New Options in STI Diagnosis and Control: What's new, available and coming soon to you

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JOHNS HOPKINS
MEDICINE

Objectives

- At the end of this presentation, attendees will be able to discuss and identify:
- Current point of care tests available for the diagnosis of common sexually transmitted infections
- Possible new tests for STI diagnoses that may become available in the near future

Disclosures

- None

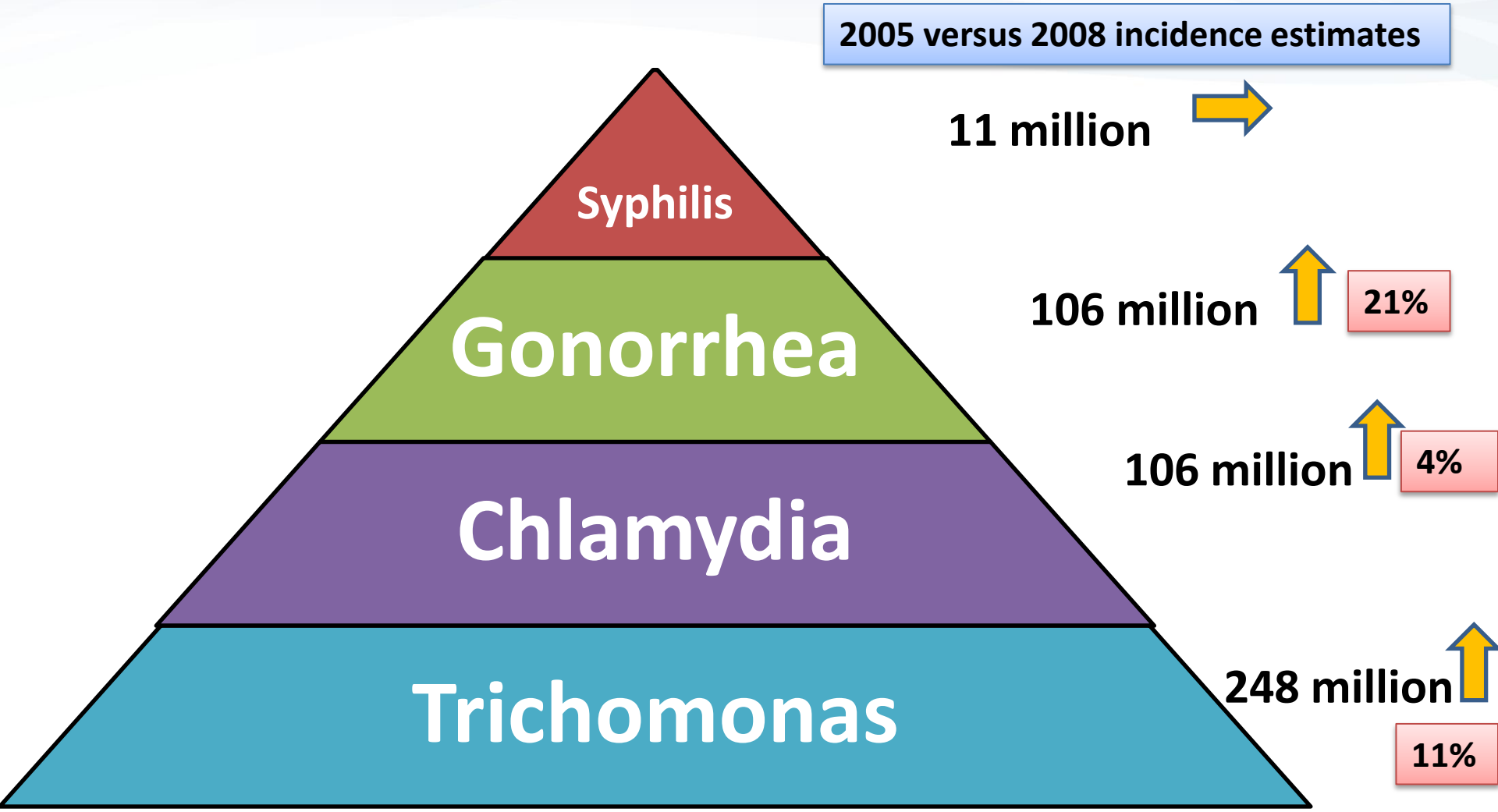
Let’s put it in perspective….

Baseline report on global sexually transmitted infection surveillance 2012

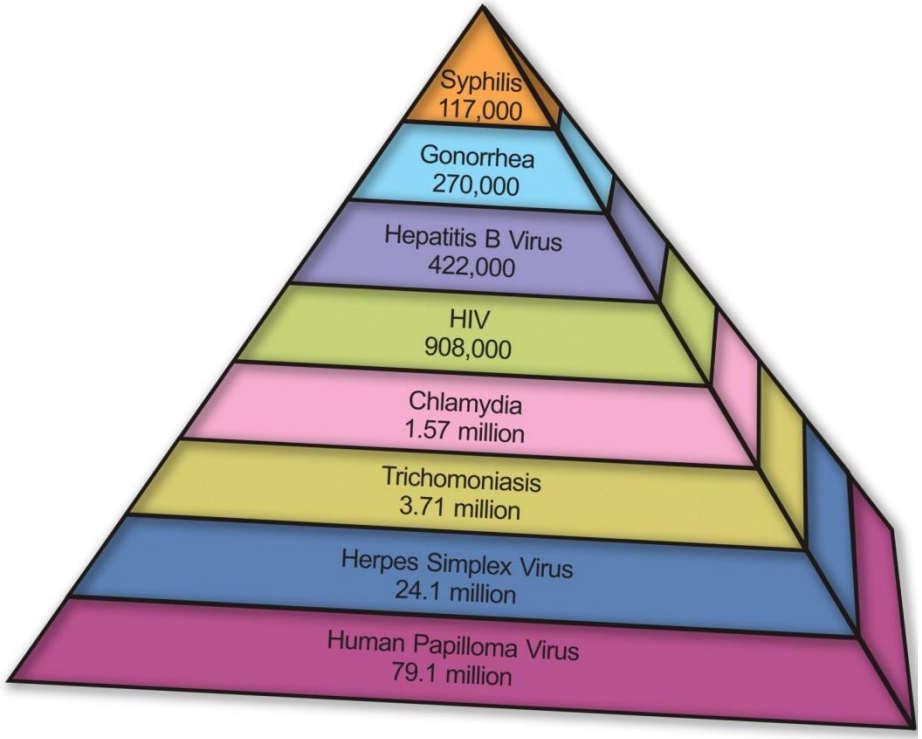
World Health Organization

- 499 Million (**up** from 340 million in 1999) new infections of curable STIs yearly
- Some exists **without symptoms**
- In pregnant women with untreated syphilis, 25% of pregnancies result in **stillbirth** and 14% in **neonatal death**
- STIs are the main **preventable cause of infertility**, particularly in women
- WHO recommends a syndromic approach to diagnosis and management of STIs.

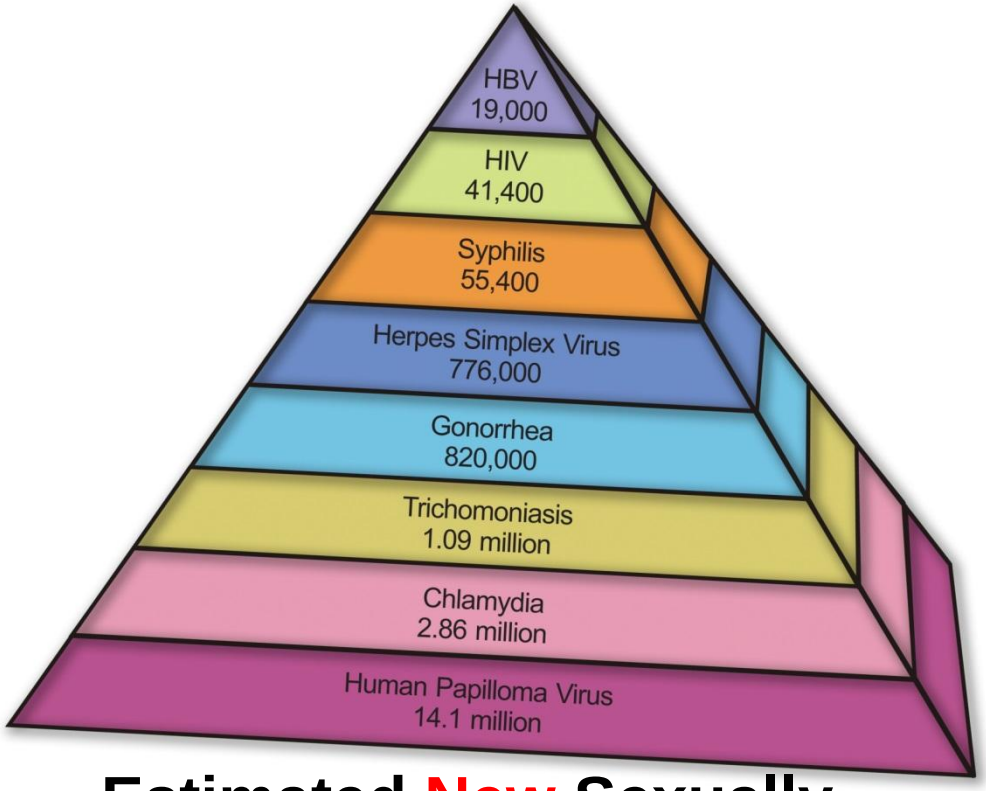
Estimated Incidence of Bacterial & protozoal STIs "Curable Infections"



Background: U.S. Estimates



Estimated Prevalence of Sexually Transmitted Infections in the U.S. (Total 110,197,000)



Estimated New Sexually Transmitted Infections in the U.S. Each Year (Total 19,738,800)

Satterwhite CL et al. Sexually Transmitted Diseases 2013;40:187-93.

But we have good diagnostics and treatments…..So what’s the problem?

Putting prevention into practice

Public health approach to STI control

Primary prevention	Behavioral, e.g. - Counseling - Condoms	Biomedical, e.g. - Vaccines - Circumcision	
Challenges	Behavioral, sexual network factors		
STI case management	Diagnosis - Symptomatic - Screening	Treatment	Partner management
Challenges	Most infections asymptomatic	Antimicrobial resistance	Repeat infections
Implementation	Access & availability	Scale-up	
Challenges	Policy, cost, lack of tests, no platform to reach infected	Political will, resources, sustainability	

ROBE

Challenges: policy and political will

- STIs are stigmatizing; lack of champions
- Many STI interventions either not fully effective or difficult to quantify impact
  - Harder to garner support

Challenges: implementation factors

- Lack of availability and access to affordable, easy-to-use diagnostic tests in much of world
  - New rapid tests for syphilis
  - Rapid tests for others may be on horizon

- Availability does not ensure effective implementation
  - Platform to access target population
  - Commitment, resources for scale-up
  - Sustainability

Public health approach to STI control

Primary prevention	Behavioral, e.g. - Counseling - Condoms	Biomedical, e.g. - Vaccines - Circumcision	
Challenges	Behavioral, sexual network factors	Need for new technologies	
STI case management	Diagnosis - Symptomatic - Screening	Treatment	Partner management
Challenges	Most infections asymptomatic	Antimicrobial resistance	Repeat infections
Implementation	Access & availability		Scale-up
Challenges	Policy, cost, lack of tests, no platform to reach infected		Political will, resources, sustainability

PROBE

What do we have currently?

- **Technology has led to sensitive nucleic acid amplification tests (NAATs), allowing non-invasive samples: vaginal swabs, urine**
- **NAATs available (CT, NG, TV, HIV, HSV, HPV)**
- **Novel approaches include POC tests, internet recruitment , and self-testing**
- **New serological tests have advanced diagnoses of HIV and HSV**
- **Yet, challenges to diagnosing STIs continue**

Chlamydia and Gonorrhea

- Commercial NAATs for CT/NG by 4-5 companies; many improved (2nd generation)
- Some are available on expensive robotic platforms, limiting their use in resource-constrained settings and small labs
- However these NAATs provide extremely high sensitivities and specificities
- Specimens can be collected by the patient (vaginal swabs 96.6-98.7% sensitivity*; penile**?)

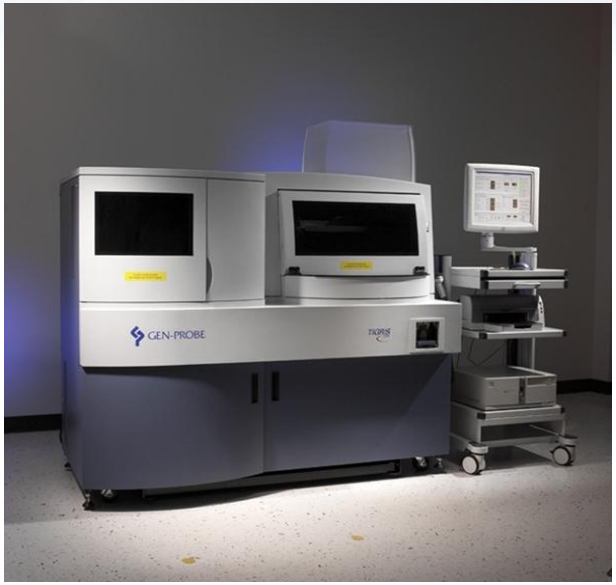
*Schachter et al, JCM 2005

**Dize et al. STI 89:305-307, 2013

Chlamydia and Gonorrhea

Assay	Specimen type	CT Sensitivity	CT Specificity	NG Sensitivity	NG Specificity
Amplicor	Vaginal	96.2%	100%	94.6%	98.1%
	Cervical	91.1%	98.2%	86.5%	100%
	Urine	83.5%	100%	75.7%	100%
Probec Q^{x}	Vaginal	96.5%	99.2%	100%	99.1%
	Cervical	91.3%	98.3%	98.5%	99.7%
	Urine	93.0%	99.4%	98.5%	99.7%
m2000	Vaginal	94.7%%	99.0%%	96.7%%	99.7%%
	Cervical	87.7%	98.9%	91.3%	99.7%%
	Urine	95.7%	99.2%	93.8%	99.7%
Aptima Combo2	Cervical	94.2%	97.6%	99.2%	98.7%
	Vaginal	96.6%	97.6%	98.7%	99.6%
	Urine	94.7%	98.9%	91.3%	98.7%

Robotic NAAT Diagnostics



And what about Point of Care or Near Patients Diagnostic tests?

Why use of POCTs in Clinical Settings

- Immediate treatment before patient leaves the clinic; no loss to follow-up
- Impact on disease epidemic?
  - Decrease interval of disease spread
- Impact on behavior?
  - Counseling on risk reduction
- ASSURED Criteria
  - When is a test good enough?

http://www.who.int/std_diagnostics/about_SDI/priorities.htm

Affordable	by those at risk of infection
Sensitive	few false negatives
Specific	few false positives
User-friendly	simple to perform: 3-4 steps, with minimal training
Rapid	rapid: to enable treatment at first visit
Robust	no requirement refrigerated storage
Equipment-free	easily collected non-invasive specimens, e.g. urine, saliva
Delivered	delivered to end-users

With diagnostics, the devil is in the details…….

If you build it, will they use it?

POCT – Build Your Own Test

- **First Priority of Needs Assessment Survey**
  - Chlamydia (62%); HIV – Early Seroconversion (14%)
  - Syphilis (8%)
- **Overall, participants selected sensitivity as their top priority, followed by cost, specificity, and time**
- **Choices (statistically significant)**

  Sensitivity: 90-99% > 80-90% > 70-80%

  Cost: $20 > $ 35 > $50

  Specificity: 99% > 95% > 90%

  Time: 5 > 15 > 25 minutes

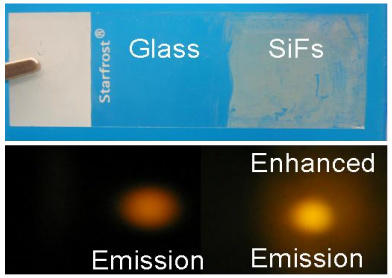
Hsieh Y-H et al. Plos One vol 6, issue 4, e19263, 2011.
Hsieh Y-H et al. Point of Care 11:126-129, 2012

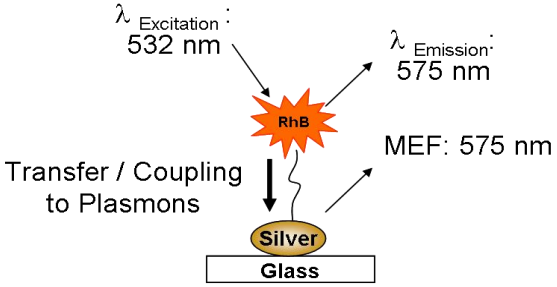
Preferences in Attributes by Prioritized Test

Attributes		Odds Ratios * all p-values <0.05			
Priority Force Choice Questions		ALL N=218	Chlamydia N= 136	Early HIV Seroconversion N=30	Syphilis N=21
Sensitivity (%)	90-99	13.6*	18.2*	10.6*	11.8*
Specificity (%)	99	3.7	3.7	4.7*	5.9*
Cost ($)	20	4.5*	5.2*	3.2	4.3
Time (minutes)	5	3.0	3.2	2.5	3.6

New POC tests for STIs

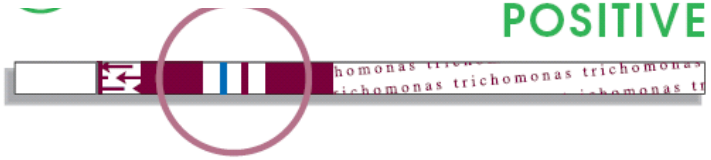
- Chlamydia



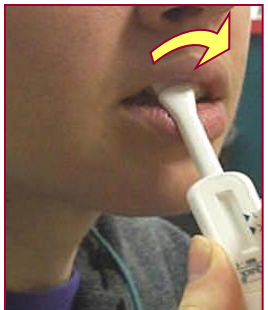


- Gonorrhea

- Trichomonas



- Syphilis



- HIV

GeneXpert® CT/NG Clinical Trial

- **1,722 female & 1,387 male subjects were tested by the Xpert CT/NG Assay and 2 NAATs**
- **The assay has a sample adequacy control (SAC) (human DNA present) and a sample processing control (SPC) (no inhibitors)**
- **Returns results in 90 minutes**

Total hands-on time: <1 Minute

Female Results CT/NG

Xpert CT/NG vs. Patient Infected Status

Specimen	Sensitivity	Specificity
CT Cervical	97.4%	99.6%
CT Vaginal	98.7%	99.4%
CT Urine	97.6%	99.8%
NG Cervical	100%	100%
NG Vaginal	100%	99.9%
NG Urine	95.6%	99.9%

Gaydos et al. J Clin Microbiol. 51:1666-1672, 2013

Male Results

Xpert CT/NG vs. Patient Infected Status

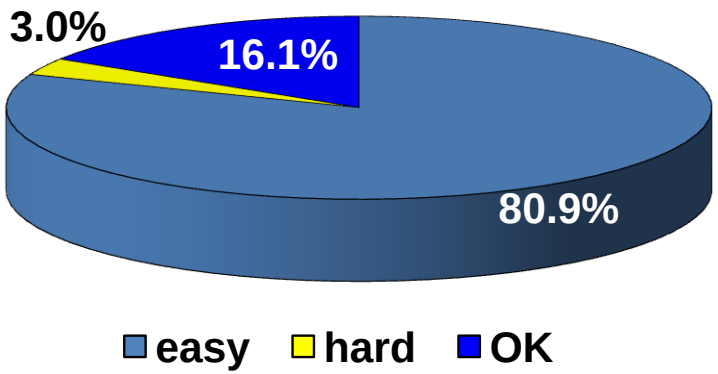
Specimen	Sensitivity	Specificity
CT Urine	97.5%	99.9%
NG Urine	98.9%	99.9%

Focus Group and Clinic Questionnaire about POCTs among patients(N =371)

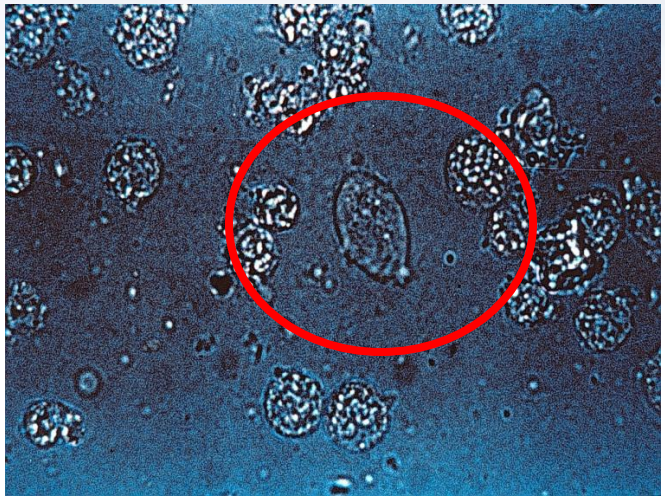
Specimen Type Preference	Percent
Cervical	15.4%
Vaginal	50.9%
Urine	33.7%

Willingness to Wait	Percent
20 min	59.0%
40 min	20.8%
60 min	10.8%
90 min	9.4%

Willingness to Pay	Percent
$10	46.6%
$20	31.0%
$30	10.8%
$40	2.7%
$50	8.9%

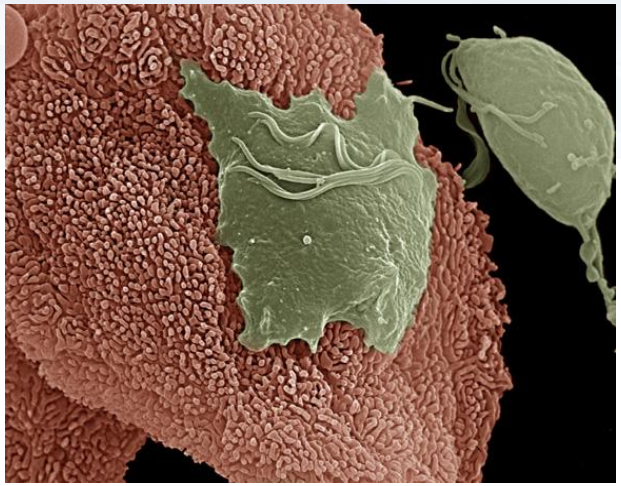


Trichomonas vaginalis



Wet Preparation showing motile trichomonads

Stained Trichomonas



Electron microscope view of trichomonas on epithelial cell

- Wet Preparation
- Culture
- Affirm
- OSOM POC

- Amplified tests (NAAT)
  - ✓ Research PCRs
  - ✓ AptimaT. *vaginalis* (ATV)
  - ✓ Becton Dickinson (TVQ)

Trichomonas Test Comparisons

	Sensitivity	Specificity
Wet prep	55%–65%	100%
Culture	75%	100%
POCT (OSOM)	>83%	>97%
PCR (LDT)	83-92%	100%
TMA AptimaTV	100%	100%
ProbTec TVQ	98.3%	98.3%

Briselden AM. *J Clin Microbiol.* 1994; Demeo LR. *Am J Obstet Gynecol.* 1996;
Huppert JS. *J Clin Microbiol.* 2005; Nye MB. *Am J Obstet Gynecol.* 2009;
Van Der Pol B. *J Clin Microbiol.* 2006.
Van Der Pol; Schwebke; Taylor: Posters STI & AIDS, 2013

QuickVue TM

QuickVue TM is a POC test that can be performed by the provider. This has a card with two test sites, on which a sample of vaginal fluid is placed with a swab that is provided in the kit.

The swab is rubbed onto two different test sites on the card. First, the swab is rubbed onto the pH site; if the pH is > 4.7, it shows a plus sign on the card; if it is < 4.7, a minus sign will appear on the card.

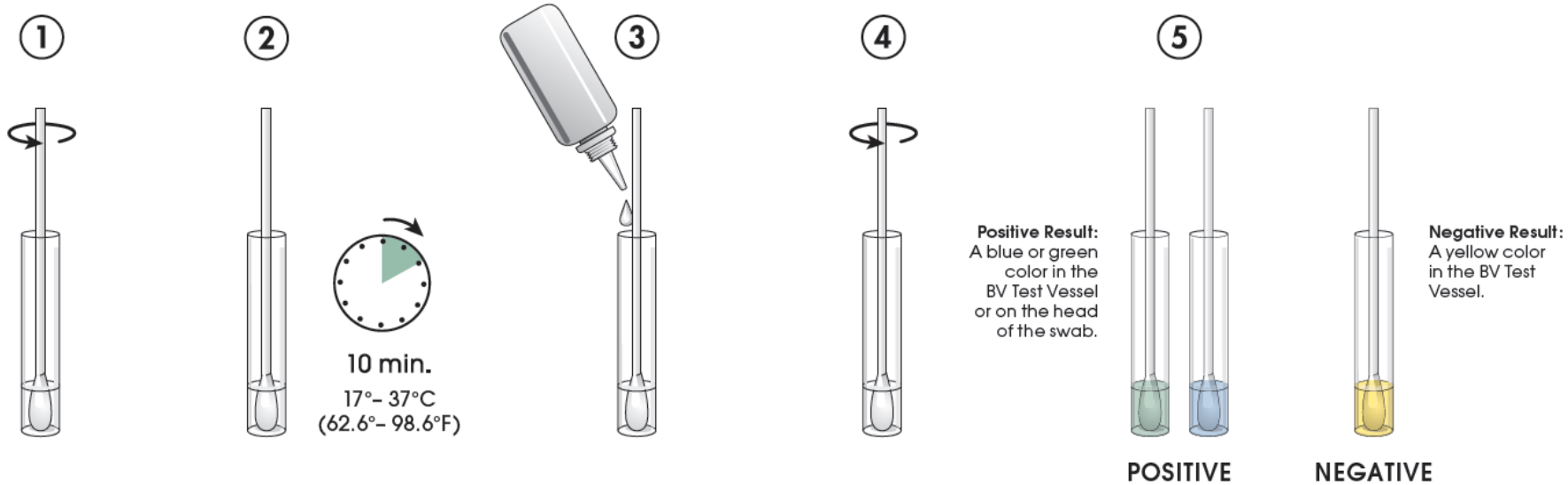
The swab is then rubbed onto the second test site, which tests for trimethylamine; if this amine is present, a plus sign will appear on the test site; if not detected, a minus sign will appear.

The results are available in two minutes. **Elevated pH and trimethylamine alone are not recommended as reliable criteria for the diagnosis of BV (CDC 2010)[18]**. According to company literature, the sensitivity and specificity are 90% and 97% respectively; however, they did not reference the study (QuickVue 2004)[98].

OSOM BV Blue TM

OSOM BVBlue TM is a POC test, which can be done by the provider. This tests for the presence of elevated levels of the enzyme, sialidase.

Due to the high correlation of the presence of sialidase with BV, a



Collect a vaginal fluid sample with a swab. Contact the swab with the lower one-third of the vaginal wall. Collect as much fluid as possible. Put the swab into the BV Test Vessel. Gently swirl the mixture.

Let the BV Test Vessel containing the swab stand for 10 minutes between 17° and 37°C.

Add one drop of Developer Solution to the BV Test Vessel containing the swab.

Gently swirl the mixture. Read the results immediately.

CAUTION: The Developer Solution is a dilute alkaline solution. This may cause skin and eye irritation. If the solution comes in contact with the skin or eyes, flush with large volumes of water.

INTERPRETATION OF TEST RESULTS:
There are two possible results:
(a) positive result or (b) negative result

NOTE: You may need to remove the swab to read the test results.

A Positive Result shows a high level of sialidase activity. A Negative Result shows a normal level of sialidase activity.

Affirm VP III

- **Affirm VP III TM**, though requiring a laboratory and specialized equipment, is marketed as a POC test that can identify *Candida sp, Trichomonas vaginalis,* or *Gardnerella v*.
- It is an automated DNA test that takes 45 minutes to complete.
- It uses a single vaginal swab to detect these organisms, using oligonucleotide probes.
- In one study, the sensitivity and specificity for Trichomonas was 83% and 100% respectively, when compared to culture (Petrin 1998, Briselden 1994).
- In relation to BV, the PCR test detects high concentrations of *G vaginalis* (Fredricks 2007; one of the bacteria characteristic of BV. Company literature states that it is a moderately complex test, which requires about two minutes of hands-on time from the provider.
- It further states that the sensitivity and specificity are as follows: Trichomonas 92% and 100% respectively; *Candida* 82% and 98% respectively; and *Gardnerella* 95% and 100% respectively (Affirm VP III 2004).

Test Procedure for *Candida*, *Gardnerella* and *Trichomonas*

Always label Sample Collection Tube, Probe Analysis Card, and Reagent Cassette with correct sample ID.

Sample Preparation

Start Sample Preparation within 1 hour of collection or store up to 4 hours at 2 - 8°C.

Note: Prepared samples may be stored up to 24 hours at room temperature before processing.

Automated Processing

Results

POSITIVE

ANY BLUE COLOR

NEGATIVE

NO BLUE COLOR

Qualitative results only. Positive results may be lighter or darker than the procedural control.

Controls

Test is VALID if
POSITIVE Control = BLUE
NEGATIVE Control = COLORLESS

For result interpretation of trivalent control see package insert.

BD

Helping all people live healthy lives

InPouch TV Test

- Another POC test, which is a combination of both POC and laboratory follow-up for culture, is the **InPouch TV Test TM**. This is a test for *Trichomonas v*. It uses a swab for inoculation. This test includes a pouch that allows immediate direct microscopic examination, which is similar to a wet mount, as well as a follow-up culture, which is evaluated in a formal laboratory for up to 7 days. Sensitivity and specificity for the direct microscopy are similar to wet smear. However, the follow-up laboratory evaluation has sensitivity and specificity similar to culture techniques (Petrin 1998, Lobo 2003, Ohlemeyer 1998, Borchardt 1995)[95] [74] [92] [6]. The follow-up culture is the key to the significant improvement in the sensitivity of the test. This is a POC test, but the improved sensitivity is related to the portion of the test that is not completed at the time of the patient's visit.

InPouch™ TV Procedure
for the Physician's Office

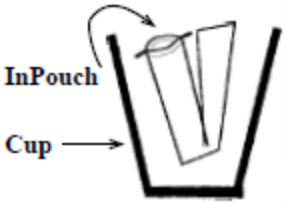
Please store uninoculated InPouches at room temperature.
Never put InPouches in the refrigerator.

1 To avoid fluid leakage, squeeze the fluid from the top of the InPouch downward toward the bottom of the upper chamber.

Tear off the plastic above the white closure. To admit the **cotton swab**, open the InPouch by pulling the closure tape's middle tabs apart. Wipe the swab between the InPouch walls.

REMOVE THE SWAB AND DISCARD.

Helpful Hint: Hands-free method of taking a specimen using the InPouch TV:



NOTE: You do not have to close the InPouch TV. You may place a ready-to-use InPouch in a cup. This will free your hands for jobs such as collection and inoculation of additional specimens. The InPouch contains strong antibiotics that will attack any micro organisms except *Trichomonas vaginalis*. You may wait until you have completed all required test procedures.

2 Squeeze the top closed. Roll the top of upper chamber down one complete roll. Move the fluid down into lower chamber. Continue to roll upper chamber down to blue InPouch label. Fold the tabs over to prevent the InPouch from reopening.

Complete and place patient label over the blue InPouch label.

DO NOT PLACE LABEL OR BAR CODE OVER VISIBLE FLUID.

DO NOT REFRIGERATE!

Helpful Hint:
Method of Incubation for the InPouch TV.

For any InPouch TV cultures (specimens) taken on a Friday afternoon at your facility, you or your clinical staff may place the InPouch TV for holding in any 37°C incubator until laboratory pick-up. At which time, the laboratory should be able to take an immediate reading.

Once inoculated and sealed, the InPouch TV medium can be kept up to **18 hours at room temperature if necessary. If held longer than 18 hours, incubation at 37°C is required.**

May 2004 Doc. No. 100-54 Rev F 050102

For More Information:

BIOMED DIAGNOSTICS
1388 Antelope Road, White City, OR 97503
(800) 964-6466 • fax: (541) 830-3001
info@biomeddiagnostics.com

InPouch™ TV Kit for the Physician's Office
Frequently Asked Questions

INOCULATION

1 **Can I use any culture swab to collect the specimen?**
Trichomonas vaginalis a "sticky" organism which will cling to anything made of dacron or plastic (swabs, tubes, tubing and pipettes). Cotton swabs are the only one you should use.

2 **Can I leave the cotton swab in the pouch?**
NO! The cotton swab can rupture the pouch during transport. A cotton swab left inside will also cloud the medium and destroy clue cells, yeast and any trichomonads present.
You will have to recollect the sample!

3 **How will menses affect the test?**
Menses will not interfere with the test.

4 **How do I use the InPouch for urine, seminal and amniotic fluids?**
These specimens need to be fresh and immediately transported to the lab. The lab tech will inoculate the pouch and perform the test. Call your lab for special handling instructions.

LABELING THE INPOUCH

1 **How do I label the InPouch?**
Place the patient label on the blue BioMed sticker in the middle of the InPouch. See diagram on reverse side.

Never place the patient label over the visible liquid areas.

INCUBATION & TRANSPORT

1 **How long can the inoculated InPouch stay in my office?**
T. vaginalis can only survive for 18 hours at 65°F - 77°F. It will die at temperatures below 65°F and above 100°F. It lives at body temperature 37°C (98.6°F) for up to 5-7 days in the InPouch.

2 **When should I send the inoculated InPouch to the lab?**
Contact your local Lab Client Services to arrange a pick-up.

STORAGE

1 **Why must the InPouches be stored at room temperature (65°F - 77°F) and not in the refrigerator?**
The InPouch medium is specially formulated for optimal recovery and growth for *Trichomonas vaginalis*. The medium also contains antimicrobial and antifungal chemicals to inhibit the growth of bacteria and yeast. **Refrigeration destroys the medium.**

Exposure to direct sunlight and temperatures above 100°F will also destroy the medium.

2 **How can I tell if the pouches are OK to use?**
When you look at an unopened pouch, the medium should appear as a clear, liquid broth with an amber color to the naked eye.

Do not use a pouch if it appears to be:

- Cloudy
- Leaky
- Dark brown
- Dry
- Medium has a thick syrup-like consistency

Please return all rejected pouches to BioMed Diagnostics via your supplier.

Trichomonas Test Comparisons

	Sensitivity	Specificity
Wet prep	55%–65%	100%
Culture	75%	100%
POCT (OSOM)	>83%	>97%
PCR (LDT)	83-92%	100%
TMA AptimaTV	100%	100%
ProbTec TVQ	98.3%	98.3%

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FDA Clearance of commercial TV NAAT assay (Gen-Probe ATV)

Molecular Testing for *Trichomonas vaginalis* in Women: Results from a Prospective U.S. Clinical Trial[▽]

Jane R. Schwebke,[1] Marcia M. Hobbs,[2] Stephanie N. Taylor,[3] Arlene C. Sena,[2] Michael G. Catania,[4] Barbara S. Weinbaum,[4] Ann D. Johnson,[4] Damon K. Getman,[4]* and Charlotte A. Gaydos[5]

Departments of Medicine/Infectious Diseases, University of Alabama at Birmingham, Birmingham, Alabama[1]; Department of Medicine, University of North Carolina, Chapel Hill, North Carolina[2]; Department of Medicine/Section of Infectious Diseases, Louisiana State University Health Sciences Center, New Orleans, Louisiana[3]; Research and Development, Gen-Probe Inc., San Diego, California[4]; and Division of Infectious Diseases, John Hopkins University, Baltimore, Maryland[5]

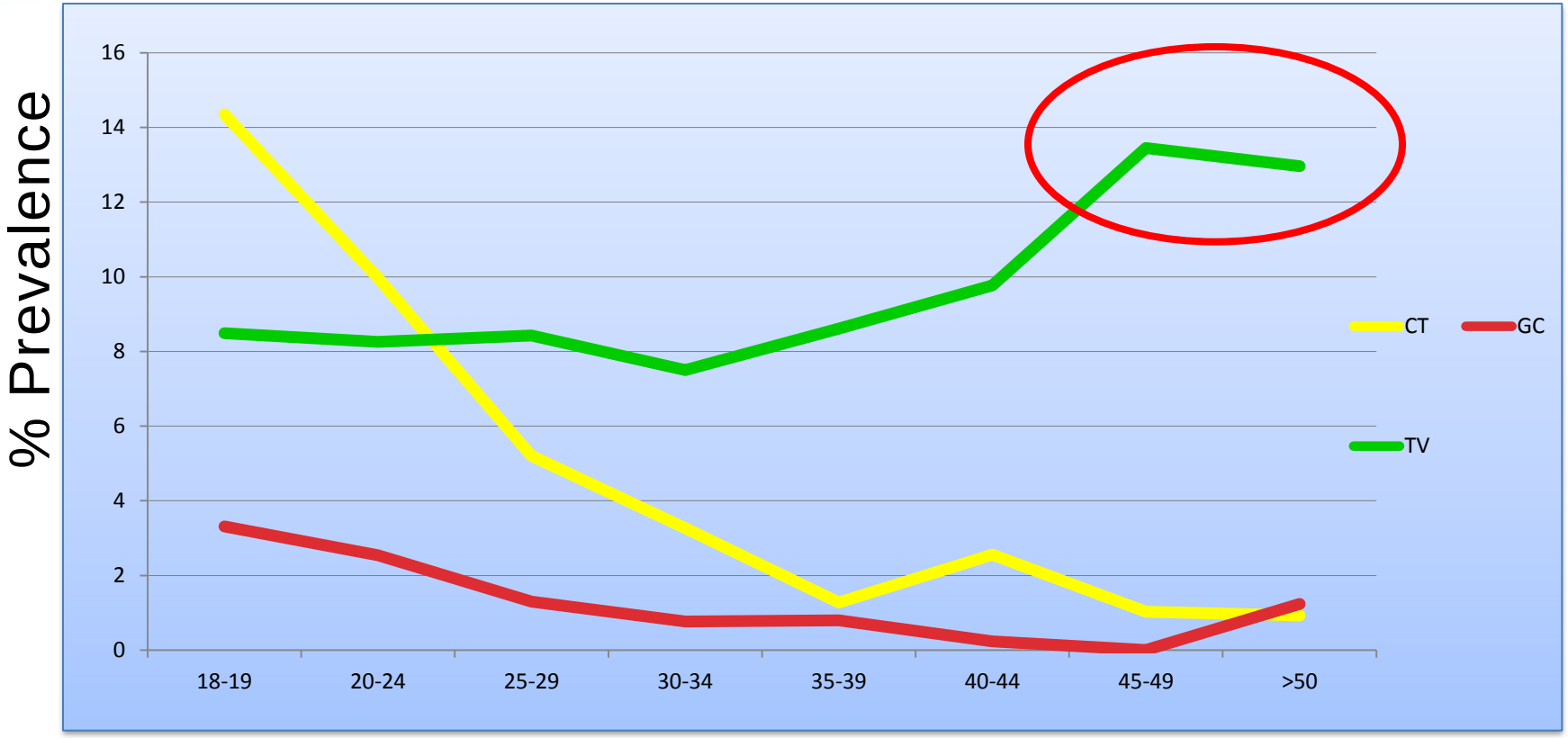
Received 28 June 2011/Returned for modification 25 July 2011/Accepted 1 September 2011

JCM 2011; 49: 4106-4111

Specimen	Number	Prevalence	Sensitivity	Specificity
Urine	735	11.4 %	95.2%	98.9%
Vaginal Swab	875	12.7%	100%	99.0%
CX Swab	920	12.4%	100%	99.4%
Thin Prep Pap	813	11.4%	100%	99.6%

FDA cleared April 2011

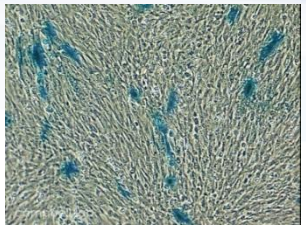
Prevalence Study of TV, CT, and GC Infections by Age (N= 7,593; 21 states)



Ginocchio et al. JCM 50:2601-2608, 2012

Herpes Simplex Virus Assays

- Virology Culture

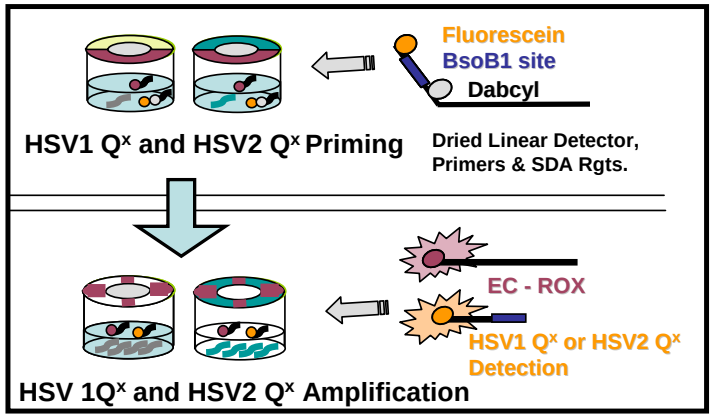


- Lab Developed PCR tests

- ELVIS (Diagnostic Hybrids) HSV 2
- New FDA cleared NAAT test (HSVQ^{x})
  - -HSV-1and 2 for lesions

Wet Foam Swab

HSV1/2 Q^{x} Assays



UVT Polyester Swab

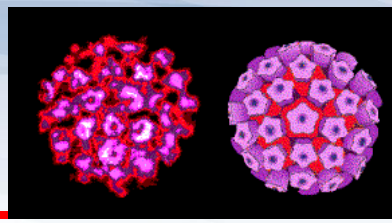
HSVQ^{x} Assay compared to PIS & PCR

Sample type	% Pos. Agreement PIS***	% Neg. Agreement PIS***	% Pos. Agreement PCR	% Neg. Agreement PCR
Qx UVT*	96.4%	98.1%	97.5%	98.1%
QxWS**	97.6%	95.7%	98.8%	95.8%
Qx UVT*	95.9%	100%	98.6%	100%
QxWS**	97.3%	97.9%	100%	98.8%

*UVT polyester swab in universal viral transport medium
** BDQ^{x} foam swab in liquid wet-swab transport medium
***PIS, patient infected status

Van Der Pol et al. J Clin Microbiol 2012;51:3466-3471

Human Papillomavirus



- 63 million cases estimated world wide
- U.S. NHANES data by PCR women age 14-59 yr have prevalence of 26.8%
- In U.S. 2,000,000 cases of ASCUS, 1,000,000 cases of LSIL, 300,000 cases of HSIL, 10,500 cases of Cervical Cancer
- Several highly sensitive and specific platforms now offer NAAT tests for the diagnosis of HPV

Cervical Cancer Screening:
Milestones & Advancements

1941
Pap Smear

1970s
Research by Harald zur Hausen Linking HPV to Cervical Cancer[1]

1996
ThinPrep® Pap Test

1999
SurePath® Pap Test

1999
Hybrid Capture® 2 HPV Test

2003
ThinPrep® Imaging System

2006
Gardasil® HPV Vaccine

2006
ThinPrep® Receives Glandular Indication

2009
Cervista® HPV HR & Cervista® HPV 16/18 Genotyping Test

2009
Cervarix® HPV Vaccine

2011/2012
APTIMA® HPV Assay and APTIMA® HPV 16 18/45 Genotype Assay

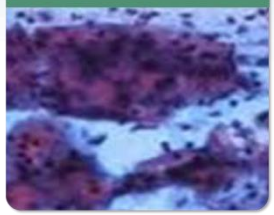
2011
cobas® HPV Test

1940s | 1990s | 2000s | 2010s

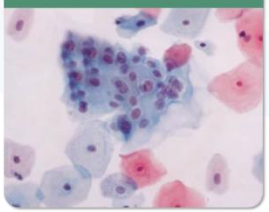
zur Hausen. *Cancer Res*. 1976;36:794.

Human Papillomavirus Assays

1940s



1990s



PAP

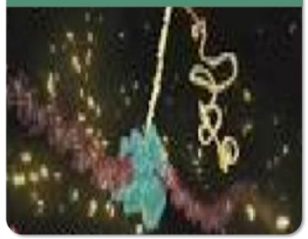
Hybrid Capture-2

2000s

Cobas® HPV

Cervista® HPV

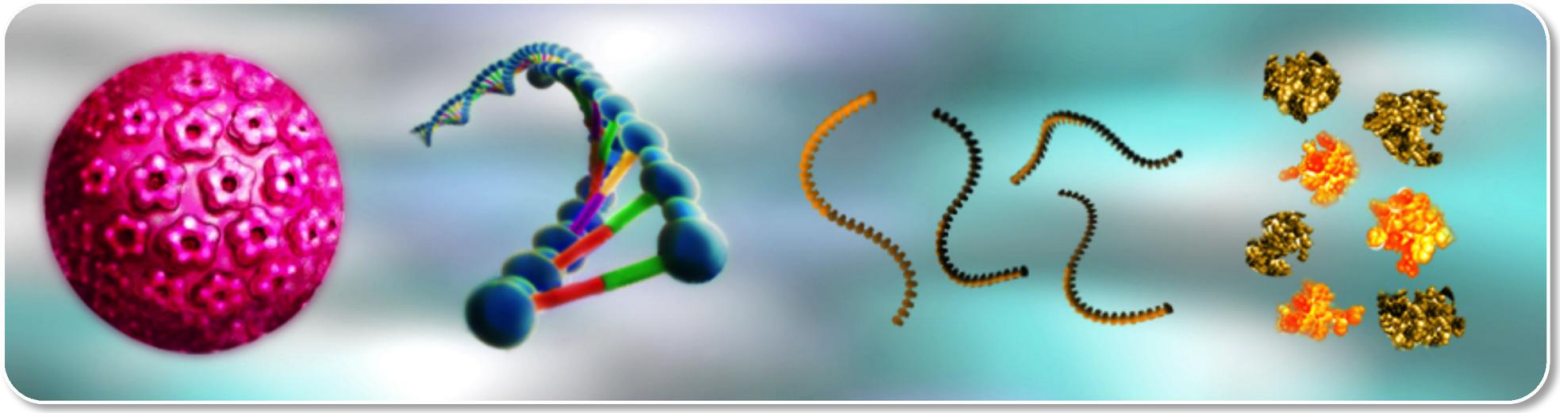
2010s



APTIMA® HPV

Real*Time*® HR HPV

Cervical Cancer: DNA vs. RNA



HPV viral particles

Viral DNA genome

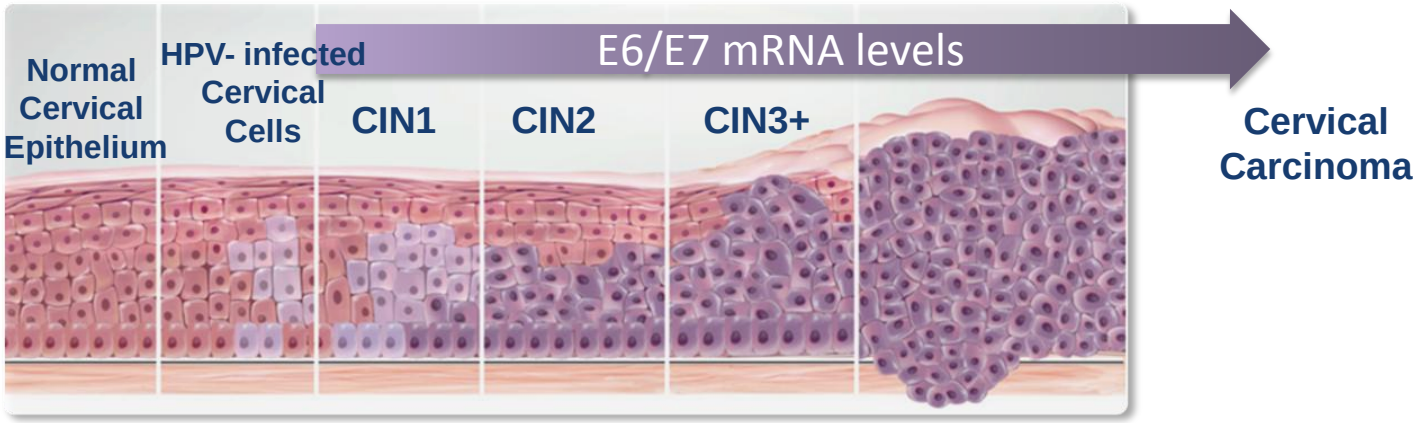
E6/E7 mRNA expression by active virus

E6/E7 *oncoproteins* Induce carcinogenesis

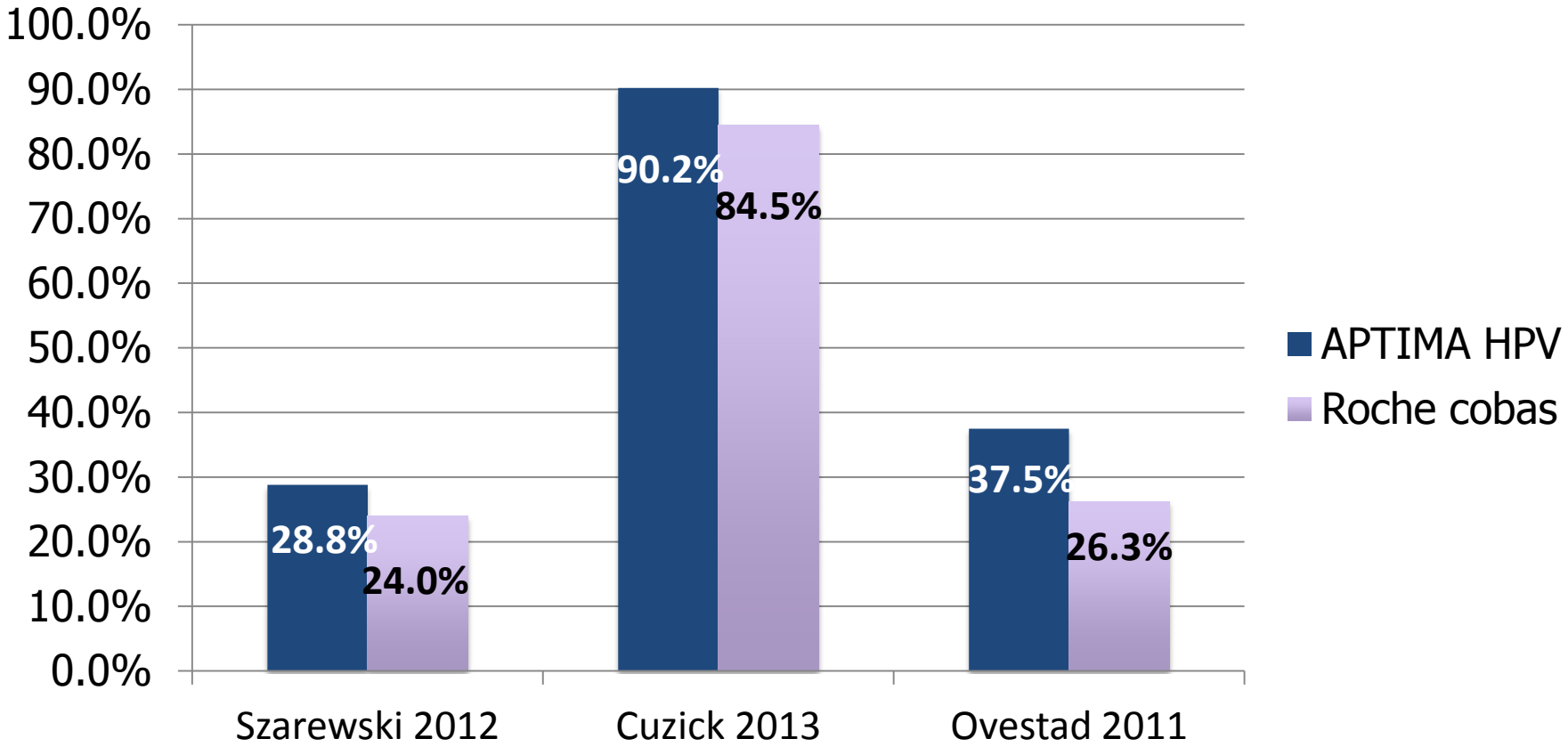
DNA indicates *presence* of HPV

Doorbar. Clinical Science 2006. 110(5):525-41

Expression of E6/E7mRNA indicates *activity* of HPV



Clinical Specificity for CIN2+ of APTIMA HPV and Roche Cobas HPV



Total population tested = 1,099

Total population tested = 6,000

Total population tested = 528

Syphilis

Reverse Algorithm testing has been introduced in the U.S.

New POC serology tests for diagnosing syphilis have proliferated

Their use is important to syphilis elimination programs worldwide and in MSM with HIV

Serologic diagnosis requires detection of two types of antibodies

- Non-Treponemal — RPR, VDRL
- Treponemal — FTA-abs, TPPA, Many new

✓ Both test types have imperfect specificity
✓ Biologic false positive non-treponemal test
✓ Falsely reactive treponemal test due to cross-reacting serum antibodies

- Reactive treponemal test cannot distinguish active from inactive infection

Second generation treponemal tests utilize recombinant antigens

- Recombinant *T. pallidum* antigens developed in the 1980s
  - ✓ High test specificity
  - ✓ Recombinant antigens as solid-phase immunoassays
  - ✓ High test sensitivity
- Over the years, several EIAs, CIAs, and MFIs have become commercially available

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 60 / No. 5
February 11, 2011

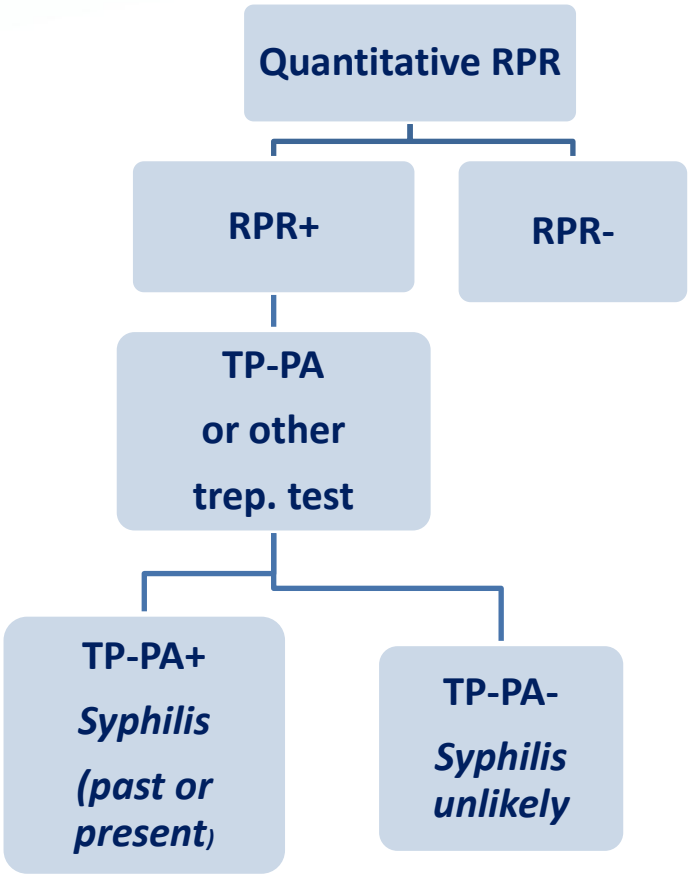
Discordant Results from Reverse Sequence Syphilis Screening — Five Laboratories, United States, 2006–2010

Treponemal tests

- Fluorescent treponemal antibody absorbed (FTA-ABS) test
- Treponema pallidum particle agglutination (TP-PA) test
- Enzyme immunoassays (EIAs)
  - ✓ Trep-Chek
  - ✓ Trep-Sure
  - ✓ Captia G
- Chemiluminescence immunoassays (CIAs)
  - ✓ LIAISON
  - ✓ Architect
- Multiplex flow immunoassays (MFI)
  - ✓ BioPlex 2200 Syphilis IgM and IgG
  - ✓ AtheNA Multi-Lyte
  - ✓ ADVIA Centaur SYPH test
- Immunochromatographic strip tests (ICS)
  - ✓ Syphilis Health Check
  - ✓ Dual Path Platform (DPP) Syphilis Screen & Confirm

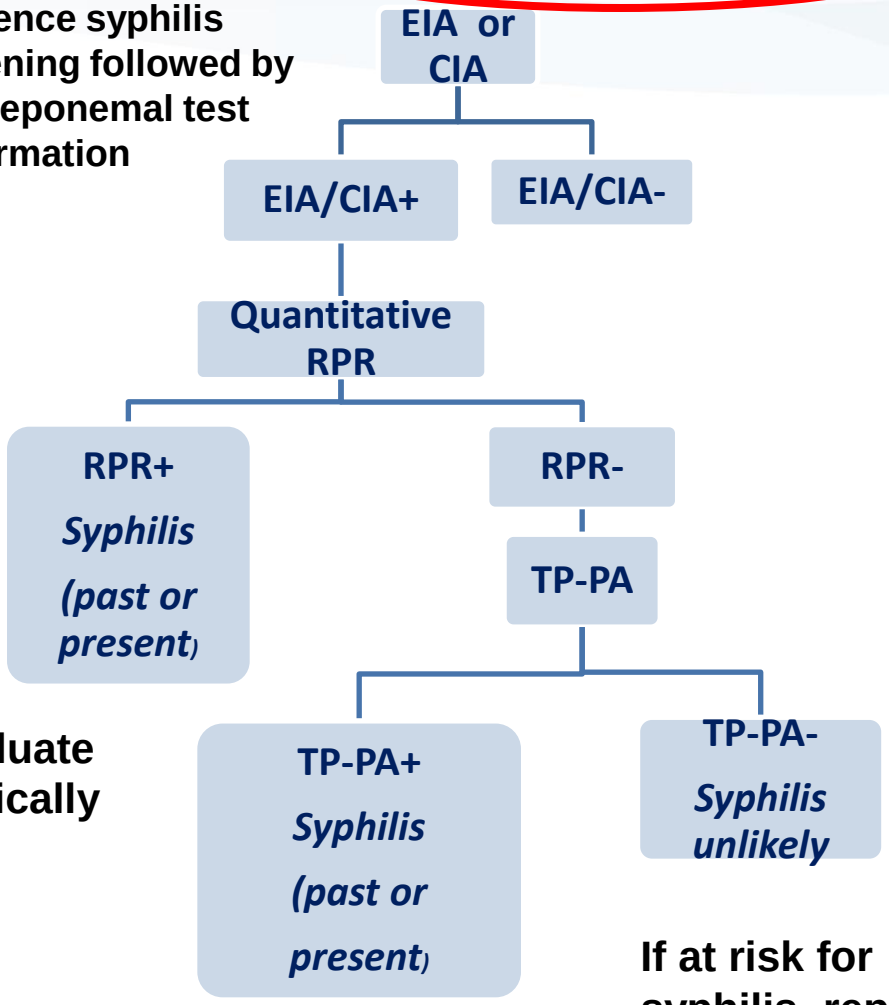
Syphilis serologic screening algorithms

Traditional



CDC recommended algorithm for reverse sequence syphilis screening followed by nontreponemal test confirmation

Reverse sequence



Evaluate clinically

If at risk for syphilis, repeat RPR in several weeks

Treponemal Syphilis EIA/CIAs

Advantages:

- Automated and may be cost saving for large volume laboratories
- May detect old untreated syphilis

Disadvantages:

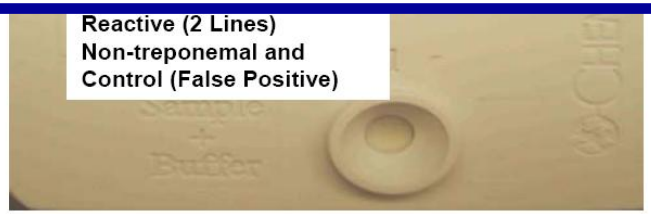
- Less clinical experience with interpretation
- May be less sensitive than FTA-ab in early primary

Dual non-treponemal and treponemal test – simultaneous detection!

Dual rapid point-of-care (POC) test:

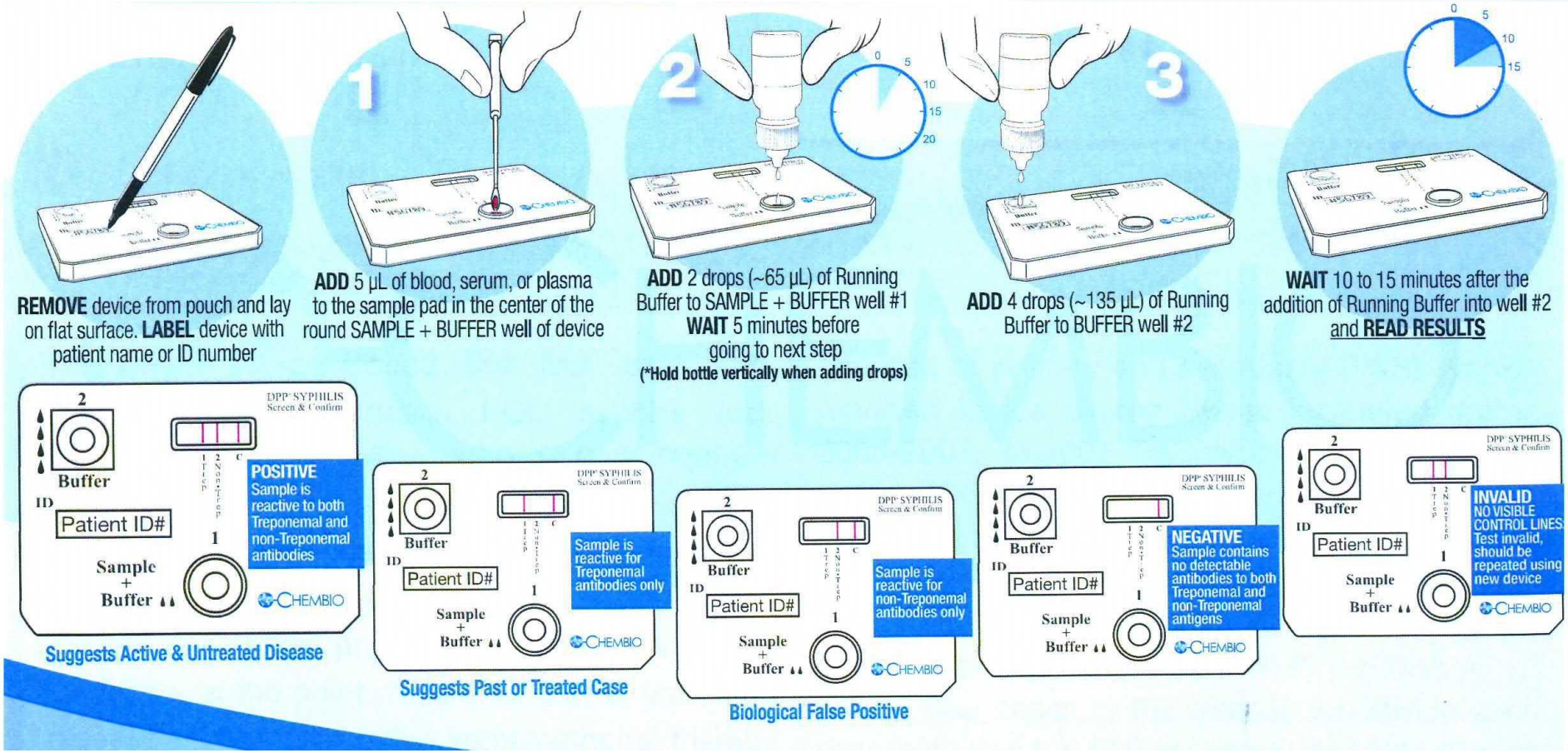
Advantages:
Relatively high sensitivity and high specificity?, whole blood by finger prick, inexpensive, no requirements of electricity, reliable results within 20 minutes (diagnosis, examination, treatment at a single clinic visit)

Important for syphilis elimination programs (e.g. congenital syphilis) globally!



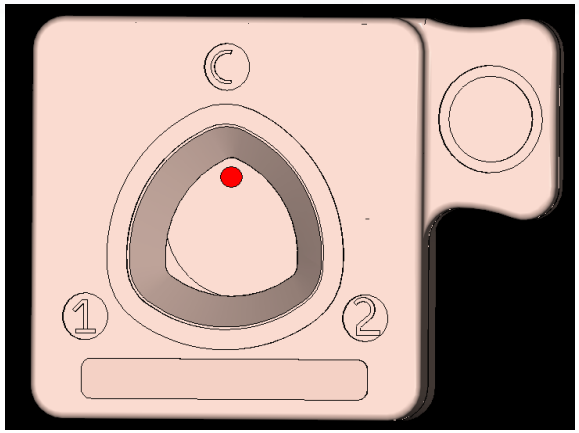
Reader ⇒ simple, rapid and less subjective

A Non-treponemal & Treponemal Combo Test

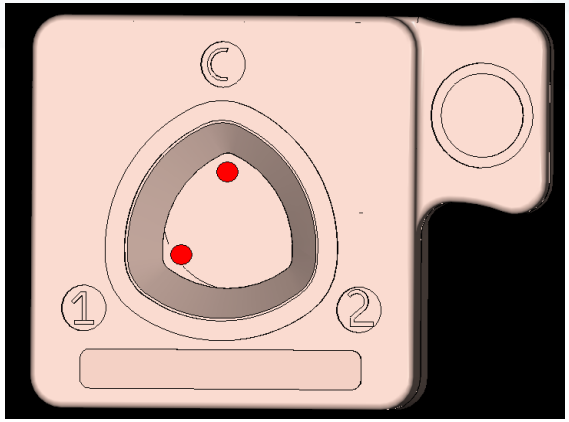


Source: Chembio Diagnostic Systems Inc., DPP® Syphilis Screen & Confirm product information sheet, 2009

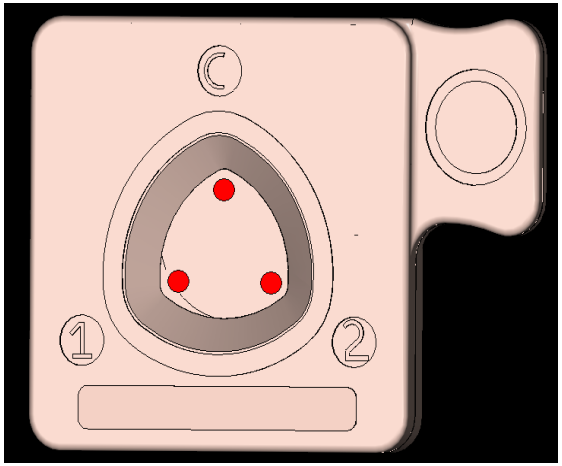
Rapid Simultaneous Detection of Reagin and Treponemal Antibodies Using the 'Signal Trepolipin' Flow-through Test



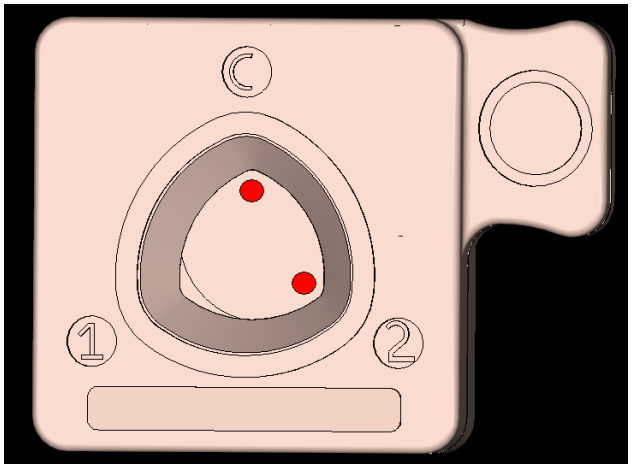
NON –REACTIVE TESTS



ONLY THE NON-SPECIFIC CARDIOLIPIN TEST REACTIVE



CONFIRMED REACTIVE TEST



ONLY THE TREPONEMAL TEST REACTIVE

SPAN

CDC
Centers for Disease Control and Prevention

POC Syphilis Health CheckTM

Syphilis Antibody Rapid Immunochromatographic Test

- Rapid qualitative screening for human TP antibodies in whole blood, serum or plasma
- Results in 10 minutes; 2 steps; room temperature
- 98% agreement to other treponemal tests
- Serum, plasma or whole blood or finger-stick

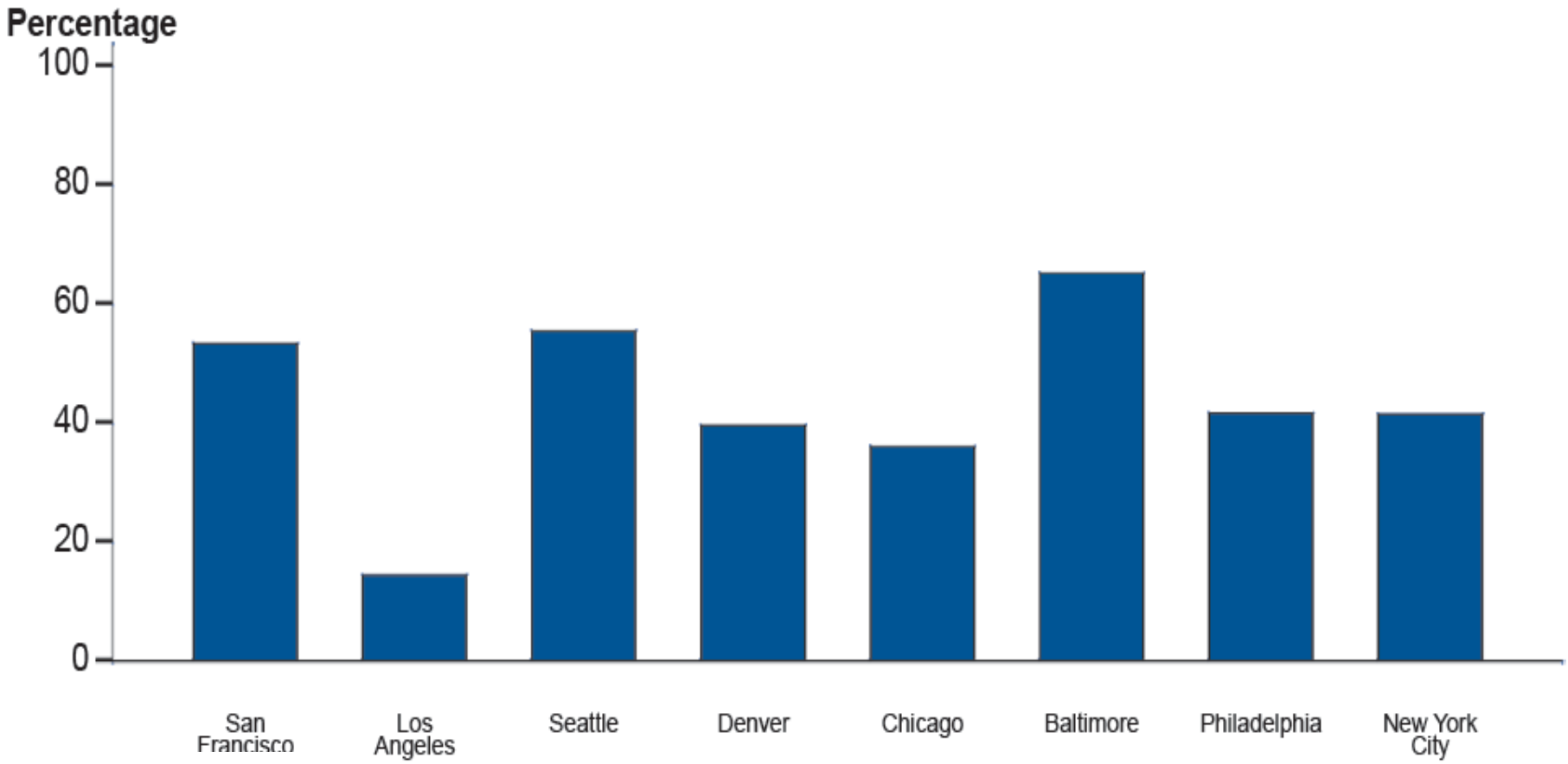
Negative: 1 colored band in control area

Positive: Colored bands in test area and control area

Inconclusive: No distinct color bands in either area

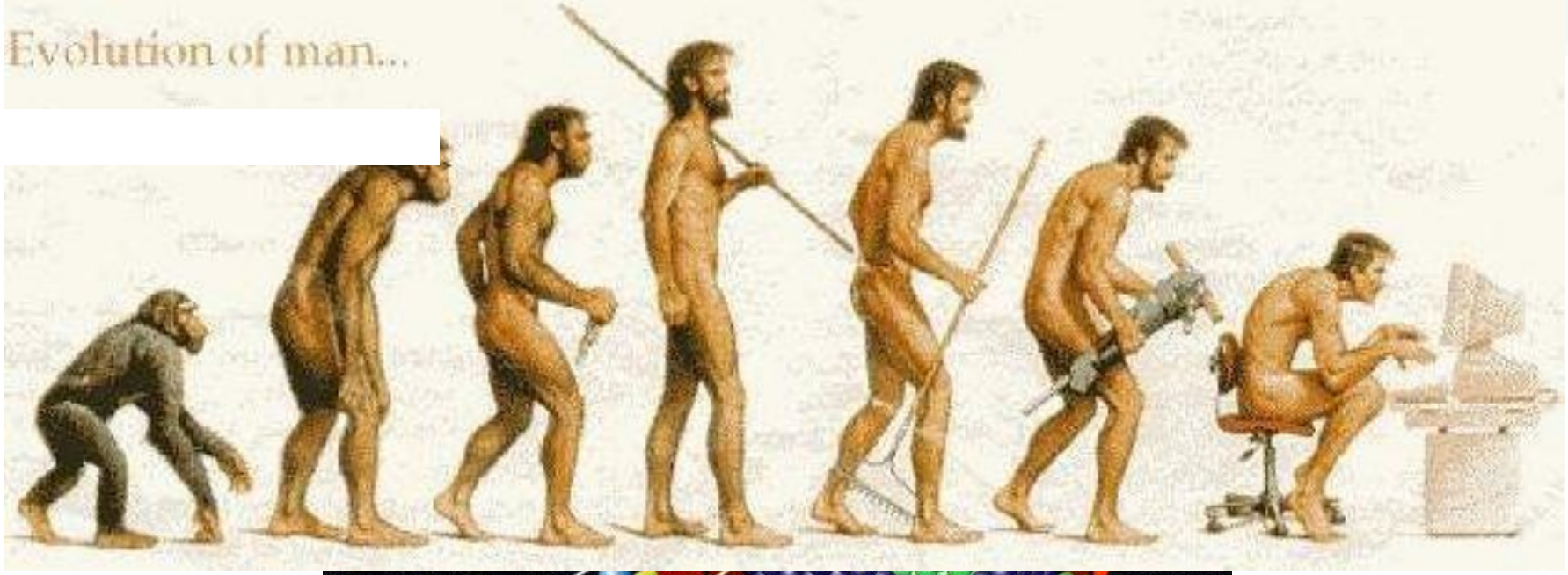
FDA Cleared

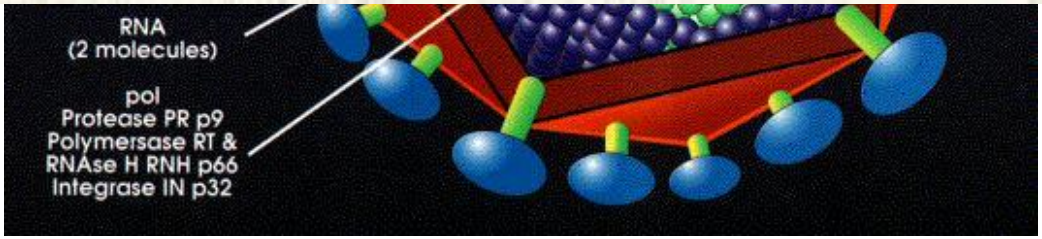
Primary and Secondary Syphilis and HIV—Proportion of MSM* Attending STD Clinics with Primary and Secondary Syphilis Who are Co-infected with HIV STD Surveillance Network (SSuN), 2011



CDC 2011 STD surveillance

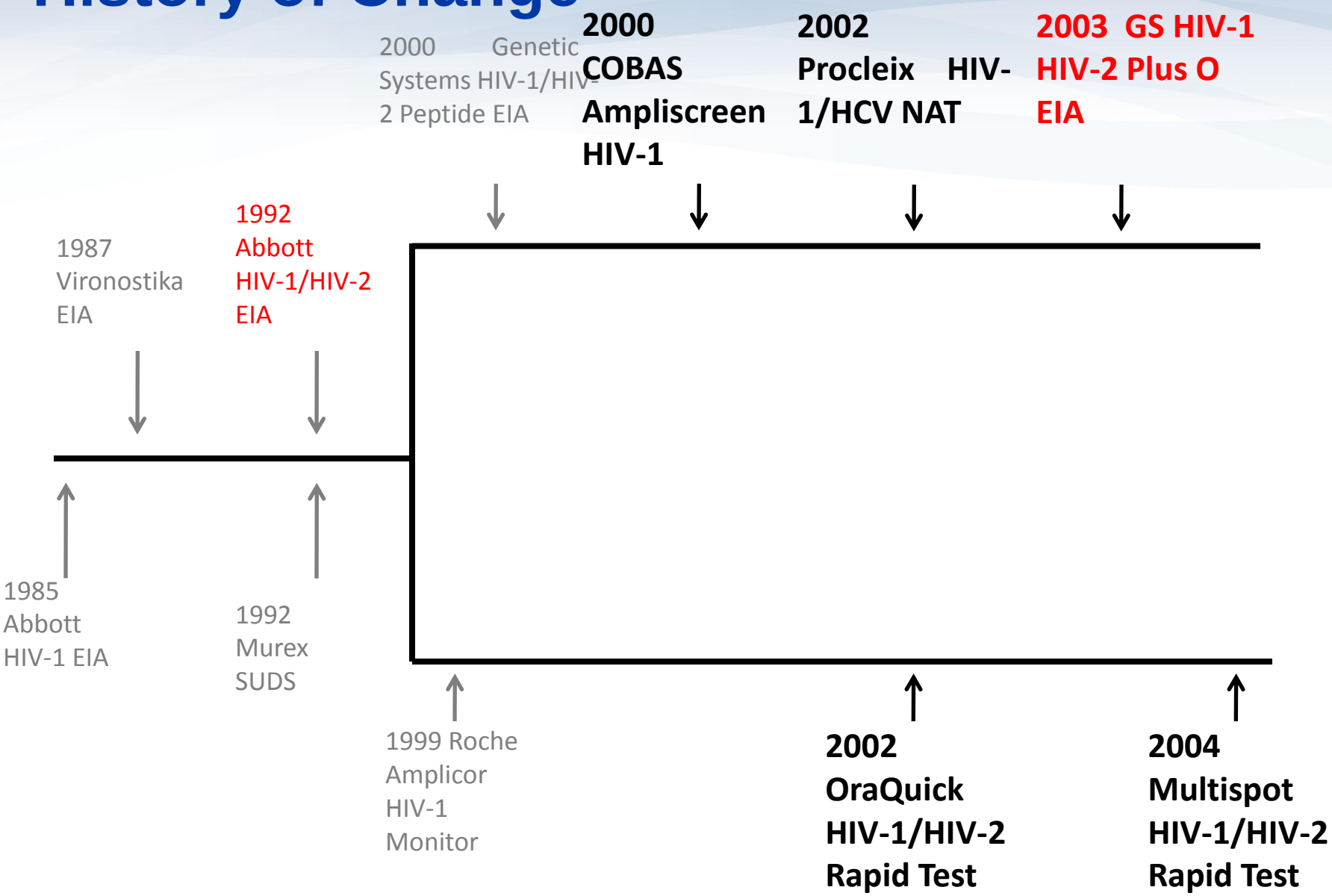
HIV Tests Have Undergone Evolution





And Many Generations…..

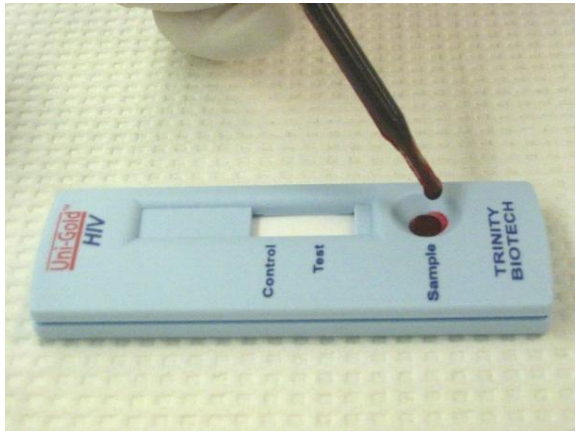
History of Change



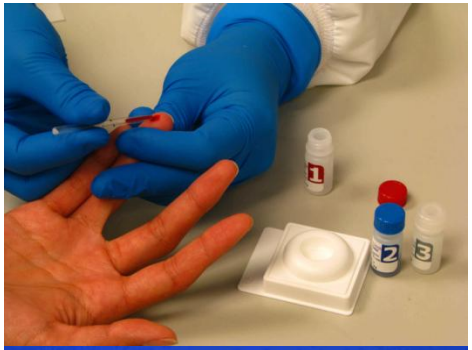
CLIA-Waived Point-of-Care Rapid HIV Tests

OraQuick Advance

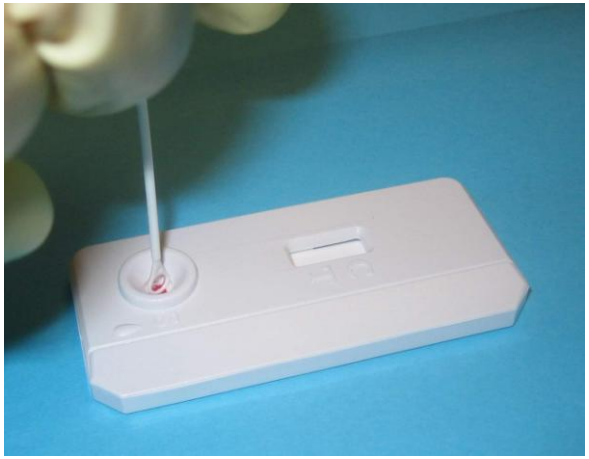
Clearview Complete



Uni-Gold Recombigen

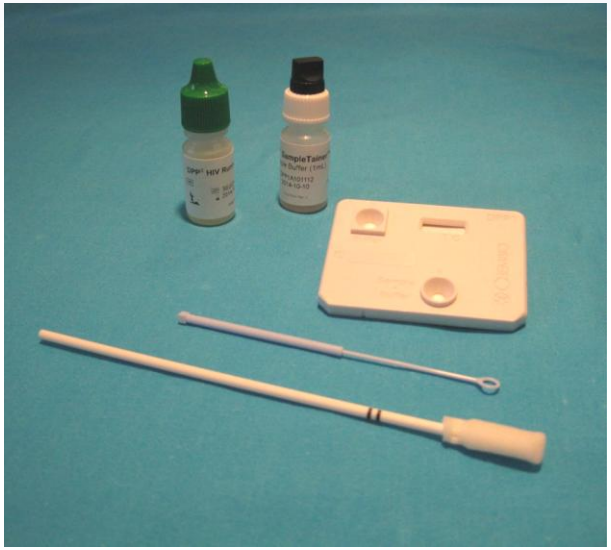


INSTI



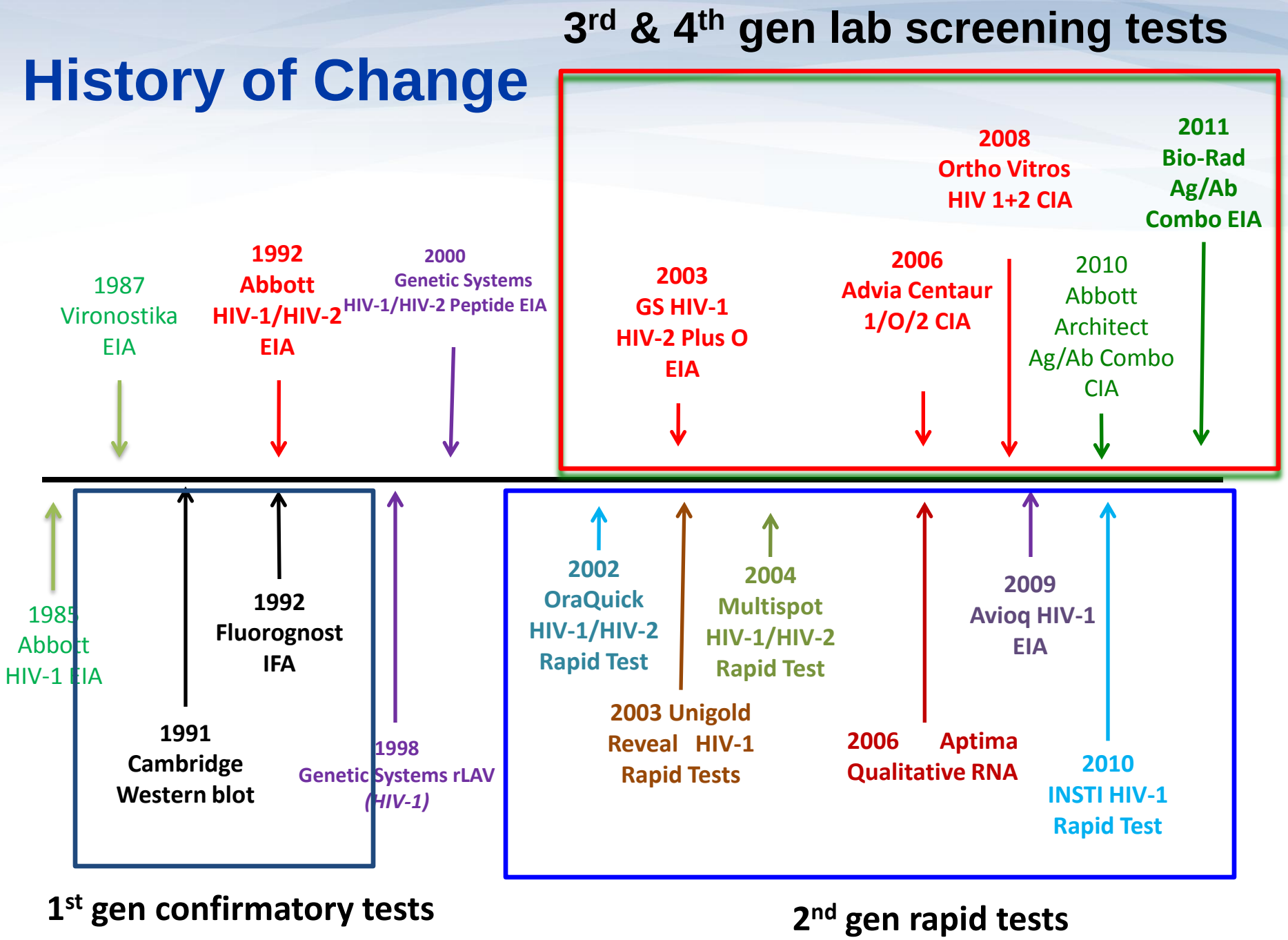
Clearview Stat Pak

DPP HIV-1/2 Assay



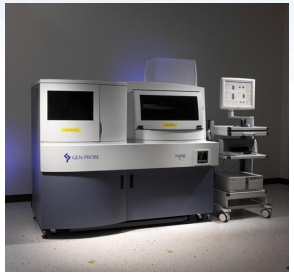
- **CLIA moderate complexity for serum, plasma, oral fluid**
- **“SampleTainer” = residual specimen after testing**
- **FDA-approved Dec 21, 2012**

History of Change



New 3rd, 4th HIV generation tests

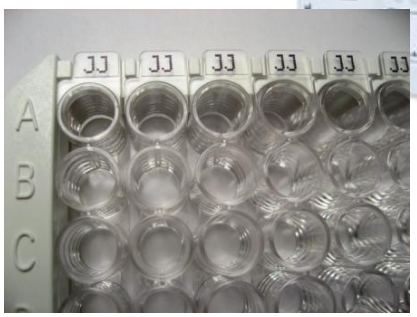
ADVIA® Centaur™ HIV 1/O/2 Enhanced



APTIMA Qualitative HIV-1 RNA

Ortho VITROS ECi/ECiQ

Abbott Architect 4th Generation Ag/Ab Combo Assay



Bio-Rad GS HIV Combo Ag/Ab EIA

New HIV Diagnostic Algorithm

4th generation HIV-1/2 immunoassay

(+)

HIV-1/HIV-2 antibody differentiation immunoassay (i.e. Multispot rapid)

(-)

Negative for HIV-1 and HIV-2 antibodies and p24 Ag

HIV-1 +

HIV-1 antibodies detected
Initiate care
(and viral load)

HIV-2 +

HIV-2 antibodies detected
Initiate care

HIV-1 +/HIV-2 +

HIV antibodies detected

HIV-1&2 (-) or indeterminate

RNA

RNA (+)

Acute HIV-1 infection
Initiate care

RNA (-)

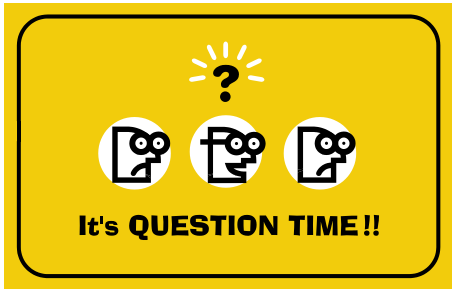
Negative for HIV-1

Branson BM, Mermin J. J Clin Vir 2011;52:S3-4;
MMWR 62, June 21, 2013. CLSI 2011

The Promising Future

- Better NAAT and serologic assays
- Better POC tests; self testing
- Testing outside a clinic; Internet recruitment

- Cheaper test kits
- Use of research to remove barriers to testing
- Learning how to effectively use these new tools and new research can improve the detection of STIs and provide cost-effective ways to increase the number of patients being treated

Acknowledgements

- Charlotte Gaydos
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- Mathilda Barnes
- Nicole Quinn
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- Jeff Holden
- Edward Hook III