

# WPTTID / Virology subgroup 2010 - 2011 Activities

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## Progress on previously launched collaborative Projects

- “International Survey on NAT Testing of Blood Donations: Expanding Implementation and Yield from 1999 to 2009” Vox Sanguinis International Forum - [Manuscript in press](#)
- HCV Viral Loads in NAT Yield Donations and Ag Test Performance for Reducing the HCV Window Phase - [Manuscript in development](#)
- Distribution of HIV Viral Loads and Performance of 4th Generation Serological Assays on HIV NAT Yield Donations from the US, South Africa, France, Germany, Poland and Japan [Manuscript in development](#)
- Rates and Correlates of HIV Elite Controller Infections Detected through Blood Donor Screening in 5 Countries - [Manuscript in development](#)
- Multicenter study of testing efficacy: HIV, HCV, and HBV NAT and serology screening - [Analyses in progress](#)
- EQAPOL Program to Characterize Recently Transmitted HIVs using Acutely Infected blood Donor Plasma and Establish Panels for Evaluation of HIV Blood Screening and Diagnostic Assays - [HIV funding obtained; Collaborative Network being expanded.](#)

# Projects for collaborative studies

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- 1) Recent documentation of NAT test failures and PEI recommendation that NAT assays should target at least 2 genetic regions of viruses - Approaches to international surveillance for test failure by systematic investigations of NAT/serology discordant screening test results - Micha Nubling
- 2) Estimates of the residual risk for HIV, HBV and HCV in SubSaharan Africa by detecting incident cases with NAT- Syria Laperche

## Project

# Estimates of the residual risk for HIV, HBV and HCV in SubSaharan Africa

Institut National de la Transfusion Sanguine, Paris, France

*S Laperche, JJ Lefrère*

French national Institute for public health surveillance

*J Pillonel*

University of California, San Francisco and Blood Systems Research Institute

*E.L. Murphy*

Francophone Sub Saharan African working group for research in transfusion

## Origin of the Francophone Sub Saharan African working group for research in transfusion

Training on transfusion safety-infectious diseases annually organized at the Institut Pasteur since 2007 (JJ Lefrère, E Murphy, C Shiboski)

**Goal:** Formation of human capital in transfusion medicine research via training in clinical research methodology

**Method:** 1) review of "state of the art" in transfusion medicine;  
2) morning lectures on clinical research methods; and  
3) afternoon workshops in which trainees write their own transfusion research protocol. (*trainees are evaluated on the basis of their written research protocol*)

**Audience:** MD's, PhD's and high-level technicians from blood centers of Francophone SubSaharan Africa+++

**Several collaborative studies: 9 Publications, 2 in preparation**

# Transfusion safety on the African continent: an international quality control of virus testing in blood banks

TRANSFUSION 2009;49:1600-1608.

*Syria Laperche, Geneviève Boukatou, Léonard Kouegnigan, Yacouba Nébié, Mohamed Ould Boulahi, Claude Tayou Tagny, Rakia Yahaya, Jean-Baptiste Tapko, Edward Murphy, and Jean Jacques Lefrère*

25 samples 4 HIV-1  
1 HIV-2  
4 HCV  
5 HBsAg  
3 mixtures  
8 negative

6 labs blind testing  
assay used in routine

. Overall assay sensitivity was 98% for HIV, 75% for HBV, and 88% for HCV; agreement between blood centers using the same assay was good. Sensitivity of rapid tests was notably poorer than EIAs, with overall sensitivity quality scores of 64.5% for rapid tests (20% for HBsAg rapid tests) compared to 100% for EIAs. The overall specificity quality scores were 98.3 and 94.5% for EIAs and rapid tests, respectively.

**CONCLUSIONS:** This pilot QC study organized for blood centers of Sub-Saharan Africa showed the feasibility of the approach despite some logistic constraints. Although interlaboratory variability was small, the poor performance of rapid tests, especially for HBsAg, raises policy questions about their use as the only screening assay.

# 2<sup>nd</sup> Quality control 2010

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**Panel :** 25 samples prepared at INTS and coded for blind testing

- 4 HIV-1: gt B, 2 WB pos, 2 WB indeterminate
- 1 HIV-2
- 4 HCV : gt 1a, 1b, 3a , 1 RIBA +++, 1 RIBA ++, 2 RIBA +
- 5 HBsAg : 2 gt D (>100 ng/ml , 1 ng/ml), 3 gt B (0.2, 1, 10 ng/ml)
- 3 mixtures : HIV+HCV, HIV+HBsAg, HCV+HBsAg
- 8 negative

17 countries from francophone  
Sub Saharan Africa

51 participating labs (capitals and regions)

42 different assays

- 10 HIV (5 Rapid tests, 1 Ab EIA, 4 Ag/Ab EIA)
- 15 HCV (8 Rapid tests, 5 Ab EIA, 2 Ag/Ab EIA)
- 17 HBsAg (10 Rapid tests, 7 Ag EIA)



# 2<sup>nd</sup> Quality control 2010

5715 results obtained

1539 expected positive

4176 expected negative

	HIV	HCV	HBsAg
<b>Sensitivity (all tests)</b>	81.4%	80.0%	75.6%
Rapid tests	72.4%	63.7%	47.4%
Ab (or HBsAg) EIA	Not applicable (1 test)	96.9%	96.8%
Ag/Ab EIA	93.1%	89%	na
<b>Specificity (all tests)</b>	99.6%	98.1%	94.5%
Rapid tests	99.5%	97.4%	99.1%
Ab (or HBsAg) EIA	Not applicable (1 test)	98.0%	96.3%
Ag/Ab EIA	99.7%	99.1%	na

# Estimate of the residual risk of transfusion-transmitted human immunodeficiency virus infection in sub-Saharan Africa: a multinational collaborative study

TRANSFUSION 2011;51:486-492.

*Jean-Jacques Lefrère, Honorine Dahourouh, Alexis E. Dokekias, Maxime D. Kouao, Amadou Diarra, Saliou Diop, Jean-Baptiste Tapko, Edward L. Murphy, Syria Laperche, and Josiane Pillonel*

TABLE 3. Incidence rates and RR of transfusion-transmitted HIV infection associated with the window period in the five participating countries

Country	Months (study period)	Person-years	Number of incident cases	Incidence rates per 100,000 per year (95% CI)	RR per 1 million donations (95% CI)	RR per number of donations (95% CI)
Burkina Faso	36 (Jan 1, 2006-Dec 31, 2008)	19,887	6	30.2 (12.3-69.3)	18.2 (2.0-72.1)	1/55,000 (1/500,000-1/13,900)
Congo	72 (Dec 1, 2002-Dec 5, 2008)	33,918	22	64.9 (41.7-100.0)	39.1 (6.9-104.1)	1/25,600 (1/145,000-1/9,600)
Ivory Coast	36 (Jan 1, 2003-Dec 31, 2005)	128,397	83	64.6 (51.8-80.6)	39.0 (8.5-83.9)	1/25,700 (1/118,000-1/11,900)
Mali	24 (Jan 1, 2006-Dec 31, 2007)	8,016	5	62.4 (23.0-154.6)	37.6 (3.8-161.0)	1/26,600 (1/263,000-1/6,200)
Senegal	36 (Jan 1, 2006-Dec 31, 2008)	21,756	4	18.4 (5.9-50.6)	11.1 (1.0-52.6)	1/90,200 (1/1,000,000-1/19,000)

The first international study for estimation of HIV RR in Sub Saharan Africa based on IR/WP model.

## Limitations (retrospective study)

- Misclassification of positive or negative donations due to the assays
- Model based only on repeat donors
- Limited study period



# Aims of the proposed study

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Based on the Francophone Sub Saharan African working group for research in transfusion

- 1) Estimates of RR for HIV, HBV, HCV by detecting incident cases with NAT
- 2) Formation of a repository of antibody and NAT+ samples
- 3) Molecular epidemiology of viral isolates

**NOT**

A feasibility study of NAT in Africa

**BUT**

The first prospective study in the African continent aimed to directly estimate the RR

# Study design

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Collection and storage a total of 100 000 consecutive samples from operationally tested donations; e.g. 10,000 samples from each of 10 African countries

Antibody positive samples removed and subjected to confirmatory testing using rigorous algorithms

Antibody negative samples tested by HIV, HCV and HBV NAT in pools of 16; ID NAT on all members of positive pools

Sample size calculated on the basis of an expected IR (at 0.10%)

## Expected number of HIV Ab neg /RNA pos

Hyp 1 : HIV Ab Prevalence 5% ; N Ab neg = 95,000 if  
100,000 tested

Hyp 2 : incidence 0.10 per 100 person-years

N expected yield cases =

$$(N_{\text{neg}} * \text{Inc}) / (365/10 - \text{Inc}) = 2,6 \sim 3$$

# Proposed organization and funding

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## 3 partners and roles

### African network

(10 countries to be determined on the basis of results in QC)

- Operational testing and provision of data
- Aliquoting of 10,000 consecutive donation samples per country

### INTS

- Shipping and receipt of the samples
- Separate positive and negative samples
- Confirmation of serological positive samples and sequencing to determine molecular diversity
- Preparation of pools (16 negative samples)
- ID NAT in each sample of positive pools

### BSRI and CTS

- NAT (N ~ 6200 pools)

## Financial support

African blood centers  
(in kind)

INTS internal funding

To be determined

# Participants

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## Country

## Coordinator

Benin

Ludovic Anani, NBS Cotonou

Burkina Faso

Koumpingnin Yacouba Nebie, NBS Ouagadougou

Burundi

Pascal Bizimana, NBS, Bujumbura

Cameroun

Claude Tayou, University hospital, Yaounde, Cameroun

Congo Brazaville

Amelia Bokilo, NBS, Brazzaville

Ivory Coast

Maxime Diane, NBS, Abidjan

Madagascar

Olivat Rakoyo Alson, NBS, Antanorivo

Mali

Hassana Guitteye NBS, Bamako

Mauritania

Ba Bocar Cire, NBS, Nouakchott

Niger

Kabo Ramata Diallo, NBS, Niamey

RDC

David Ndakala, NBS, Kinshasa

Senegal

Saliou Diop, NBS Dakar

Togo

Akueté Yvon Segbena, RBS, Lome.