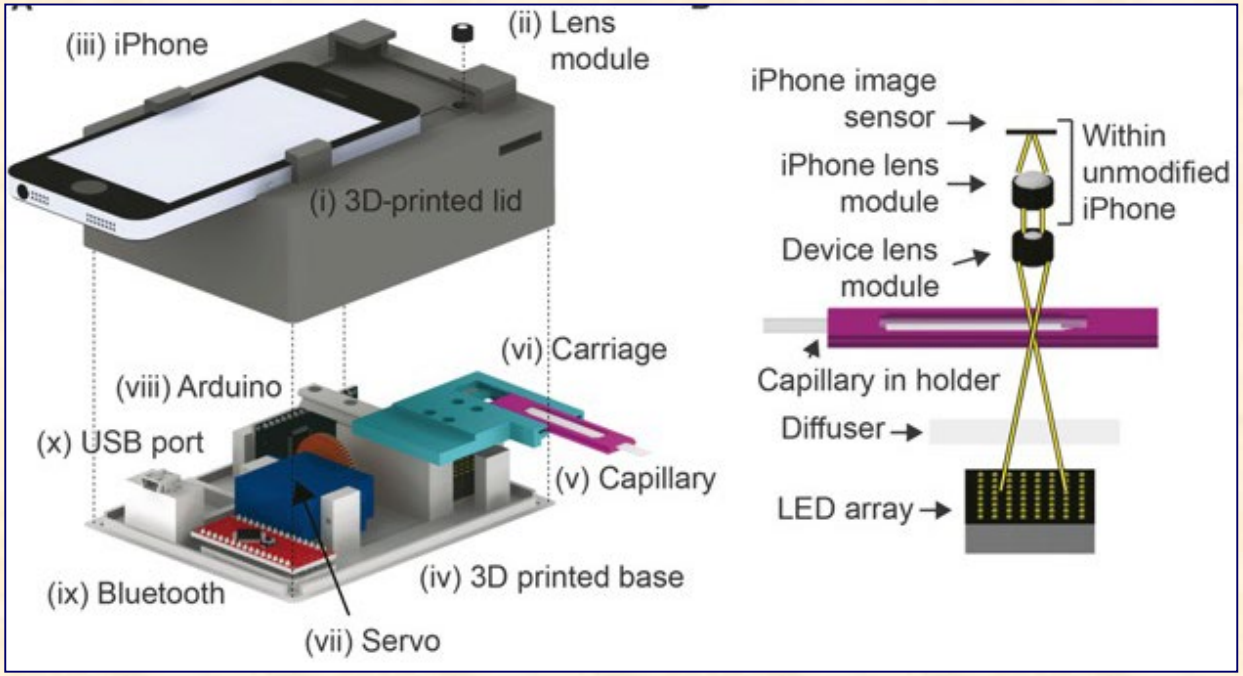
- A way of preventing these SAEs is to identify these patients with high mf load

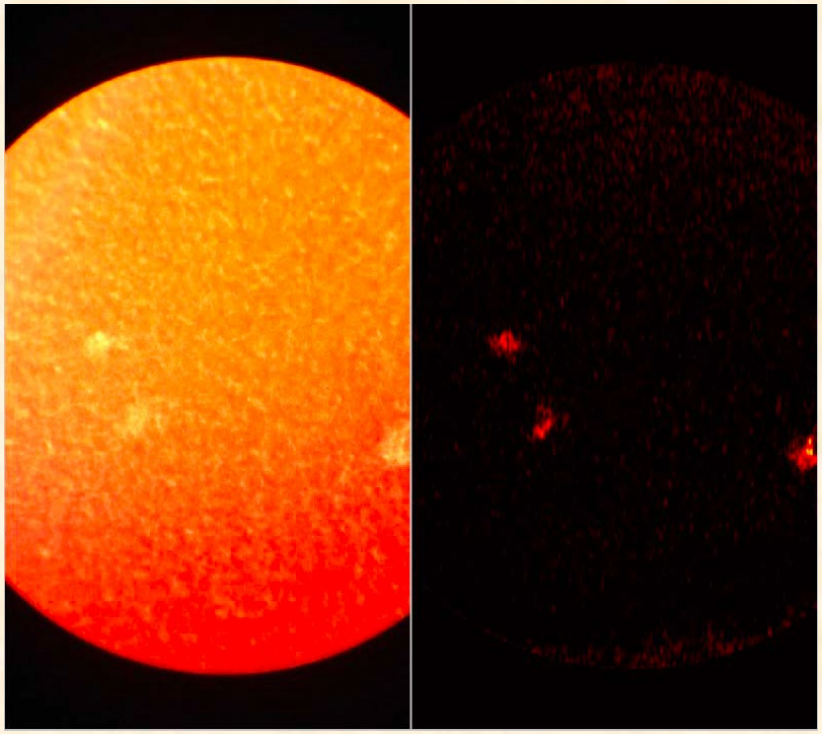
- The aim of the Test and not Treat (TaNT) was to identify these at risk patients, and to exclude them from IVM treatment

The TaNT study in Cameroon

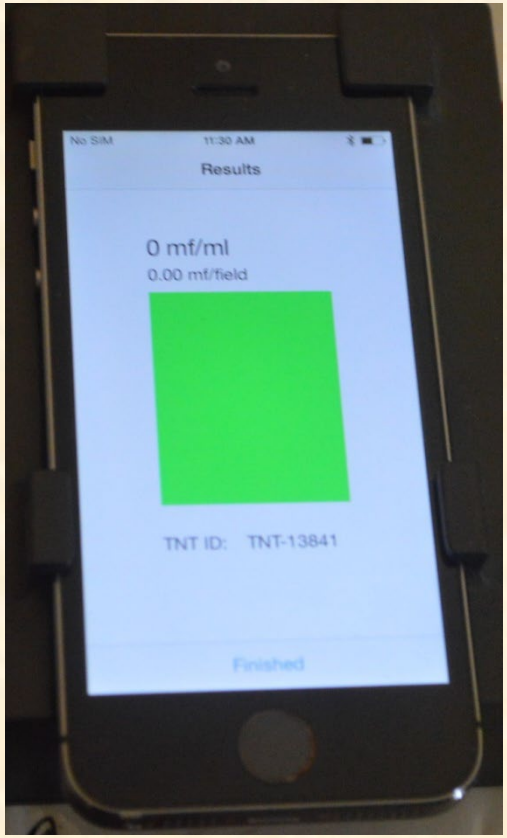
Based on the LoaScope (*Loa* mf count per mL blood appears within 2 mn on the screen of the smartphone)

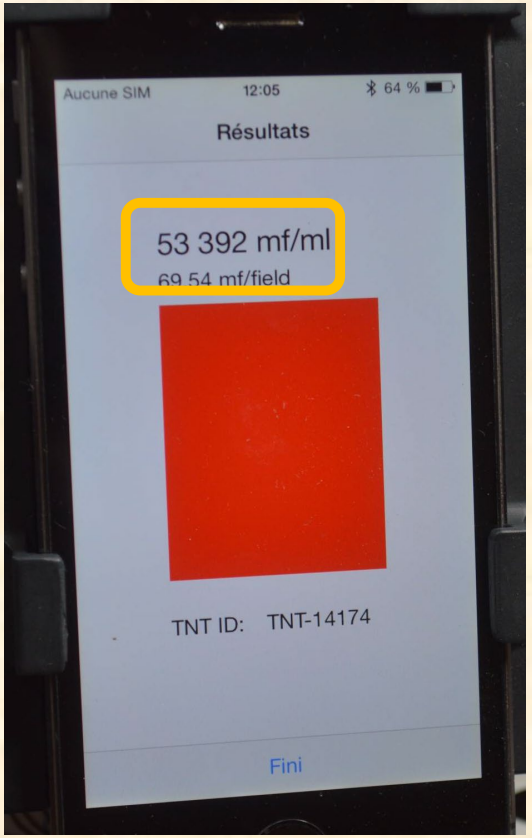






- Seven 5-second videos (7 field of view) showing microfilariae wriggling in the blood
- Image automatic analysis
- Algorithm

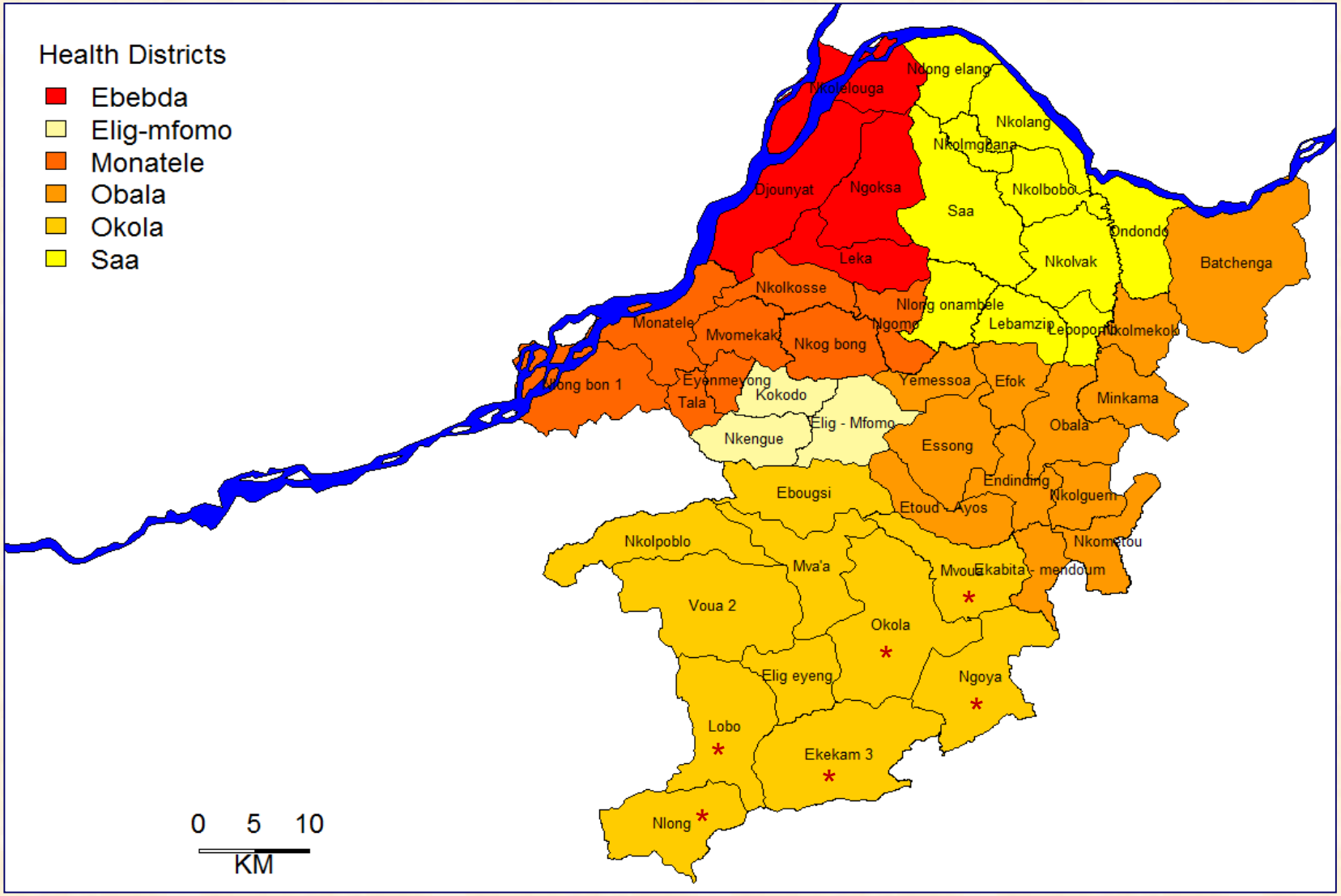




The three steps

- Round 1 in Okola HD (September – October 2015)
  - assess LoaScope performance (mf counts compared with TBS)
  - test the efficacy of the TaNT strategy using the LoaScope, i.e. its ability to prevent SAEs
- Round 2 in Okola HD (March – May 2017) with same protocol
  - test whether participation rate (population's trust) had increased
  - test whether people treated with IVM would need to be re-tested at the subsequent TaNT campaign
- Round 1 in Soa HD (November 2017 – January 2018)
  - test whether the LoaScope can be used by trained local personnel
  - evaluate the costs

Rounds 1 & 2 in Okola HD (interval: 18 months)



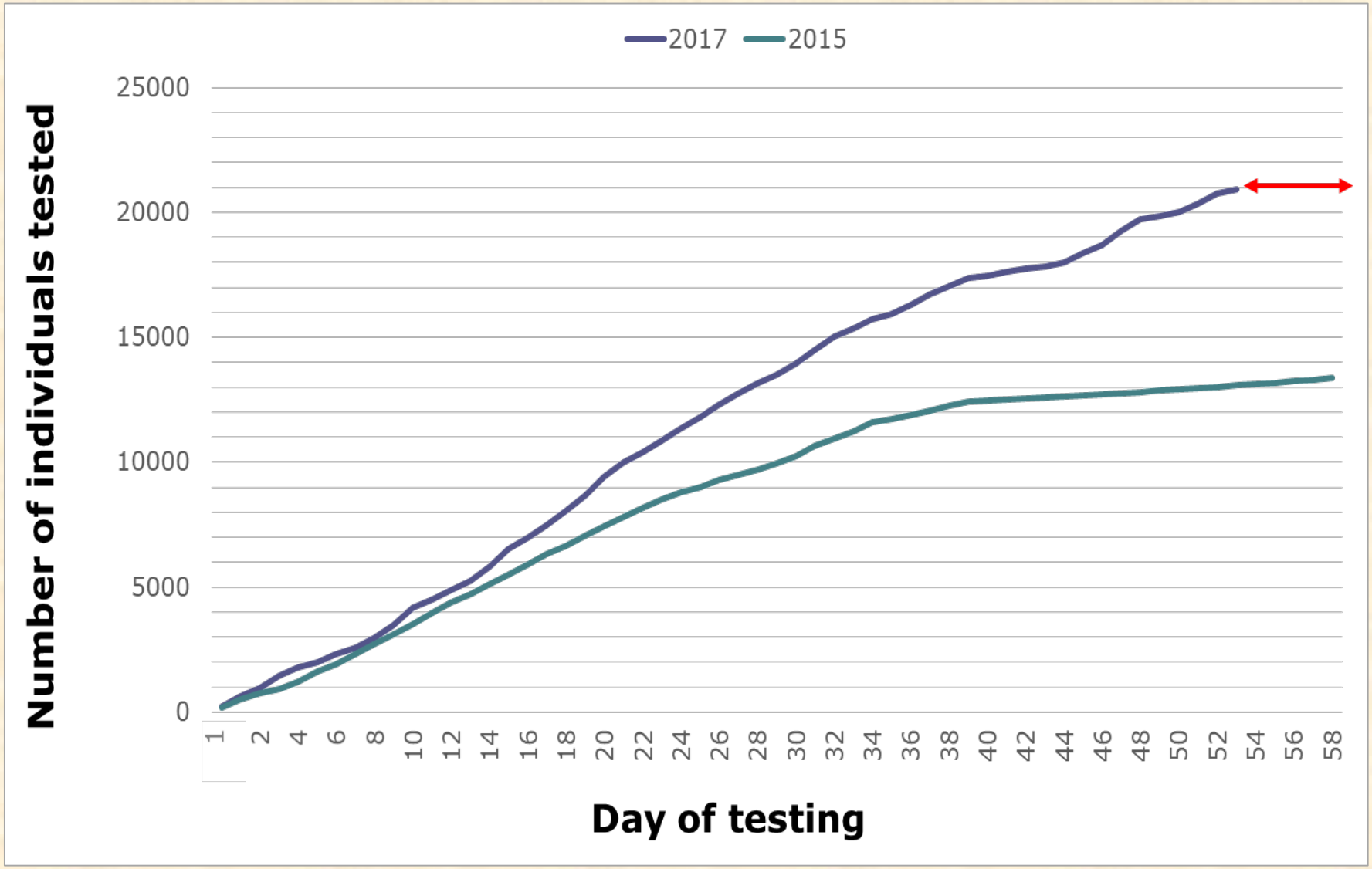
Rounds 1 & 2 in Okola HD (interval: 18 months)

	2015	2017
Number of villages	92	95
Total population	26,430	29,586
Population aged ≥5	22,842	25,421
Tested (% of pop. aged ≥5)	16,259 (71.2%)	21,034 (82.7%)
Treated with IVM	15,522	20,200
Excluded for *Loa* (% of treated)	340 (2.1%)	298 (1.5%)
Excluded for other reasons	397 (2.4%)	408 (2.0%)
Number AEs (% of treated)	934 (6.0%)	633 (3.1%)
Number SAEs	0	0

No case of SAE at both rounds

Significant increase in participation rate: population trusts TaNT

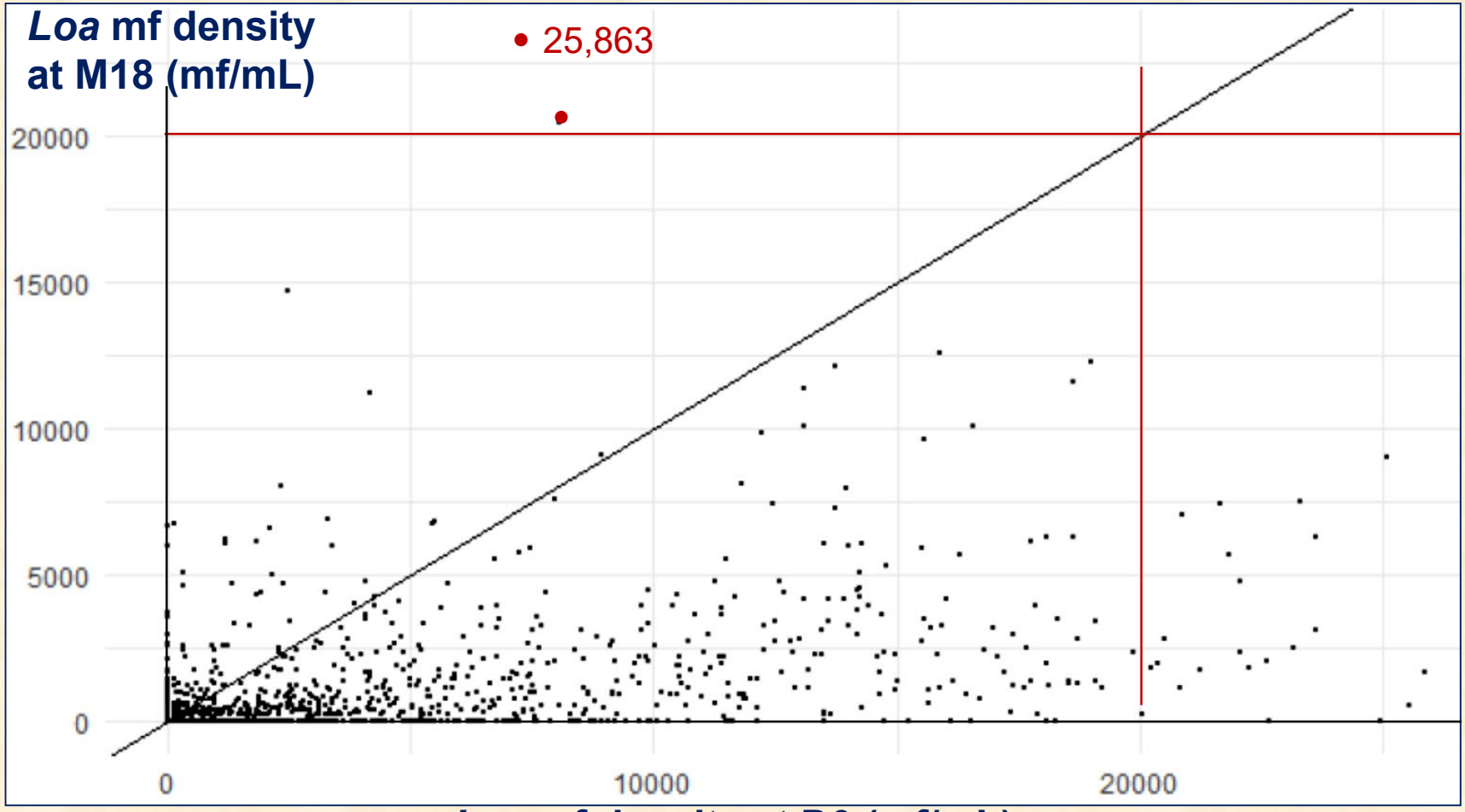
Rounds 1 & 2 in Okola HD (interval: 18 months)



Effect of IVM on *Loa* microfilaraemia

Follow up of 6730 subjects 18 months after a single dose of IVM

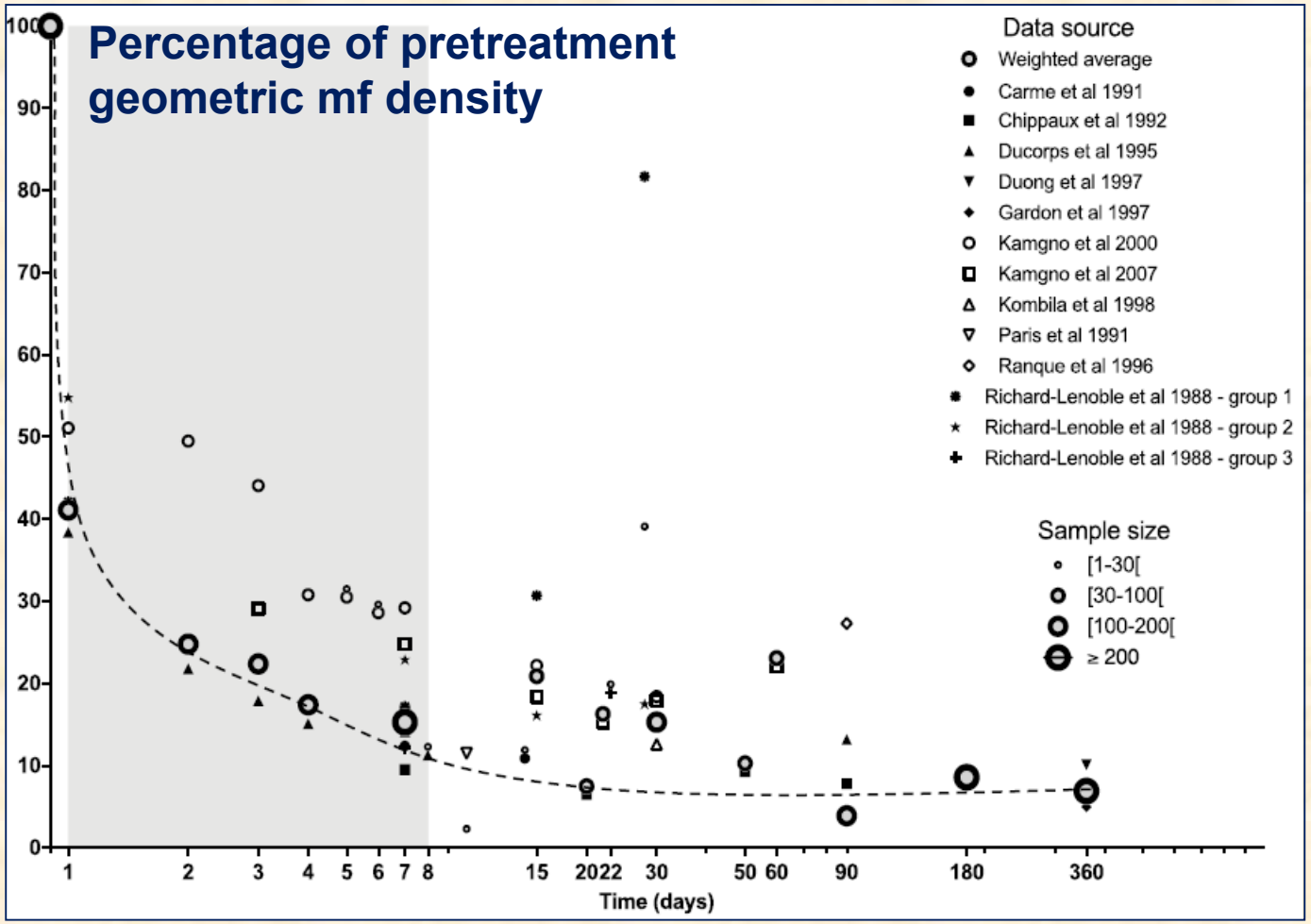
Only 2 subjects with >20,000 mf/mL; treatment uncertain; below the real risk threshold → no need to re-test subjects treated 12-18 mo. before



Effect of IVM on *Loa* microfilaraemia

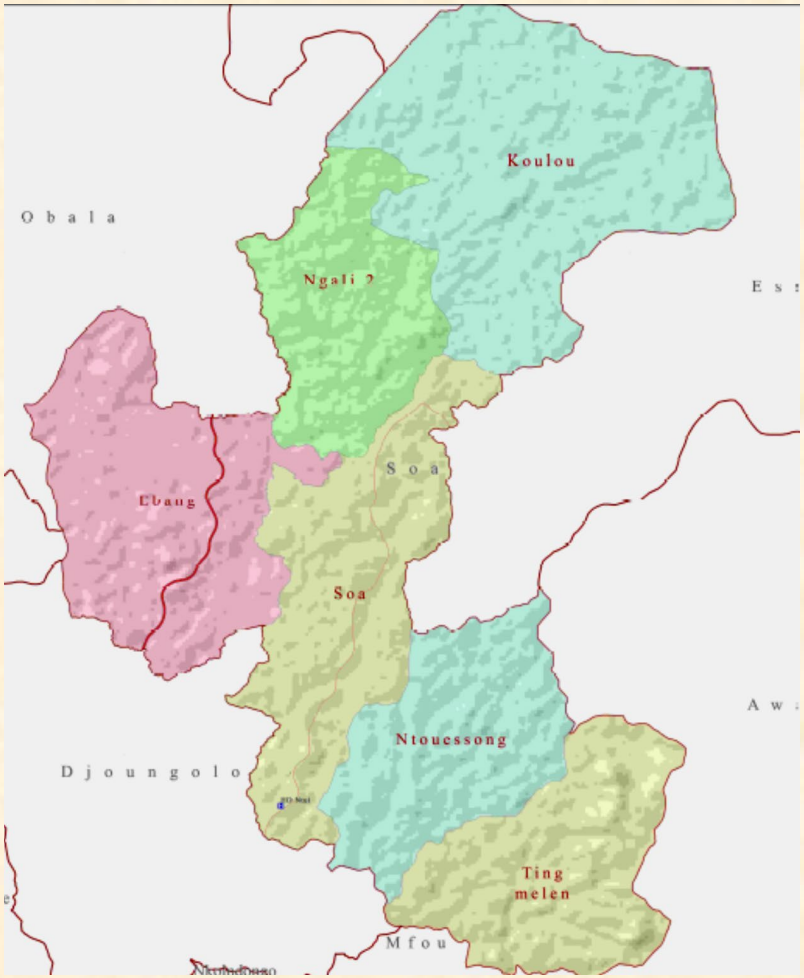
- Meta-analysis of 11 published trials (8 with individual data available)
- 757 subjects followed up at various time points (D0, then D1-D365)

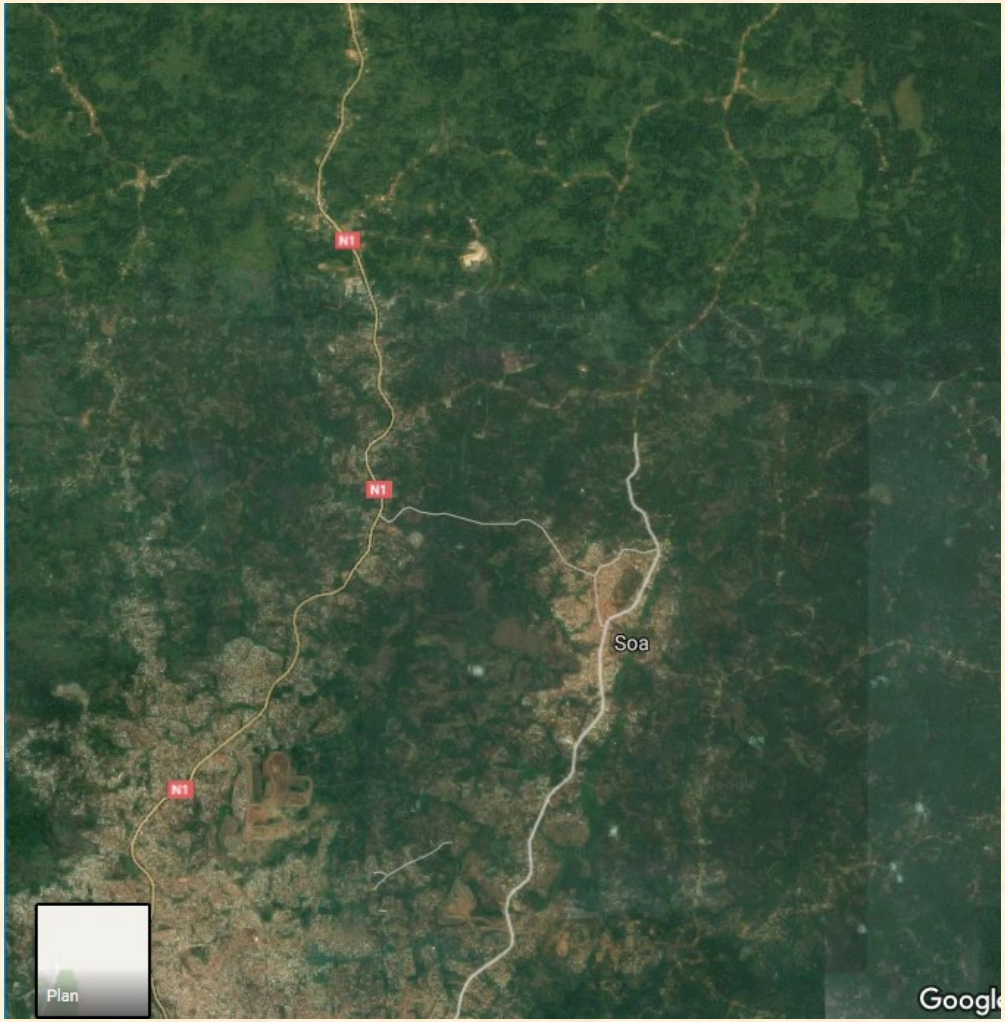
In average : *Loa* mf density are at 10% of the pre-treatment density from D20 to D365



Round 1 in Soa HD: operationalization of TaNT

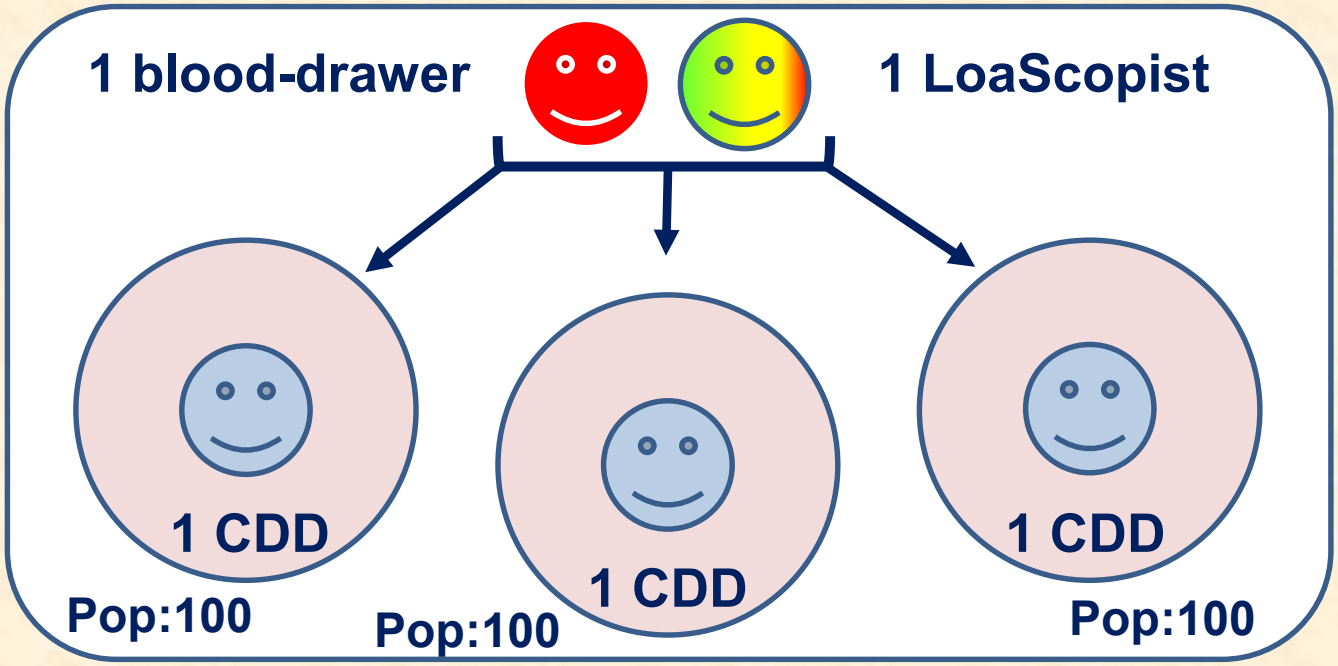
- An area near Yaoundé, with some rural and some semi-urban health areas





Round 1 in Soa HD: operationalization of TaNT

- **TaNT teams of 3 persons:**
  - 1 blood drawer (for 300 persons) (lab technicien, retired nurses, etc.)
  - 1 LoaScopist (for 300 persons)
  - 1 CDD (for 100 persons)
- **Training during 2 days**



Round 1 in Soa HD: operationalization of TaNT

- **10 local teams** of 3 persons working in parallel
- **3 supervisors** (3-4 local teams per supervisor)
- 1 team for **AE surveillance**
- 1 team for **mobilization**

Round 1 in Soa HD: operationalization of TaNT

- 3 rural (R), 2 semi-urban (SU) and 1 urban (U) health areas
- ~ 30,000 subjects tested/treated, 0.82% excluded for *Loa*, and again no SAE
- coverages low in urban and semi-urban HAs
- Proof-of-concept that community-based TaNT can be applied
- Many lessons learnt regarding logistics for the future campaigns

Health areas	Total Pop	Pop >5 yo	Tested	Treated	Excluded for *Loa*	Excluded other	AE	Coverage
Ting Melen (R)	1,967	1,697	1,644	1,585	16	43	7	80.6
Koulou (R)	1,534	1,342	1,035	975	38	22	18	63.6
Ngali 2 (R)	1,869	1,594	1,017	963	36	18	19	51.5
Ebang (SU)	23,209	19,906	11,412	10,987	53	372	47	47.3
Ntouessong (SU)	10,162	8,618	3,602	3,473	44	85	25	34.2
Soa (U)	32,902	29,524	12,098	11,765	58	275	68	35.8
TOTAL	71,643	62,681	30,808	29,748	245	815	184	41.5

Round 1 in Soa HD: cost analysis

(coordinated by Erasmus Medical Center team)

- **What are the costs at district level of implementing one round of TaNT strategy using LoaScope in Soa HD an area endemic for loiasis and hypoendemic for onchocerciasis?**
  - **cost per person (in the population)**
  - **cost per person screened**
  - **cost per person treated**
  - **cost per health area**
  - **cost per person excluded**
  - **cost per activity**
- **Which are the main cost drivers?**

Round 1 in Soa HD: cost analysis

(coordinated by Erasmus Medical Center team)

Health area Total censused population: 71,643	Total global cost (US$)	Cost per person censused	Cost per person tested	Cost per person treated	Cost per person excluded for Loa	Coverage
Ting Melen (R)	18,942	10	12	12	1,184	80.6
Koulou (R)	16,157	11	16	17	425	63.6
Ngali 2 (R)	17,331	9	17	18	481	51.5
Ebang (SU)	92,027	4	8	8	1,736	47.3
Ntouessong (SU)	42,501	4	12	12	966	34.2
Soa (U)	105,223	3	9	9	1,814	35.8
Total	292,181	4	9	10	1,193	41.5

Higher costs in the rural health areas where more efforts were made to reach high coverages

Round 1 in Soa HD: cost analysis

The relatively high costs per person treated are mainly due to personnel costs including perdiems to the monitoring team and to the CDDs for census and treatment. Many other costs included in the analysis are certainly irrelevant for a realistic programmatic implementation.

More realistic scenarios were designed according to the literature and the study team's experience. Estimate are as follows for a total censused population of 71,643 and a coverage of 42%:

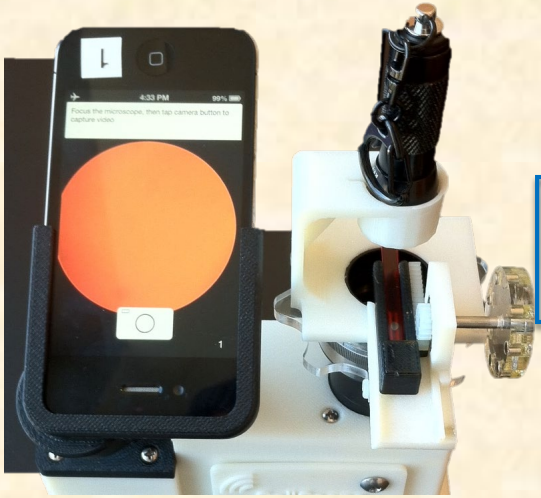
Scenario	Total global cost (US$)	Cost per person censused	Cost per person tested	Cost per person treated	Cost per person excluded for Loa	Coverage
Base case	135,044	1.9	4.4	4.5	551	42%
Low cost	107,999	1.5	3.5	3.6	441	42%
High cost	271,456	3.8	8.8	9.1	1,108	42%

Conclusions from Okola and Soa

- **TaNT using LoaScope is efficient: no SAE recorded after IVM treatment of ~35,000 IVM-naive people**
- **An individual treated with IVM will not need to be re-tested at the subsequent TaNT campaign (cost will decrease rapidly with time)**
- **The population understands and trusts the process (anthropo study)**
- **LoaScopes can be used by local personnel after short training (personnel cost will be relatively low)**
- **A high proportion of the costs in Soa are related to perdiems to personnel in charge of supervision (this might be reduced if local personnel is in charge of this activity)**

Conclusions : next steps

- **Number of available LoaScopes:**
  - **~25 LoaScope v2 devices (mostly used for TaNT)**
  - **~15 LoaScope v1 devices (mostly used by the TFGH for mapping)**
- **Next version probably not available before 2019**
- **Need to accelerate production of LoaScopes and of capillaries**
- **the next campaign in Okola cannot start because of lack of capillaries**



Original prototype (2014)

Automated prototypes (v1 – 2015, v2 – 2017)

Planned production unit (2018-2019)

Conclusions : next steps

- New information will be obtained during the 3rd round in Okola and the 2nd round in Soa (when capillaries will be available)
- In both HDs, efforts will be made to reduce central supervision to a minimum to reduce costs
- New HDs in Cameroon where TaNT strategy will be applied have been identified
- Train personnel from other countries (Gabon, Congo, DRC, …)
- Possibility to use the LoaScope to test naive subjects in oncho-hyper-mesoendemic areas where the proportion of systematic non-compliers is high (maintaining a significant reservoir of parasites). Strategies to do this have to be developed

Acknowledgements

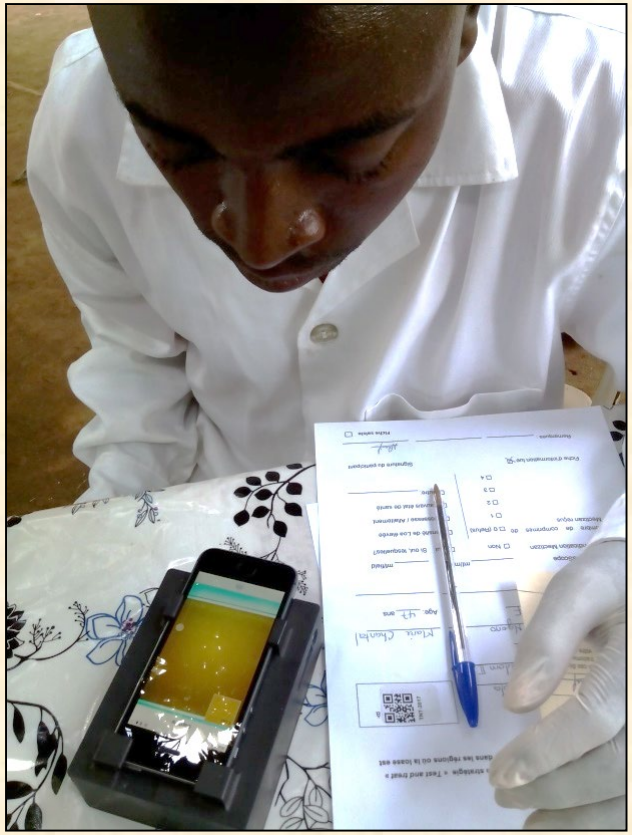
The communities in Okola and Soa HDs

The teams for their remarkable commitment

The

BILL & MELINDA GATES foundation

M. Bakalar, C. Chesnais, D. Fletcher, J. Kamgno, A. Klion, E. Lenk, C. Mackenzie, H. Moungui, H. Nana-Djeunga, F. Ndonko, T. Nutman, S. Pion, W. Stolk, J. Tchatchueng & many others



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LABORATORY of PARASITIC DISEASES NIAID

Berkeley UNIVERSITY OF CALIFORNIA

Erasmus MC University Medical Center Rotterdam

An important result regarding OAE

- The first ever conducted cohort study on OAE demonstrates that the skin O. volvulus microfilarial density during childhood is very significantly associated with the risk of developing epilepsy later on
- This temporal and dose-related relationships support the causal relationship between onchocerciasis and epilepsy
- A second study will be conducted in the coming months to confirm this result

Lancet Infect Dis 2018

Published Online
September 26, 2018

The temporal relationship between onchocerciasis and epilepsy: a population-based cohort study

Cédric B Chesnais, Hugues C Nana-Djeunga, Alfred K Njamnshi, Cédric G Lenou-Nanga, Charlotte Boullé, Anne-Cécile Zoung-Kanyi Bissek, Joseph Kamgno, Robert Colebunders, Michel Boussinesq

An important result regarding OAE

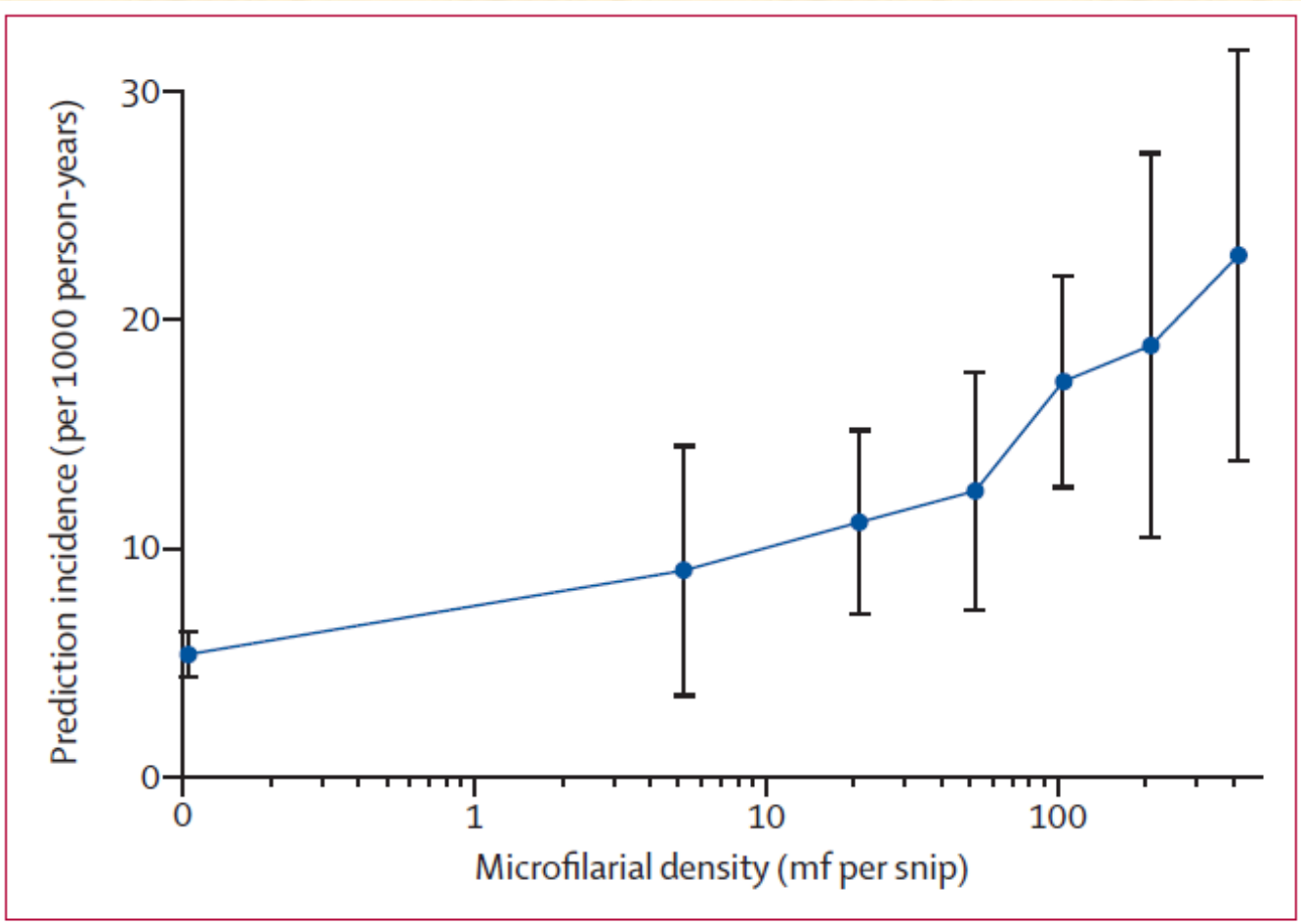

Figure 1: **Predicted incidences of epilepsy according to individual microfilarial densities**

Vertical lines indicate the 95% CI for each point of measure from the final model. X axis is presented in a logarithm scale. Mf per snip=microfilariae per skin snip.