project newsletter Issue IV. 2013

# cap Rapid Screening HIV

Early detection of HIV-1 using ultra-sensitive, rapid capacitive biosensor

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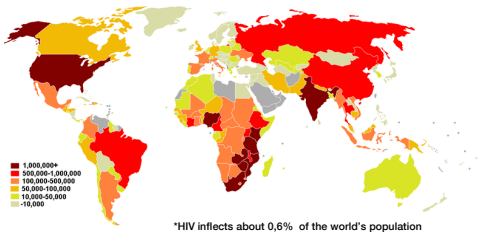
The CapHIV proposal addresses the need to increase the competitiveness of the SME partners by developing a cost-effective method to screen p24 capsid protein for the early diagnosis of HIV infection, a major health and economic threat to the quality of life of European citizens. A group of SMEs, covering the supply chain, have put together this proposal in order to gain the knowledge and resources to realise a CapHIV device exploiting the results of the novel, ultra-sensitive capacitance based sensor technology proposed by providing a fast and reliable early screening method in a cost efficient way.



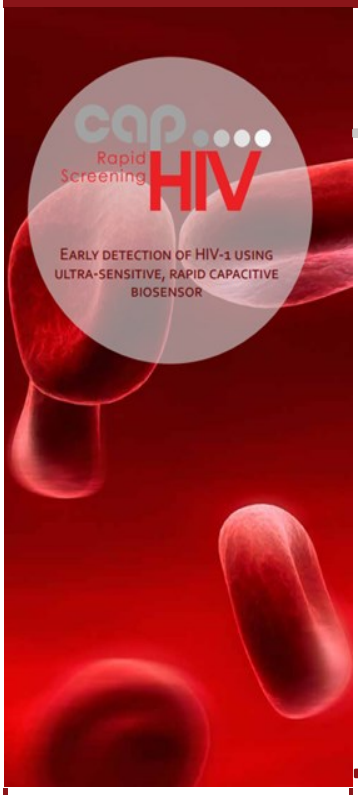

*HIV inflects about 0,6% of the world's population

The most commonly used and widely accessible diagnostic tests and assays rely on the presence of HIV antibodies, but the window period before seroconversion takes place to produce these antibodies in the host can take up to six months. Moreover, newborns cannot be tested with these methods due to maternal antibodies masking their true HIV status.
Thus, antibody-detecting approaches have major shortcomings in incidence and infant testing, which are critical components to early treatment and reduced transmission rates.
Diagnostic tests targeting antibodies or nucleic acids are also susceptible to false or discordant results due to viral variations.
Hence, of particular interest as a target then is the conserved viral capsid protein, p24 antigen.

Under certain conditions, antigen assays can achieve sensitivities that nearly match those of NATs without the need for amplification steps, and the antigen has a much shorter window period than the antibody, allowing it to be much more effective at incidence and infant testing.
There is a need for more advanced and sensitive analyses, and capacitive biosensors have in recent years gained much attention.
The aims of the poject are as follows:

- Develop a rapid, accurate, and portable capacitance-based bioanalytical sensor for the detection of trace concentrations of viral markers for an early diagnose of life-threatening diseases.
- Design a portable prototype sensor for practical application in field settings and a marketable sensor - chip that is suitable and robust for use in real-world settings and harsh conditions.
- Thoroughly study the effect of non-specific binding (NSB) in complex sample matrices, while devising a set of protocols, procedures, and strategies for its reduction.
- Perform scientific studies where spiked and clinical samples will be analyzed.
- Exploit the potential phage display libraries to quickly generate antibody analogues to be utilized for the detection of new, emerging pandemic threats.
- Use the accumulated knowledge to develop hardware and software in order to build and validate a field-adopted sensor product that can detect and quantify viral antigens (i.e. p24-antigen) in complex sample matrices in the concentration range of 10-15 – 10-20 moles per liter (<<fg/mL).

CAPACITIES
REA
The capHIV project is co-funded by the European Commission in the 7th Framework Programme under the Grant Agreement n° 243633




## the consortium

| Partner No. | Short name | Legal name | Country |
|---|---|---|---|
| 1. (RTD) | MFKK | MFKK INVENTION AND RESEARCH CENTER SERVICES COMPANY LTD. | HU |
| 2. (SME) | CAPSENZE | CAPSENZE HANDELSBOLAG | SE |
| 3. (SME) | PHENO | PHENOSYSTEMS SA | CH |
| 4. (SME) | LIO | LIONEX GMBH | DE |
| 5. (SME) | ABBCN | AB BCN S.L. | ES |
| 8. (RTD) | LU | LUNDS UNIVERSITET | SE |


## meetings

### M15 Technical Meeting

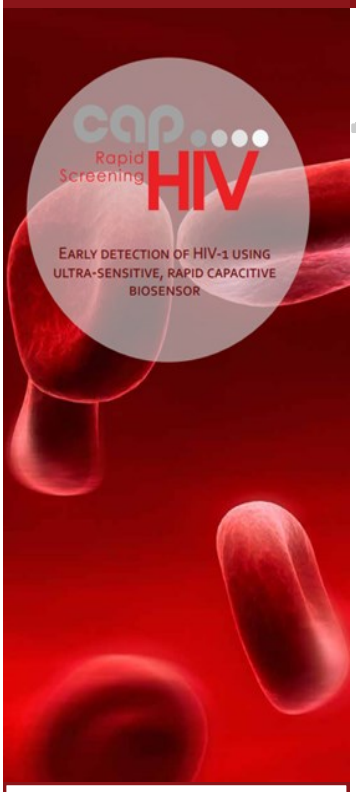
The meeting was held on 11nd of December 2012, in Budapest, Hungary, organised by the MFKK.

### M18 General Meeting

The meeting was hosted by ABBCN in Barcelona, Spain on 19nd February 2013.


### Upcoming meetings

The next technical meeting (M21) will take place in Montreux, Switzerland, organized by SME partner PHENOSYSTEMS.

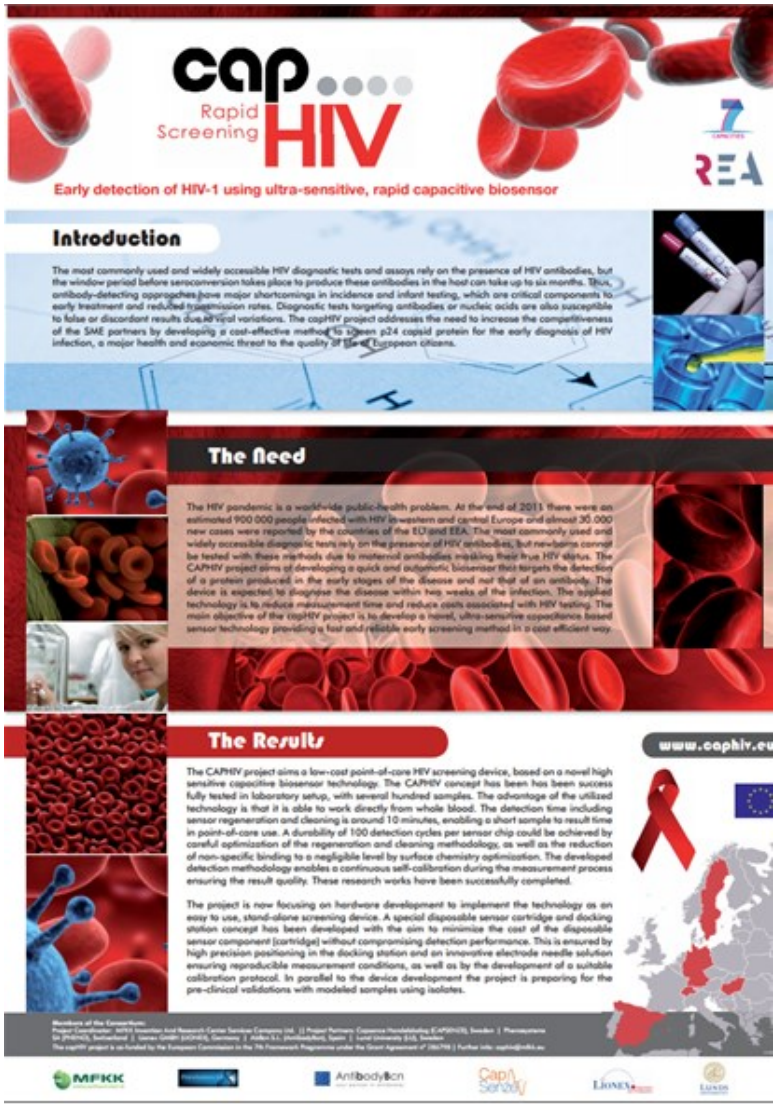



Project website:

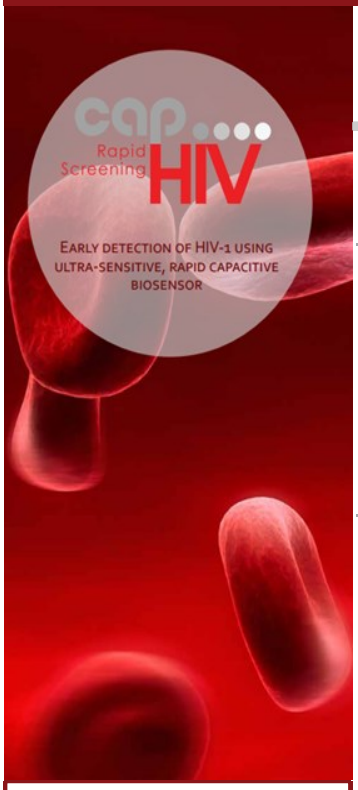
http://www.caphiv.eu

## project progress

- The project website (www.caphiv.eu) is operated and maintained regularly with news, public and confidential (partner access only) uploads
- The project poster is ready, can be accessed from the project website.




The project is now focusing on hardware development to implement the technology as an easy to use, stand-alone screening device. A special disposable sensor cartridge and docking station concept has been developed with the aim to minimize the cost of the disposable sensor component (cartridge) without compromising detection performance. This is ensured by high precision positioning in the docking station and an innovative electrode needle solution ensuring reproducible measurement conditions, as well as by the development of a suitable calibration protocol. In parallel to the device development the project is preparing for the pre-clinical validations with modeled samples using isolates.




For more information, visit:

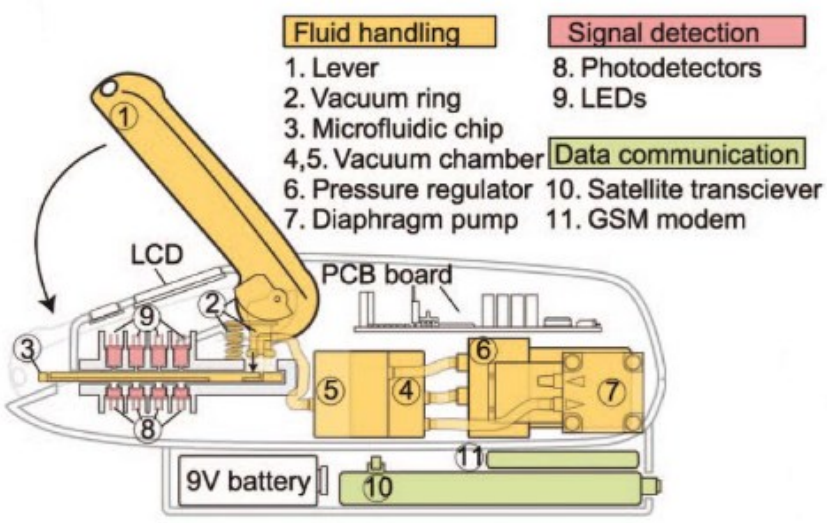
http://cuit.columbia.edu/lionmail-softwaremobile-device-setup

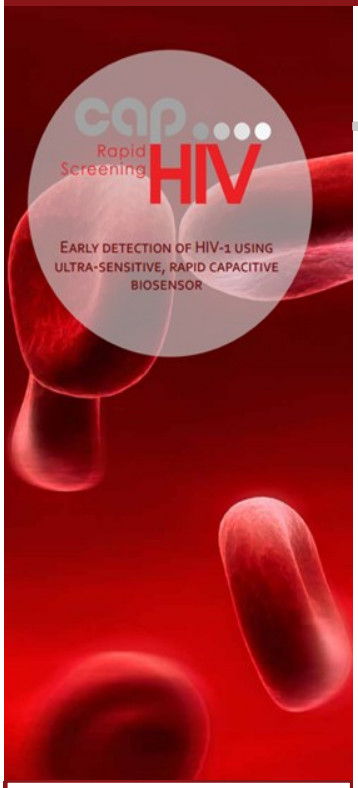
# patent watch

## Mobile device of Columbia University

Clin Chem.2013 Jan 17.
Mobile Device for Disease Diagnosis and Data Tracking in Resource-Limited Settings.
Chin CD, Cheung YK, Laksanasopin T, Modena MM, Chin SY, Sridhara AA, Steinmiller D, Linder V, Mushingantahe J, Umviligihozo G, Karita E, Mwambarangwe L, Braunstein SL, van de Wijgert J, Sahabo R, Justman JE, El-Sadr W, Sia SK.
Source
Department of Biomedical Engineering, Columbia University, New York, NY

BACKGROUND: Collection of epidemiological data and care of patients are hampered by lack of access to laboratory diagnostic equipment and patients' health records in resource-limited settings. We engineered a low-cost mobile device that combines cell-phone and satellite communication technologies with fluid miniaturization techniques for performing all essential ELISA functions.
METHODS: We assessed the device's ability to perform HIV serodiagnostic testing in Rwanda and synchronize results in real time with electronic health records. We tested serum, plasma, and whole blood samples collected in Rwanda and on a commercially available sample panel made of mixed antibody titers. RESULTS:HIV testing on 167 Rwandan patients evaluated for HIV, viral hepatitis, and sexually transmitted infections yielded diagnostic sensitivity and specificity of 100% and 99%, respectively. Testing on 40 Rwandan whole-blood samples-using 1μL of sample per patient-resulted in diagnostic sensitivity and specificity of 100% and 100%. The mobile device also successfully transmitted all whole-blood test results from a Rwandan clinic to a medical records database stored on the cloud. For all samples in the commercial panel, the device produced results in agreement with a leading ELISA test, includingdetection of weakly positive samples that were missed by existing rapid tests. The device operated autonomously with minimal user input, produced each result 10 times
faster than benchtop ELISA, and consumed as little power as a mobile phone. CONCLUSIONS:A low-cost mobile device can perform a blood-based HIV serodiagnostic test with laboratory-level accuracy and real-time synchronization of patient health record data.






For more information, visit:

http://www.30yearshiv.org/

# events

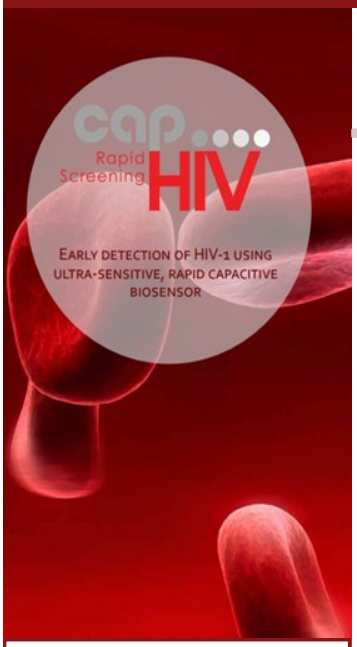
## 30 years of HIV Science: Imagine the Future

Date: 21-23 May 2013
Venue: Paris, France

May 2013 will mark the 30th year since the publication in Science reporting for the first time the identification of a retrovirus associated with AIDS-related syndromes, now referred to as human immunodeficiency virus. To celebrate this anniversary, the Institut Pasteur in collaboration with the U.S. National Institutes of Health, ANRS and sidaction is organizing an international symposium. The objective of this symposium is not to trace the history of the discovery of the virus, but to focus on the critical challenges and the future priorities that remain in HIV science as a result of 30 years of fantastic achievements. Distinguished international speakers will share their findings and their vision of the priorities of HIV research in the coming years.


## 11th European Meeting on HIV & Hepatitis- Treatment Strategies & Antiviral Drug Resistance

Date: 20-22 March 2013
Venue: Rome, Italy
This meeting was started 10 years ago with the objective to provide clinical virologists and other infectious diseases treating specialists involved in both research and clinical practice with the opportunity to share data and discuss their clinical application. The focus of the workshop at the time was specifically on HIV antiretroviral drug resistance, which was the main challenge facing the clinician a decade ago. Hence the original name as the European Drug Resistance workshop.
Over the years the challenges facing European clinicians treating HIV patients expanded. As resistance was better understood and managed, broader treatment issues (adherence, toxicity, etc.) were added to the workshop. Similarly, as better treatments for HCV became available, many of them were required to treat viral Hepatitis as well.




## events


By attending the 10th edition of this meeting, you will receive a full overview of the latest developments in Hepatitis B, C and HIV, translated to clinical practice. The meeting will provide ample time for Q & A, discussion and interaction in a balanced and neutral scientific environment. Furthermore, much attention will be given to clinical management through extensive clinical case discussions.

For more information, visit:

http://www.virology-education.com/index.cfm/t/Welcome/vid/BC6D1A31-9C52-5781-0EB4439C52C0A582

### 14th EUROPEAN AIDS CONFERENCE

Date: 16-19 October 2013
Venue: Brussels, Belgium

14th EUROPEAN AIDS CONFERENCE
OCTOBER 16–19, 2013
BRUSSELS, BELGIUM

The 14th European AIDS Conference which is being organised under the auspices of the European AIDS Clinical Society (EACS). The European AIDS Clinical Society (EACS) is a not-for-profit scientific society of European professionals involved in the field of HIV/AIDS. It was established in 1991 and is currently chaired by Prof. Manuel Battegay of Switzerland with Prof. Fiona Mulcahy of Ireland as Vice President.
„We will do our best to offer an exciting scientific conference programme, composed of state-of-the-art plenary lectures as well as abstract-driven sessions presenting the latest original research in the field of HIV medicine. As a special feature we are happy to announce that the 15th International Workshop on Co-morbidities & Adverse Drug Reactions in HIV will be affiliated with this EACS conference to allow for stimulating synergies in addressing issues concerning long -term care which are of common interest."
One of the key goals of the EACS in organising this biennial European conference is to promote an interest in HIV clinical research amongst young researchers/ clinicians from across Europe at an early stage in their career.

http://www.eacs-conference2013.com/index.php?id=39

Project Coordinator

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# www.caphiv.eu