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The Crux

BIMONTHLY FORUM FOR THE LABORATORIANS

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Editorial

More than four decades after HIV first emerged as a global health challenge, remarkable scientific advances have transformed what was once considered a fatal diagnosis into a manageable chronic condition. Central to this progress is Antiretroviral Therapy (ART), a life-saving treatment that suppresses the virus, preserves immune function, and enables people living with HIV to lead long, healthy, and productive lives.

Despite these achievements, HIV continues to affect millions worldwide. Stigma, misinformation, unequal access to healthcare, delayed diagnosis, and treatment interruptions remain significant barriers to ending the epidemic. Addressing these challenges requires more than medical innovation—it demands public awareness, compassionate care, strong health systems, and sustained commitment from governments, healthcare providers, communities, and individuals alike.

This issue highlights the remarkable advances in HIV care through Antiretroviral Therapy (ART), emphasizing the importance of awareness, early diagnosis, treatment adherence, and the collective effort to eliminate stigma and improve the lives of people living with HIV.

Learning is even more enjoyable when paired with moments of relaxation. So, don't miss our special BOUQUET section, packed with fun-filled jokes, interesting Q&A, motivational quotes, and much more to refresh your mind while enriching your knowledge.

We hope this edition informs, inspires, and entertains you.

Happy Reading!

HIV and Antiretroviral Therapy (ART)

PART I: HOW ART WORKS AND WHY STARTING EARLY MATTERS

HIV used to be a death sentence. Today, with antiretroviral therapy (ART), people living with HIV can live long, healthy lives — as long as they start treatment early and take it consistently. This newsletter explains how ART works, why starting it quickly matters, how it prevents transmission, and how it can affect HIV test results.

How HIV Affects the Body

HIV attacks the immune system — specifically the white blood cells (CD4 cells) that fight infection. Over time, without treatment, HIV destroys enough of these cells that the body can no longer defend itself. This final stage is called AIDS. Most people progress to AIDS within about 10 years if left untreated.

What is ART and how ART Works

Antiretroviral therapy (ART) is a combination of medications that treat HIV. While ART can't cure HIV, it can reduce the levels of HIV in your body. Low levels of the virus mean your body can produce more CD4 cells. This keeps your immune system healthy and makes you less likely to get serious infections.

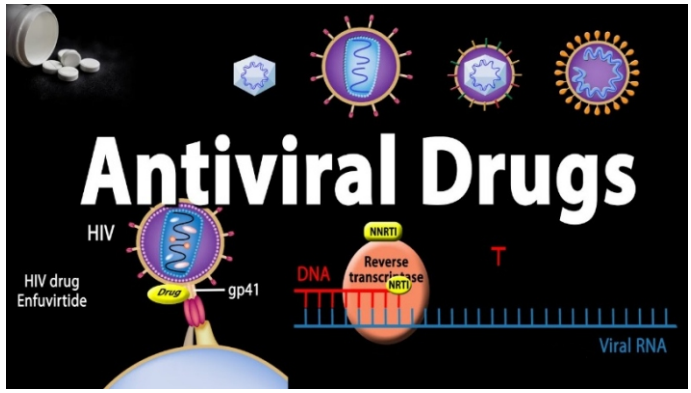
There are seven types of ART medicines:

- NRTIs — stop the virus from copying its genetic material.
- NNRTIs — block a key enzyme the virus needs to replicate.
- Protease Inhibitors — prevent new virus particles from maturing.
- Entry Inhibitors — stop HIV from entering healthy cells.
- Integrase Inhibitors — prevent the virus from embedding into the cell's DNA.
- Pharmacokinetic Enhancers — help other ART medicines work more effectively.
- Combination pills — pack multiple medicines into one daily tablet.

ART can now also be given as a monthly or two-monthly injection, making it easier for people who struggle with daily pills.

Reaching an Undetectable Viral Load

The goal of ART is to bring the amount of HIV in the blood (viral load) down to an undetectable level — usually within six months of starting treatment.[8] Once someone stays undetectable for at least six months in a row, they are called "durably undetectable." This is the key milestone for both health and prevention. Stopping or interrupting ART — even briefly — can let the virus rebound and causes faster disease progression.[8]



Why Combination Treatment Matters

HIV mutates quickly. Using just one drug gives the virus a chance to develop resistance. Using three or more drugs from different classes at the same time closes off these escape routes. Missing doses — even occasionally — can allow the virus to replicate and become resistant, limiting future treatment options. Staying on ART consistently is essential.

Starting ART Early Makes a Big Difference

WHO recommends starting ART within 7 days of diagnosis, or on the same day if possible. Research shows this leads to much better outcomes.

A study of 1,846 people in China found that starting ART within 30 days reduced the chance of treatment failure by **68%** and more than doubled the likelihood of patients taking their medicine consistently.[5] Estimates from Spain suggest early ART could prevent nearly 1,000 HIV infections and save over €300 million in healthcare costs over 20 years.[5]

A real-world programme in New York City (JumpstART) showed that **83% of patients** who started ART rapidly achieved an undetectable viral load within 3 months, compared to only **45%** who started later — and they got there in 31 days instead of 95.[6] The main barriers were cost, readiness, and access to care — not the medicine itself.[6]

Undetectable = Untransmittable (U=U)

People with an undetectable viral load cannot sexually transmit HIV to their partners. Three major studies following over 3,000 couples and 74,000 sexual acts without condoms found **zero transmissions** from a partner on effective ART.[8] This message — called U=U — reduces stigma, supports open conversations about HIV, and shows that treatment is also prevention.

Sticking to Treatment

ART only works if taken consistently — missing more than 5% of doses can allow the virus to become resistant. Starting early helps: research

shows that people who start ART quickly are more likely to keep taking it long-term.[5] Support from counsellors, peer groups, and mental health services all make a difference. For some patients, monthly injections given at a clinic can remove the challenge of daily pills entirely.

Prevention Beyond ART

ART is most effective as part of a broader prevention approach. HIV-negative people at risk should consider PrEP (pre-exposure prophylaxis). PEP (post-exposure prophylaxis) is available for emergencies. Condoms, regular HIV testing, and harm reduction services all remain important layers of protection.

PART II: HOW LONG-TERM ART CAN AFFECT HIV TEST RESULTS

The Challenge

ART works by suppressing HIV in the body. But this success can have an unintended side effect: over time, it can lower antibody levels enough to affect how HIV tests perform. This is important for both diagnosing individuals and tracking the epidemic at a population level.

Can ART Cause a False-Negative HIV Test?

A study of 207 people in Malawi who had been on ART and undetectable for over 4 years found that nearly **1 in 20 (4.8%)** had HIV rapid test results that were weak or negative — even though they were HIV-positive.[4] This can happen as early as one year after starting ART. The same study found that almost **1 in 5 (19.4%)** showed results that would be falsely classified as a recent, new HIV infection in surveillance surveys.[4] This matters because it can lead to overestimating how many new infections are happening and underestimating how many people are living with HIV.[4]

Not All Tests Are Equally Affected

A South African study of 70 people who started ART very early in their infection found that laboratory-based tests maintained **100% accuracy** regardless of when ART was started.[7] However, simple antibody-only rapid tests (the kind often used at the point of care) missed up to half of infected individuals who had started ART very early.[7] The key takeaway: tests that detect both the virus (antigen) and the antibody — called 4th-generation tests — are far more reliable in this situation.

Good News for Routine Community Testing

A large community HIV testing study in rural South Africa (6,802 people) found that standard rapid tests were **just as accurate** — or even slightly more accurate — in people already on ART compared to those who had never taken ART.[3] This is reassuring: for the majority of people being tested in communities, who started ART after their immune response was established, rapid tests still work well.[3]

Making Sense of the Evidence

These studies tell a consistent story — the timing of ART relative to infection is what matters most:

Started ART very early (before the immune response developed) → antibody-only rapid tests may miss the infection.[7]

On ART for many years → antibody levels can drop enough to affect some tests and cause false "recent infection" results in surveys.[4]

On ART after full immune response (most common scenario) → standard rapid tests remain reliable for community testing.[3]

Quick Reference: Test Reliability by Situation

Context	Lab / 4th-Gen Tests (ELISA or CLIA)	Antibody-Only Rapid Tests	Incidence/ Surveillance Tests
ART started very early (before immune response)	100% accurate ✓	Can miss up to 50% — unreliable ✗	Not applicable
On ART for 4+ years	Reliable for diagnosis	~95% — generally OK	~19% false 'recent' results — adjust estimates ✗
Community testing, ART after seroconversion	Reliable ✓	96–99% accurate ✓	Monitor; apply ART corrections

Conclusion

ART has transformed HIV from a fatal disease into a manageable condition. Starting treatment early leads to better health, better adherence, and prevents transmission to others. When someone is undetectable, they cannot pass HIV to their sexual partners.

However, the widespread use of ART also means we need to be thoughtful about HIV testing. Antibody-only rapid tests can miss infections in people who started ART very early. Laboratory-based tests and 4th-generation tests (ELISA or CLIA) that detect both antigen and antibody are more reliable in these cases. For routine community testing of people who have been on ART for some time, standard rapid tests remain dependable.

The message is simple: get people onto ART as early as possible, support them to stay on it, and choose the right test for the right situation.

BOUQUET

In Lighter Vein

Boss to employees: 'We will continue to have these meetings every single day until I work out why no work is being done'!

My boss is very easygoing. He told me not to think of him as the boss, rather, think of him as a friend who is never wrong."

Is the glass half full? Is it half-empty? According to engineers, the glass is twice as big as it needs to be.

Wisdom Whispers

"Life isn't about finding yourself; life is about creating yourself."

❖

"If you continuously compete with others, you become bitter, but if you continuously compete with yourself, you become better."

❖

"Don't ask permission to fly. The wings are yours. And the sky belongs to no one."

❖

"Weak people Revenge, Strong people forgive, Intelligent people IGNORE."

Brain Teasers

1. **Which antiretroviral drug requires genetic screening (HLA-B*5701 testing) prior to initiation due to the risk of severe hypersensitivity reactions?**
   A) Nevirapine C) Tenofovir
   B) Abacavir D) Dolutegravir

2. **Which diagnostic test is the preferred method for the early diagnosis of HIV in infants born to mothers with HIV (below 18 months of age)?**
   A) Rapid HIV antibody test C) CD4 count
   B) Western Blot D) HIV DNA/RNA PCR

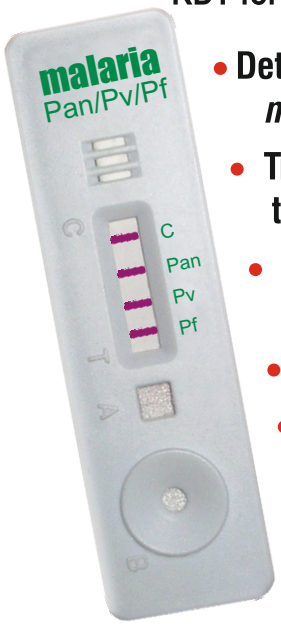
3. **What is the standard, recommended first-line Antiretroviral Therapy (ART) regimen for adults and adolescents living with HIV?**
   A) 3 NRTIs + 1 Protease Inhibitor
   B) 1 NNRTI + 1 Protease Inhibitor
   C) 2 NRTIs + 1 Integrase Strand Transfer Inhibitor (INSTI) or NNRTI
   D) 1 NRTI + 1 NNRTI

4. **What is the primary clinical goal of antiretroviral therapy (ART) in managing HIV patients?**
   A) To completely eradicate the virus from the body
   B) To suppress the viral load to undetectable levels, preserve immune function, and prevent opportunistic infections
   C) To stimulate CD4 cell production above normal levels
   D) To shorten the acute infection period so treatment can be

ANSWER: 1-B, 2-D, 3-C, 4-B

paramax-3

RDT for detection of *P. falciparum*, *P. vivax* & other malarial species.



- Detection and differentiation of *P. falciparum*, *P. vivax* , *P. ovale*, *P. malariae* & *P. knowlesi* infection.
- True speciation of the "Big Two" i.e. *P. falciparum* & *P. vivax* through specific Pf HRP 2 & Pv - pLDH Bands.
- Indirect speciation between *P. v.* and *P.o.*, *P.m.* infection through Pv pLDH and Pan specific pLDH band.
- Detection of mixed infection of *P. falciparum* & *P. vivax.*
- Sensitivity and specificity in excess of 98% for *P. falciparum* & *P. vivax* and other malaria species.
- Useful for monitoring successful therapy through vivax specific and Pan specific pLDH bands.

Dengucheck™ Combo

Rapid test system for the detection of Dengue NS-1 antigen and IgG/IgM antibodies to Dengue virus in human serum/plasma.

Detects dengue infection on the first day of appearance of clinical symptoms – Test system designed to detect dengue NS 1 antigen.

Differentiates between primary & secondary infection – Combined test system for detection of NS1 antigen and IgG/IgM antibodies to dengue virus.

Choice of testing either NS1 antigen or antibodies to dengue – Separate test pouches for NS 1 antigen & IgG/IgM test.

Reliable performance – Excellent correlation with standard NS1 detection and dengue antibody detection test.

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