INFECTIOUS DISEASES · HIV MEDICINE · INDIA

A E T C M

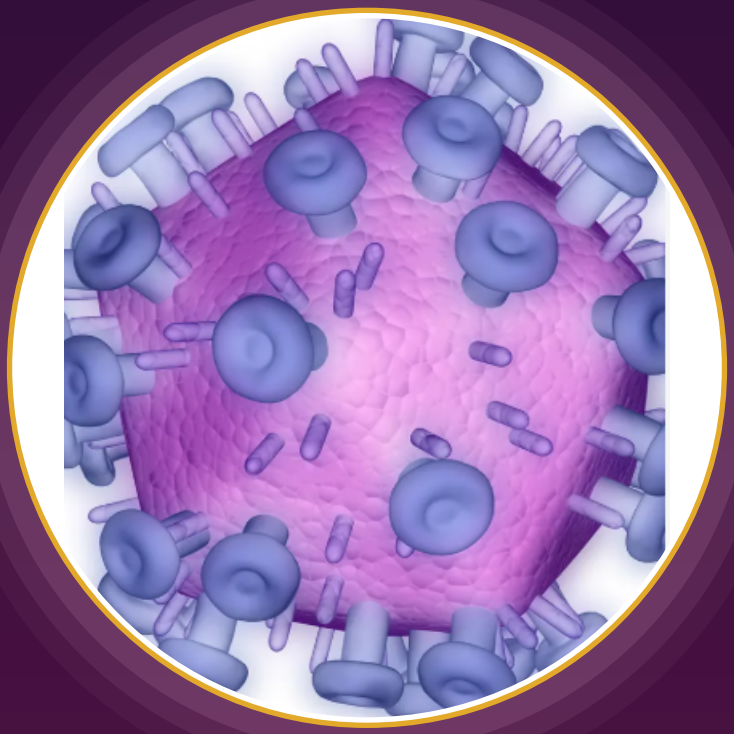
HIV Medicine

for Postgraduates

Virology · Diagnosis · ART · Opportunistic Infections · Prevention

A one-topic, one-page clinical guide for MD/DNB/DM residents — HIV virology, NACO testing strategy, **ART with the latest DHHS (clinicalinfo.hiv.gov) and NACO regimens**, every major opportunistic infection with drug tables and flowcharts, neoplasms, pregnancy, PEP and PrEP.

► Open the quick menu — tap to jump ›



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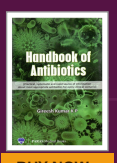
By

Dr. Gireesh Kumar K.P.

For MD / DNB / DM postgraduates, residents and physicians caring for people with HIV

Based on DHHS (clinicalinfo.hiv.gov) and NACO National Guidelines for HIV Care and Treatment

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Quick Menu

Sections, the most-searched topics and the reference tables — tap any button

SECTIONS

Virology & natural history › | Diagnosis & evaluation › | Antiretroviral therapy › | TB & respiratory OIs ›

Neurological disease › | Oral, GI & liver › | Eye, skin, blood & systems › | Neoplasms ›

Pregnancy, children & prevention ›

MOST-SEARCHED TOPICS

Start ART — TLD › | DHHS regimens 2026 › | When to start ART › | Treatment failure ›

Second-line ART › | IRIS › | Drug interactions › | Testing & window period › | NACO testing ›

Viral load › | AHD package › | OI prophylaxis › | TB with ART › | PCP › | Cryptococcal meningitis ›

Toxoplasmosis › | CMV retinitis › | Kaposi sarcoma › | HIV in pregnancy › | Infant prophylaxis ›

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INTRODUCTION

How to use this book

HIV Medicine for Postgraduates — Dr. Gireesh Kumar K.P. · AETCM · First edition · November 2026

This book is written for MD (General Medicine, Emergency Medicine, Paediatrics, Microbiology, Pharmacology, Community Medicine), DNB and DM residents who look after people living with HIV (PLHIV). Its headings follow the AETCM HIV Medicine teaching notes — virology, natural history, clinical problems by organ system, evaluation, HAART, pregnancy and post-exposure prophylaxis — rewritten and updated to the **DHHS guidelines on clinicalinfo.hiv.gov** (adult/adolescent ART update of September 2026 and the OI guidelines) and the **NACO National Guidelines for HIV Care and Treatment**.

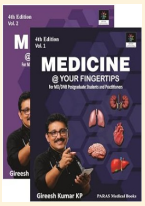
There are 9 sections. Each section opens with a one-page summary table. Every topic then has its own page laid out the same way: a crimson header, a short overview, two boxes (key facts and key investigations), then tables, flowcharts or figures, a blue **Clinical pearls** box and a gold **Further reading** box with free guideline links. Where radiology or fundus images help, a blue image box gives a QR code and link to an open image atlas (Radiopaedia, EyeRounds, Frontiers).

Element on the page	What it means
Red box	Key facts, definitions or likely pathogens (India)
Blue box	Key investigations and what to order first
Flowchart	Step-by-step approach; crimson box = start, green = treat/act, gold = decision, red = danger
Drug tables	Drug, dose, duration, renal/liver adjustment, interactions (DDI) and adverse reactions (ADR)
NACO / DHHS	Where the Indian programme and the US DHHS panel differ, both are shown and labelled
Image box (QR)	Scan or tap to open the radiology / fundus / pathology images online
Stamp at bottom right	Other books by the author — tap BUY NOW

About doses and regimens

Doses are for adults (≥30 kg) with normal renal and hepatic function unless stated. Fixed-dose combinations are written as components (e.g. TLD = tenofovir disoproxil fumarate 300 mg + lamivudine 300 mg + dolutegravir 50 mg). Check the current NACO circular and the DHHS website before prescribing — HIV guidance changes several times a year. Use the Liverpool HIV Drug Interactions checker for every new co-medication.

This book is a teaching aid for postgraduates and clinicians, based on DHHS, NACO, WHO and IDSA/HIVMA guidance current in November 2026. It does not replace clinical judgement, the ART centre/SACEP decision or institutional policy.



ALSO BY THE AUTHOR · COMPANION BOOK FOR POSTGRADUATES

Medicine @ Your Fingertips (Vols 1 & 2)

The MD/DNB postgraduate companion to internal medicine — exam-oriented, systematic and up to date (PARAS Medical Books). BUY NOW ›

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PREFACE

Preface

Why this book, and how I hope you will use it



Dr. Gireesh Kumar K.P.

Forty years after the first cases were described, HIV remains one of the defining infections of our time — and India still carries the second-largest number of people living with HIV in the world. Yet the face of the disease has changed beyond recognition. The young man who in the 1990s came to the emergency department with cryptococcal meningitis, wasting and oral thrush now walks into the ART centre, takes one tablet of TLD a day and expects to live a normal lifespan.

For the postgraduate this creates a new challenge. You must still recognise and treat the full range of opportunistic infections — tuberculosis, Pneumocystis pneumonia, cryptococcal meningitis, toxoplasmosis, CMV retinitis — because late presentation remains common in our country. At the same time you must master modern antiretroviral therapy: integrase inhibitors, rapid ART initiation, viral-load-based monitoring, drug interactions with rifampicin, two-drug regimens, long-acting injectables, PrEP and the principle that **undetectable = untransmittable**.

This book keeps the headings of the HIV Medicine notes many of you have studied from, but every page has been rewritten to the current DHHS guidelines on clinicalinfo.hiv.gov and the NACO National Guidelines for HIV Care and Treatment. Wherever the Indian programme and the international panels differ, both are shown so that you can answer the examiner and also treat the patient in front of you.

Each topic fits on one page, with tables, flowcharts, clinical pearls and free links to the guidelines and image atlases. I hope it will be opened at the bedside, in the ART centre and the night before the examination.

I thank my colleagues and students at AETCM and the ART centre teams whose questions shaped this book, and above all the people living with HIV who continue to teach us. Suggestions and corrections are most welcome.

Dr. Gireesh Kumar K.P.
Academy for Emergency, Trauma & Critical Care Medicine (AETCM)
Kochi, Kerala · November 2026

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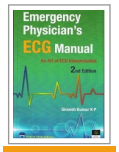
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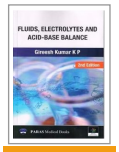
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Ten golden rules of HIV care

1. Offer an HIV test to every adult with TB, STI, pregnancy, hepatitis or an unexplained illness. 2. Start ART for everyone — same day or within 7 days if no contraindication. 3. TLD is the NACO first-line regimen. 4. Screen for TB at every visit (4-symptom screen). 5. CD4 <200: CrAg, co-trimoxazole and fluconazole/TPT as indicated. 6. Defer ART 4–6 weeks in cryptococcal and 4–8 weeks in TB meningitis. 7. Double dolutegravir with rifampicin. 8. Viral load at 6 and 12 months, then yearly. 9. Undetectable = untransmittable (U=U). 10. Check every co-medication for interactions.

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SECTION 1 · 11 TOPICS

Virology, Transmission & Natural History

Overview and one-page summary table

HIV is a lentivirus that infects CD4 T cells and macrophages, integrates into the host genome and slowly destroys cell-mediated immunity. Understanding its structure and life cycle explains how every antiretroviral class works; understanding natural history explains why opportunistic infections appear at predictable CD4 thresholds.

#	Topic	Key point for the postgraduate	Page
1	HIV and AIDS — the Virus	Retrovirus, lentivirus; gp120/gp41 envelope, p24 capsid, 2 ssRNA + RT, integrase, protease	8
2	HIV-1 and HIV-2 — Types, Groups and Subtypes	India: HIV-1 subtype C; HIV-2 resistant to NNRTIs — use DTG-based ART	9
3	HIV Life Cycle — Entry into the CD4 T Cell	Binding → fusion → reverse transcription → integration → assembly → budding → maturation	10
4	Immunopathogenesis of HIV Infection	GALT depletion, chronic immune activation, microbial translocation, reservoir	11
5	Epidemiology — India and the World	India: ~25.6 lakh PLHIV (2024), adult prevalence 0.20%; target 95-95-95	12
6	Modes of Transmission	Receptive anal sex 1.38% per act; transfusion ~92%; MTCT 15–45% without intervention	13
7	Natural History of HIV Infection	Acute → clinical latency (8–10 y) → symptomatic → AIDS; median survival 1–2 y after AIDS untreated	14
8	Acute HIV Syndrome (Primary HIV Infection)	Mononucleosis-like illness 2–4 weeks after exposure; antibody may be negative — order Ag/Ab + HIV RNA	15
9	Asymptomatic Infection, LTNP and PGL	PGL: nodes >1 cm at ≥2 extra-inguinal sites for >3 months; exclude TB and lymphoma	16
10	WHO Clinical Staging and CDC Classification	Stage 4 = AIDS-defining; CDC stage 3 = CD4 <200 or OI	17
11	Clinical Problems by CD4 Count	CD4 predicts OIs: <200 PCP; <100 toxo, crypto; <50 CMV, MAC, PCNSL	18

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Draw and label the HIV virion and list its genes and proteins
- Describe the life cycle and link each step to an ARV class
- Quote per-act transmission risks and the stages of natural history
- Use WHO clinical staging and CD4-based prediction of OIs



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HIV and AIDS — the Virus

Overview. **HIV** — human immunodeficiency virus; **AIDS** — acquired immunodeficiency syndrome, the late stage of HIV infection defined by CD4 count <200 cells/µL or an AIDS-defining illness. HIV is an enveloped, diploid, positive-sense single-stranded RNA retrovirus (family *Retroviridae*, genus *Lentivirus*).

Key facts

- Spherical virion, 100–120 nm, lipid envelope from host cell membrane
- Genome ~9.7 kb: two identical copies of ssRNA
- Reverse transcriptase is error-prone → ~1 mutation per genome per cycle; ~10^{10} virions made per day

Structural genes and proteins

- **gag** → p24 (capsid), p17 (matrix), p7 (nucleocapsid)
- **pol** → reverse transcriptase, integrase, protease
- **env** → gp160 → gp120 (SU) + gp41 (TM)

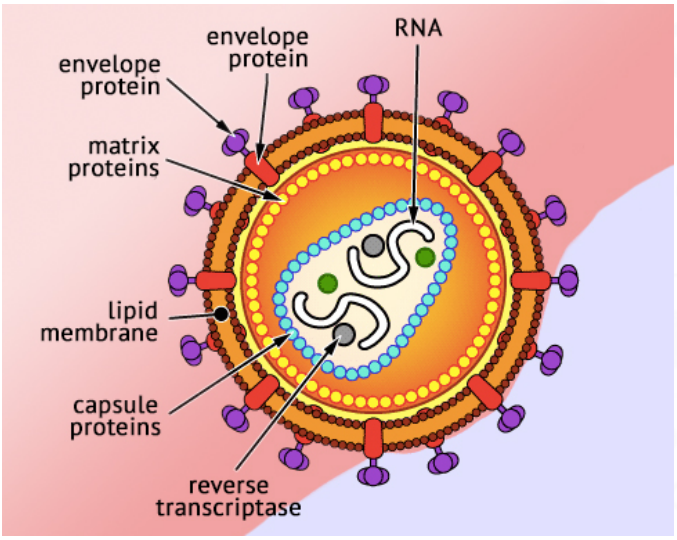


Figure 1. Structure of the HIV virion

Regulatory and accessory genes

Gene	Function
tat	Trans-activator of transcription
rev	Exports unspliced viral mRNA from nucleus
nef	Down-regulates CD4 and MHC-I; ↑ infectivity
vif	Counteracts APOBEC3G (host restriction)
vpr	Nuclear import, G2 arrest
vpu / vpx	vpu (HIV-1): CD4 degradation, release; vpx in HIV-2

Clinical pearls

p24 is the antigen detected by 4th-generation tests and is the target of the newest class, the capsid inhibitor lenacapavir. gp120 binds CD4 and the co-receptor; gp41 mediates fusion and is blocked by enfuvirtide.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · WHO HIV guidelines

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

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HIV-1 and HIV-2 — Types, Groups and Subtypes

Overview. Two species infect humans. **HIV-1** causes the global pandemic; **HIV-2** is restricted mainly to West Africa, with pockets (and dual HIV-1/2 infection) in western India — Maharashtra and Goa.

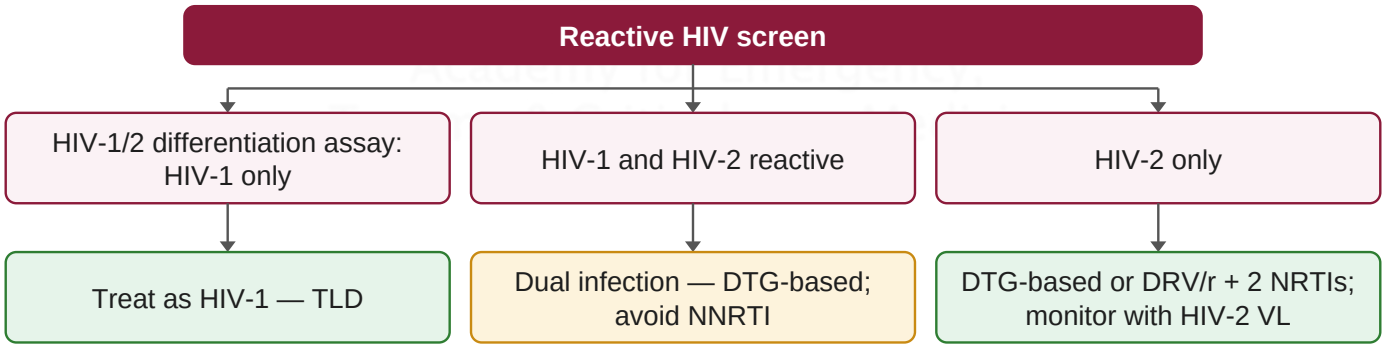
HIV-1 groups

- **M** (major, >90%): subtypes A–D, F–H, J, K, L and circulating recombinant forms (CRFs)
- **O** (outlier), **N** (non-M non-O), **P** — rare, Cameroon
- India: >95% **subtype C**; A, B and recombinants in the North-East

When to suspect HIV-2

- Link to West Africa or western India
- Positive screen with an HIV-2-reactive differentiation assay
- Low or undetectable HIV-1 viral load despite low CD4
- Poor response to NNRTI-based ART

Feature	HIV-1	HIV-2
Origin	Chimpanzee SIVcpz	Sooty mangabey SIVsm
Transmissibility	High	Lower (sexual and vertical much lower)
Progression to AIDS	Median 8–10 years without ART	Slower; many long-term non-progressors
Viral load	High; quantitative assays widely available	Low; needs HIV-2-specific RNA assay
Accessory gene	vpu	vpx
NNRTIs (EFV, NVP, RPV, DOR)	Active	**Intrinsically resistant**
Enfuvirtide	Active	Resistant
PIs	All active	Only LPV/r, DRV/r, SQV/r reliably active
INSTIs (DTG, BIC, RAL)	Active	Active — **preferred**
Recommended ART	TLD (NACO), INSTI-based (DHHS)	TLD; or DRV/r + 2 NRTIs



Clinical pearls

Dolutegravir-based first-line (TLD) has made HIV-2 management simple: it is fully active against both species. Never start an efavirenz or nevirapine regimen in HIV-2 or dual infection.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

Handbook of Antibiotics
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HIV Life Cycle — Entry into the CD4 T Cell

Overview. HIV enters cells bearing CD4 plus a co-receptor (CCR5 or CXCR4), converts its RNA into DNA and integrates it into the host chromosome as a **provirus**. Integration creates a latent reservoir in resting memory CD4 cells — the reason ART must be lifelong.

Target cells

- CD4 helper T cells (main target)
- Macrophages, monocytes, microglia, dendritic cells
- Follicular dendritic cells trap virus in lymph nodes

Co-receptor tropism

- **R5 (CCR5)** — early infection, transmitted virus; maraviroc target
- **X4 (CXCR4)** — late disease, rapid CD4 decline
- CCR5Δ32 homozygotes are resistant (Berlin, London patients)

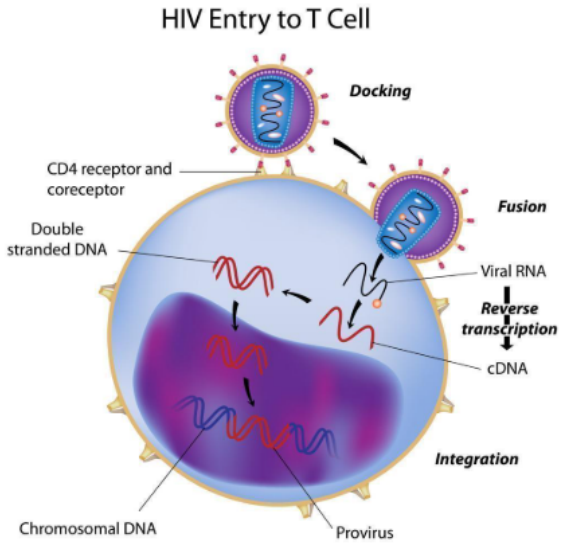


Figure 2. HIV docking, fusion, reverse transcription and integration in a CD4 T cell

Step	What happens
1 Attachment	gp120 binds CD4, changes shape and engages CCR5/CXCR4
2 Fusion	gp41 harpoons into the membrane; envelope fuses; capsid enters
3 Uncoating	Capsid transported to the nucleus (lenacapavir site)
4 Reverse transcription	RT copies RNA → RNA–DNA hybrid → double-stranded cDNA
5 Integration	Integrase inserts proviral DNA into host chromosome
6 Transcription	Tat drives transcription; Rev exports viral mRNA
7 Translation	Gag, Gag-Pol and Env polyproteins produced
8 Assembly & budding	Immature virion buds from cell membrane
9 Maturation	Protease cleaves Gag-Pol → infectious virion

Clinical pearls

Every step is a drug target: attachment (fostemsavir, ibalizumab), co-receptor (maraviroc), fusion (enfuvirtide), capsid (lenacapavir), RT (NRTIs, NNRTIs), integration (INSTIs) and maturation (PIs).

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

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Immunopathogenesis of HIV Infection

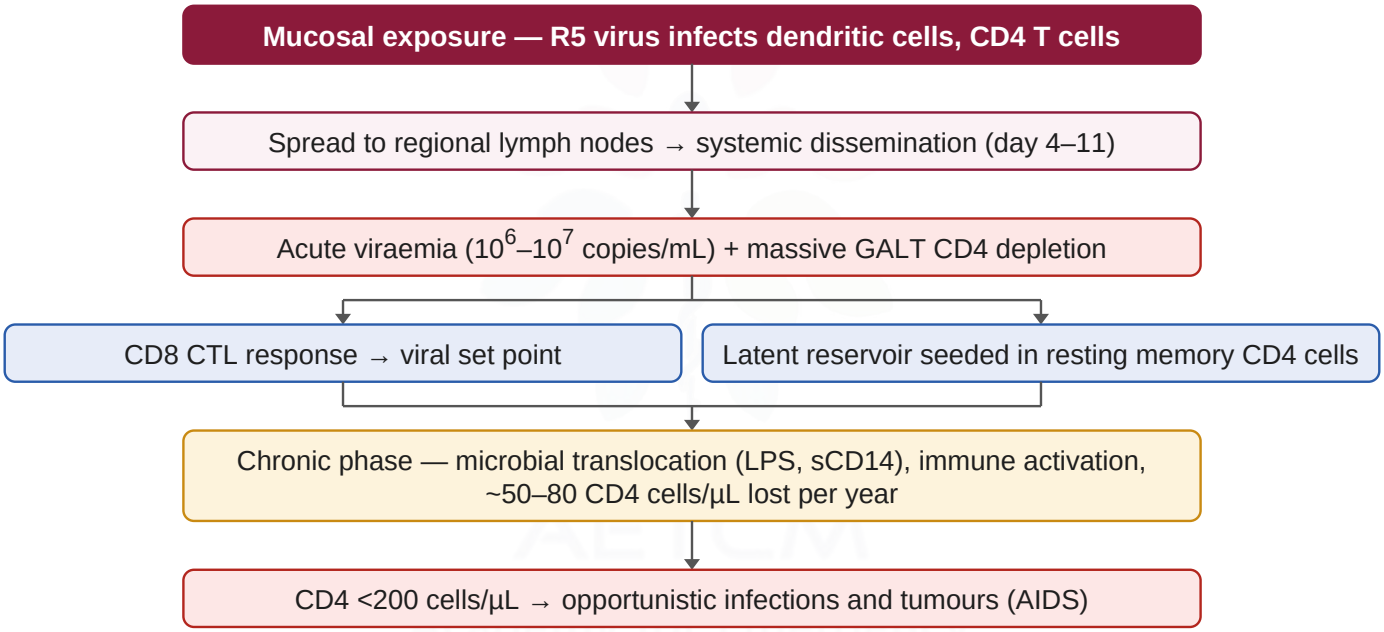
Overview. CD4 depletion is the hallmark, but HIV disease is equally a disease of **chronic immune activation**. Massive loss of gut CD4 cells in the first weeks allows microbial products to leak into the blood, driving inflammation that persists even on ART and contributes to cardiovascular, renal, bone and neurocognitive disease.

Mechanisms of CD4 loss

- Direct viral cytopathic effect
- Pyroptosis of abortively infected cells (caspase-1)
- CD8 CTL killing of infected cells
- Activation-induced apoptosis
- Reduced thymic output

Immune defects

- Loss of Th1/Th17 help → OIs
- Polyclonal B-cell activation, hypergammaglobulinaemia, poor vaccine response
- NK and macrophage dysfunction
- Lymph-node architecture destroyed (fibrosis)



Determinant	Faster progression	Slower progression
Viral set point	High (>100,000 copies/mL)	Low (<1,000)
Host genetics	HLA-B*35, CCR5 wild type	HLA-B*57, B*27, CCR5Δ32 heterozygote
Virus	X4 tropism, subtype D	Nef-deleted virus, HIV-2
Co-infections	TB, HSV-2, malaria raise viral load	—

Clinical pearls

The viral set point 6 months after infection predicts the speed of progression. Immune activation markers (IL-6, D-dimer, sCD14) remain higher than in HIV-negative people even on suppressive ART — the basis of "inflammaging" and statin use in PLHIV.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary



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Epidemiology — India and the World

Overview. India has a low-prevalence, concentrated epidemic with the second-largest number of people living with HIV globally. NACO's India HIV Estimation 2025 report put the number at about **25.6 lakh PLHIV in 2024**, with adult (15–49 y) prevalence of **0.20%** and annual incidence of 0.05 per 1,000 uninfected people.

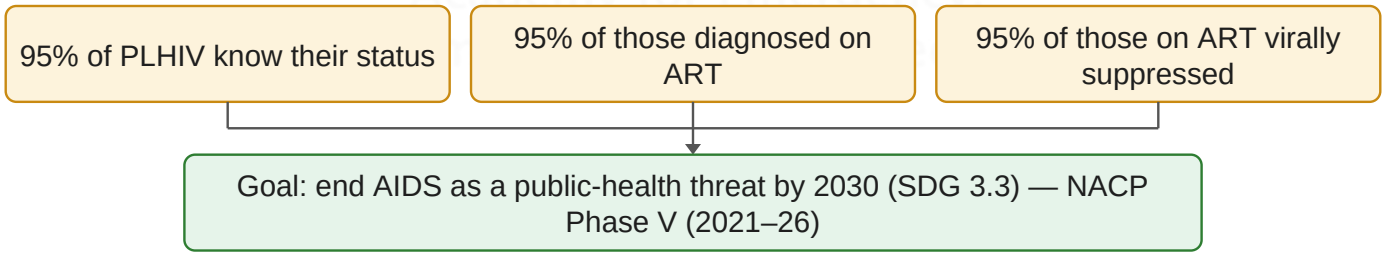
India — key numbers (NACO estimates)

- AIDS-related deaths down ~81% since 2010; new infections roughly halved
- Most PLHIV: Maharashtra, Andhra Pradesh, Karnataka
- Highest prevalence: Mizoram, Nagaland, Manipur (North-East)
- Youth (15–24 y) prevalence ~0.06%

Global (UNAIDS, 2024)

- ~40.8 million people living with HIV
- ~1.3 million new infections; ~630,000 AIDS-related deaths
- ~31 million on ART
- Sub-Saharan Africa carries two-thirds of the burden

Population group (India)	Why at higher risk	Programme response
Female sex workers (FSW)	Multiple partners, condom negotiation	Targeted interventions (TI), condoms, STI care
Men who have sex with men (MSM)	Receptive anal sex, stigma	TI, PrEP demonstration, community clinics
People who inject drugs (PWID)	Needle sharing — North-East, Punjab	Needle–syringe exchange, opioid substitution therapy
Hijra / transgender people	Sex work, stigma	TI, community-led services
Migrants and truckers	Bridge population	Link workers, Suraksha clinics
Prisoners	Injecting drugs, sex in closed settings	Prison ICTC and ART link



Clinical pearls

High-risk groups in India have HIV prevalence many times the national average. In the North-East, injecting drug use drives the epidemic; in the South and West, heterosexual transmission dominates.

Further reading — tap to open (free) ► NACO (naco.gov.in) · UNAIDS fact sheet

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

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Modes of Transmission

Overview. HIV is transmitted by sexual contact, blood and blood products, sharing of injecting equipment, and from mother to child (pregnancy, delivery, breastfeeding). It is **not** transmitted by casual contact, mosquitoes, sharing food or utensils, saliva, tears or sweat.

Factors that increase risk

- High viral load (acute infection, advanced disease)
- Genital ulcer disease, STIs
- Receptive partner, anal sex, menstruation
- Lack of male circumcision
- Deep injury, hollow-bore needle

Factors that eliminate or reduce risk

- **U=U**: sustained VL <200 copies/mL → no sexual transmission
- Condoms (~80–90%)
- PrEP (>90% if adherent)
- PEP within 72 h
- Male circumcision (~60%)

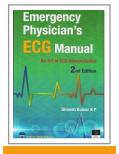
Exposure	Risk per 10,000 exposures	Approx. %
Parenteral		
Blood transfusion from HIV-positive donor	9,250	92.5%
Needle sharing (injecting drugs)	63	0.63%
Percutaneous needle-stick	23	0.23–0.3%
Mucous membrane splash	~9	0.09%
Sexual		
Receptive anal intercourse	138	1.38%
Insertive anal intercourse	11	0.11%
Receptive penile–vaginal	8	0.08%
Insertive penile–vaginal	4	0.04%
Oral sex	Low (not quantifiable)	—
Perinatal		
Mother-to-child, no intervention	—	15–45% (higher with breastfeeding)
Mother on suppressive ART + infant prophylaxis	—	<1%

Clinical pearls

Per-act sexual risks look small but accumulate, and multiply 5–20-fold during acute HIV. Mother-to-child transmission occurs mostly around delivery; breastfeeding adds risk if maternal viral load is not suppressed.

Further reading — tap to open (free) ► CDC HIV risk & prevention · NACO (naco.gov.in)

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary



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Natural History of HIV Infection

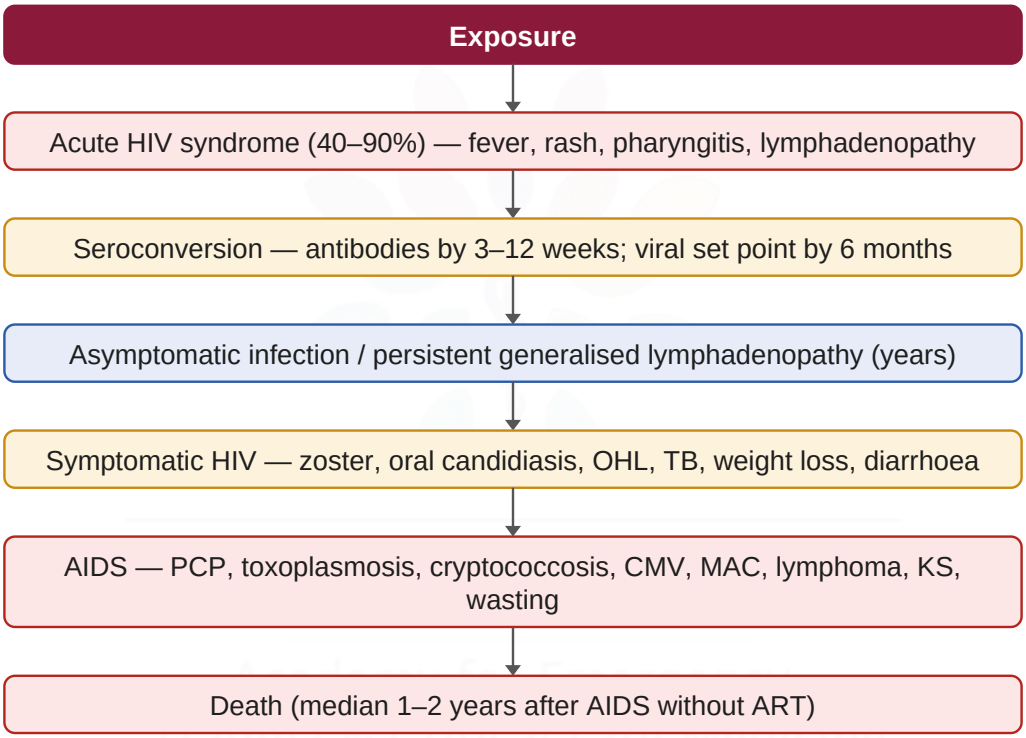
Overview. Without ART, HIV infection progresses through predictable phases. The rate of CD4 decline averages 50–80 cells/µL per year, faster with high viral load. ART halts this course and restores near-normal life expectancy.

Phases (untreated)

- **Eclipse** (~10 days): no marker detectable
- **Acute HIV** (2–4 weeks): high viraemia, seroconversion
- **Chronic / clinical latency**: median 8–10 years
- **Symptomatic HIV**: CD4 200–500
- **AIDS**: CD4 <200 or AIDS-defining illness

Laboratory course

- HIV RNA peaks at 10^6–10^7, falls to set point by 6 months
- p24 antigen detectable day 15–20
- Antibody detectable 3–12 weeks
- CD4 dips in acute phase, recovers partly, then steadily falls



Category	Definition	Frequency
Typical progressors	AIDS in 8–10 years	70–80%
Rapid progressors	AIDS within 2–3 years	10–15%
Long-term non-progressors	Stable CD4 >500 for ≥7–10 years without ART	~5%
Elite controllers	VL <50 copies/mL without ART	<1%

Clinical pearls

Clinical latency is not virological latency — billions of virions are produced and destroyed every day. This is why treatment is recommended for everyone, including long-term non-progressors.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

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Acute HIV Syndrome (Primary HIV Infection)

Overview. A mononucleosis-like illness develops 2–4 weeks after exposure in 40–90% (about 70%) of people. It lasts 1–2 weeks and is often missed. Viral load is extremely high, so transmission risk is greatest now.

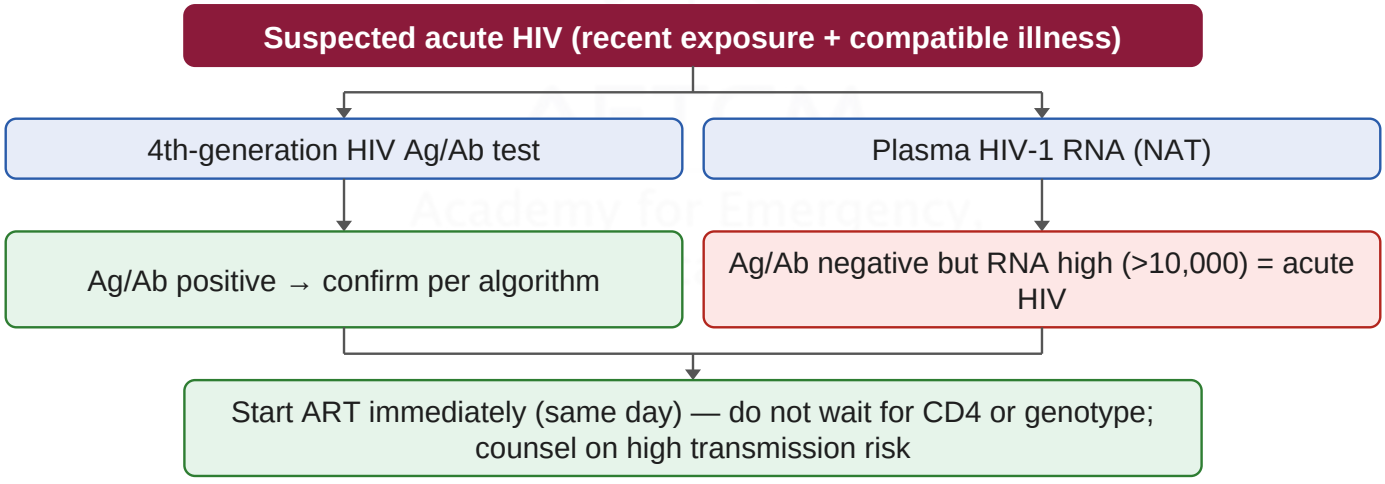
Clinical features

- Fever (>80%), fatigue, myalgia, headache
- Pharyngitis, cervical lymphadenopathy
- Maculopapular rash on trunk (40–80%)
- Mucocutaneous ulcers (mouth, oesophagus, genitals)
- Diarrhoea, weight loss
- Aseptic meningitis, Bell palsy, GBS (rare)

Laboratory

- Lymphopenia, then CD8 lymphocytosis; atypical lymphocytes
- Thrombocytopenia, ↑ transaminases
- **4th-generation Ag/Ab** positive from ~day 18
- **HIV-1 RNA** usually >100,000 copies/mL
- Rapid antibody tests may be negative

Differential diagnosis	How to distinguish
EBV infectious mononucleosis	Monospot / EBV VCA-IgM; no mucocutaneous ulcers
CMV mononucleosis	CMV IgM
Secondary syphilis	Palms and soles rash, RPR/VDRL positive
Streptococcal pharyngitis	Exudate, rapid strep test
Dengue, scrub typhus	NS1/IgM, eschar, Weil-Felix/IgM
Drug reaction, viral hepatitis, toxoplasmosis	History, serology



Clinical pearls

A low-level RNA result (<10,000 copies/mL) with a negative antibody test may be a false positive — repeat. Always test for HIV in anyone with an STI, unexplained fever with rash, or aseptic meningitis.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

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CBME-BASED INTERNAL MEDICINE
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Asymptomatic Infection, LTNP and PGL

Overview. After seroconversion most people feel well for years. The only sign may be **persistent generalised lymphadenopathy (PGL)**. Immune damage continues silently, so this is the ideal time to diagnose and treat.

Persistent generalised lymphadenopathy

- Nodes >1 cm at ≥2 extra-inguinal sites for >3 months
- Symmetrical, firm, mobile, non-tender — cervical, axillary, occipital
- Follicular hyperplasia on biopsy
- Does not predict faster progression

When to biopsy (FNAC/excision)

- Asymmetric or rapidly enlarging node, >3–4 cm
- Fever, sweats, weight loss
- Low CD4 (<200) with new nodes
- Hepatosplenomegaly, cytopenias

Differential diagnosis of PGL in PLHIV	Clues
Tuberculous lymphadenitis	Matted, caseating, cold abscess; CBNAAT on aspirate
Lymphoma (NHL, Hodgkin)	Rapid growth, B symptoms, LDH ↑
Kaposi sarcoma	Skin/mucosal lesions, HHV-8
Multicentric Castleman disease	Fever, splenomegaly, CRP ↑, HHV-8 viraemia
Disseminated fungal (histoplasma, talaromyces)	Umbilicated skin papules, cytopenias
Secondary syphilis, toxoplasmosis	RPR, Toxoplasma IgM
Drug reaction, sarcoid, SLE	History, ANA
IRIS lymphadenitis	Weeks after starting ART

Group	Definition	Implication
Long-term non-progressors (LTNP)	HIV ≥7–10 years, CD4 stable >500, no ART	ART still recommended
Elite controllers	Undetectable VL without ART (HLA-B*57/B*27)	Higher CVD and inflammation — ART recommended (DHHS)
Viraemic controllers	VL <2,000 without ART	ART recommended

Clinical pearls

In India, a new node in a person with HIV is tuberculosis until proved otherwise — aspirate for CBNAAT and cytology before anything else.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

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WHO Clinical Staging and CDC Classification

Overview. WHO clinical staging uses clinical events and is used across NACO ART centres; the CDC surveillance classification uses CD4 count. Both identify people who need urgent evaluation and prophylaxis.

WHO stage	Clinical conditions (adults and adolescents)
Stage 1	Asymptomatic; persistent generalised lymphadenopathy
Stage 2	Weight loss <10%; recurrent upper RTIs, sinusitis; herpes zoster; angular cheilitis; recurrent oral ulcers; papular pruritic eruption; seborrhoeic dermatitis; fungal nail infection
Stage 3	Weight loss >10%; chronic diarrhoea >1 month; fever >1 month; persistent oral candidiasis; oral hairy leukoplakia; **pulmonary TB**; severe bacterial infections; necrotising ulcerative stomatitis/gingivitis; Hb <8 g/dL, neutrophils <500, platelets <50,000
Stage 4 (AIDS-defining)	HIV wasting; PCP; recurrent severe bacterial pneumonia; chronic HSV >1 month; oesophageal candidiasis; **extrapulmonary TB**; Kaposi sarcoma; CMV disease; CNS toxoplasmosis; HIV encephalopathy; extrapulmonary cryptococcosis; disseminated NTM; PML; chronic cryptosporidiosis/cystoisosporiasis; disseminated mycosis; recurrent non-typhoidal Salmonella bacteraemia; lymphoma; invasive cervical cancer; atypical leishmaniasis; HIVAN; HIV cardiomyopathy

CDC stage (2014)	CD4 count	CD4 %
Stage 0	Early infection: negative test within 180 days of first positive	—
Stage 1	≥500 cells/µL	≥26%
Stage 2	200–499	14–25%
Stage 3 (AIDS)	<200 cells/µL, or a stage-3-defining OI	<14%

Advanced HIV disease (WHO / NACO)
Adults and adolescents with CD4 <200 cells/µL or WHO stage 3–4, and all children under 5 years. These people need the advanced disease package — see the AHD page.

Clinical pearls

Staging is assigned by the most advanced condition ever diagnosed — it does not go back down with ART. The CD4 count, however, tells you the current risk of opportunistic infection.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · WHO HIV guidelines

Section: Virology, Transmission & Natural History · Summary table on page 7 · ARV drug formulary

Handbook of Antibiotics
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Clinical Problems by CD4 Count

Overview. The CD4 count (normal about 500–1,500 cells/µL; Indian laboratory range ~359–1,725) predicts which opportunistic infections are likely. Use it to narrow the differential and to start prophylaxis.

CD4 count (cells/µL)	Infectious complications	Non-infectious complications
>500	Acute retroviral syndrome; candidal vaginitis	PGL; Guillain–Barré; myopathy; aseptic meningitis
200–500	Bacterial pneumonia (pneumococcus); **pulmonary TB**; herpes zoster; oral candidiasis; oral hairy leukoplakia; self-limited cryptosporidiosis; KS	CIN/cervical cancer; B-cell lymphoma; anaemia; ITP; Hodgkin lymphoma; lymphoid interstitial pneumonitis
<200	**Pneumocystis pneumonia**; disseminated histoplasmosis, talaromycosis; miliary/extrapulmonary TB; PML	Wasting; peripheral neuropathy; HIV-associated dementia; cardiomyopathy; vacuolar myelopathy; NHL
<100	**Toxoplasma encephalitis**; **cryptococcal meningitis**; chronic cryptosporidiosis; microsporidiosis; oesophageal candidiasis; chronic HSV	—
<50	**CMV retinitis**/disseminated CMV; disseminated **MAC**	Primary CNS lymphoma

CD4 <200 → co-trimoxazole (PCP), CrAg screen (WHO), TB-LAM if sick

CD4 <100 + Toxo IgG+ → co-trimoxazole covers toxoplasma

CD4 <50 → dilated fundus exam for CMV retinitis

- TB, bacterial pneumonia, zoster and Kaposi sarcoma occur at **any** CD4 count — common in India even with CD4 >350.
- CD4 % is more stable than absolute count (e.g. in splenectomy or leucopenia); CD4% <14 ≈ CD4 <200.
- After starting ART, OIs can appear early as IRIS despite a rising CD4.

Clinical pearls

A 30-year-old with fever, dry cough and hypoxia who has oral thrush and CD4 of 80 has PCP until proved otherwise; the same symptoms with CD4 of 450 suggest bacterial pneumonia or TB.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

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SECTION 2 · 8 TOPICS

Diagnosis, Evaluation & Monitoring

Overview and one-page summary table

HIV is diagnosed with a combination of antigen, antibody and nucleic-acid tests that differ in their window periods. In India the NACO three-test strategy is used at ICTCs. After diagnosis, a structured baseline evaluation identifies advanced disease, co-infections and contraindications to ART.

#	Topic	Key point for the postgraduate	Page
12	HIV Diagnostic Tests and Window Periods	4th-gen Ag/Ab detects infection ~18 days; NAT ~10–33 days; antibody 3–12 weeks	20
13	NACO HIV Testing Strategy (ICTC)	Strategy III — three different rapid tests; all reactive = positive; discordant = inconclusive	21
14	Early Infant Diagnosis and Difficult Results	Antibody unreliable <18 months — DNA PCR at 6 weeks, 6 months, 12 months, and after weaning	22
15	CD4 Count — Measurement and Interpretation	Baseline CD4 stages disease and decides prophylaxis; on ART, viral load is the monitoring test	23
16	Viral Load — Monitoring and Definitions	NACO: VL at 6 and 12 months then yearly; VL ≥1000 → EAC → repeat; DHHS failure = VL >200	24
17	Baseline Evaluation of a Newly Diagnosed PLHIV	History, exam, CD4, VL, TB screen, CrAg, HBsAg/HCV, RPR, creatinine, pregnancy test	25
18	Advanced HIV Disease (AHD) Package	CD4 <200 or stage 3/4: screen (LAM, Xpert, CrAg), prevent (CPT, TPT, fluconazole), rapid ART	26
19	HIV Drug Resistance Testing	Genotype on the failing regimen (VL >500–1,000); M184V, K65R, K103N, INSTI mutations	27

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Choose the right test for the window period and age
- Apply the NACO three-test strategy
- Interpret CD4 and viral load results
- Deliver the advanced HIV disease package



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HIV Diagnostic Tests and Window Periods

Overview. Each test detects a different marker that appears at a different time after infection. The **window period** is the time from infection to a reliably positive test. Choose the test according to the clinical question.

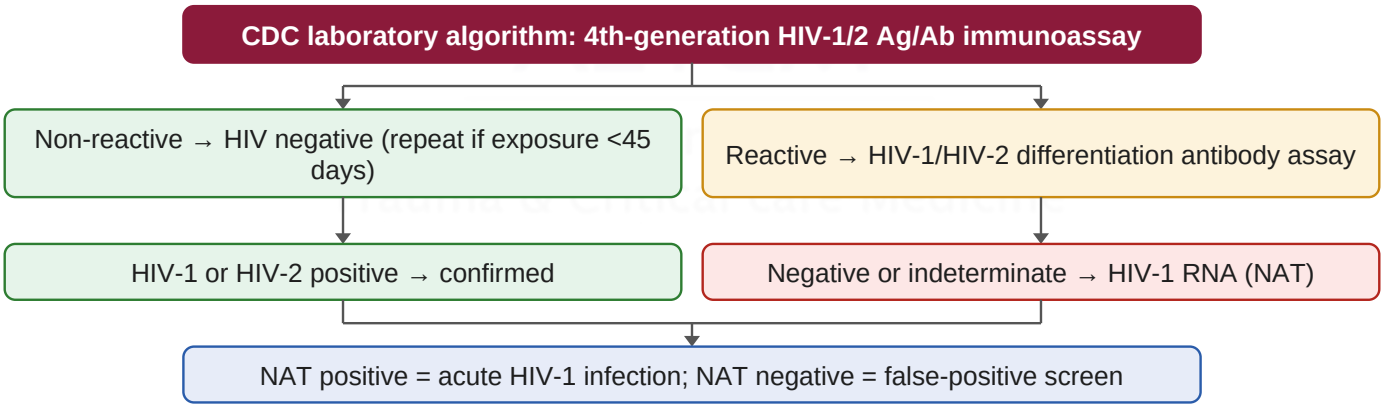
Markers in order of appearance

- HIV RNA (NAT) — day 10–15
- p24 antigen — day 15–20
- IgM antibody — day 20–25
- IgG antibody — 3–12 weeks
- Western blot bands complete — months

Best test for the situation

- Routine screen: 4th-gen Ag/Ab (lab) or NACO rapid tests
- Acute HIV / recent exposure: Ag/Ab + HIV-1 RNA
- Infants <18 months: HIV-1 DNA PCR (DBS)
- Indeterminate results: NAT, repeat at 2–4 weeks

Test	Detects	Window (approx.)	Use
3rd-generation rapid / ELISA	IgM + IgG antibody	23–90 days	ICTC screening (NACO)
4th-generation Ag/Ab (CLIA/ELISA)	p24 antigen + antibody	18–45 days	Lab screening (CDC algorithm)
p24 antigen alone	Capsid protein	15–20 days	Research; acute HIV
HIV-1 RNA (quantitative NAT)	Viral RNA	10–33 days	Acute HIV; viral load monitoring
HIV-1 DNA PCR (qualitative)	Proviral DNA in cells	—	Early infant diagnosis
HIV-1/2 differentiation assay	Type-specific antibody	—	Confirms and types (replaced Western blot)
Western blot	Antibodies to gp160/120, gp41, p24	Late	Obsolete; indeterminate in early infection
HIV self-test (oral fluid/blood)	Antibody	3 months	Reactive → confirm at ICTC



Clinical pearls

A negative antibody test in a patient with recent high-risk exposure and a febrile illness does not exclude HIV — send HIV-1 RNA. Never diagnose HIV from a single rapid test.

Further reading — tap to open (free) ► CDC HIV testing algorithm · NACO National Guidelines for HIV Care & Treatment 2021

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NACO HIV Testing Strategy (ICTC)

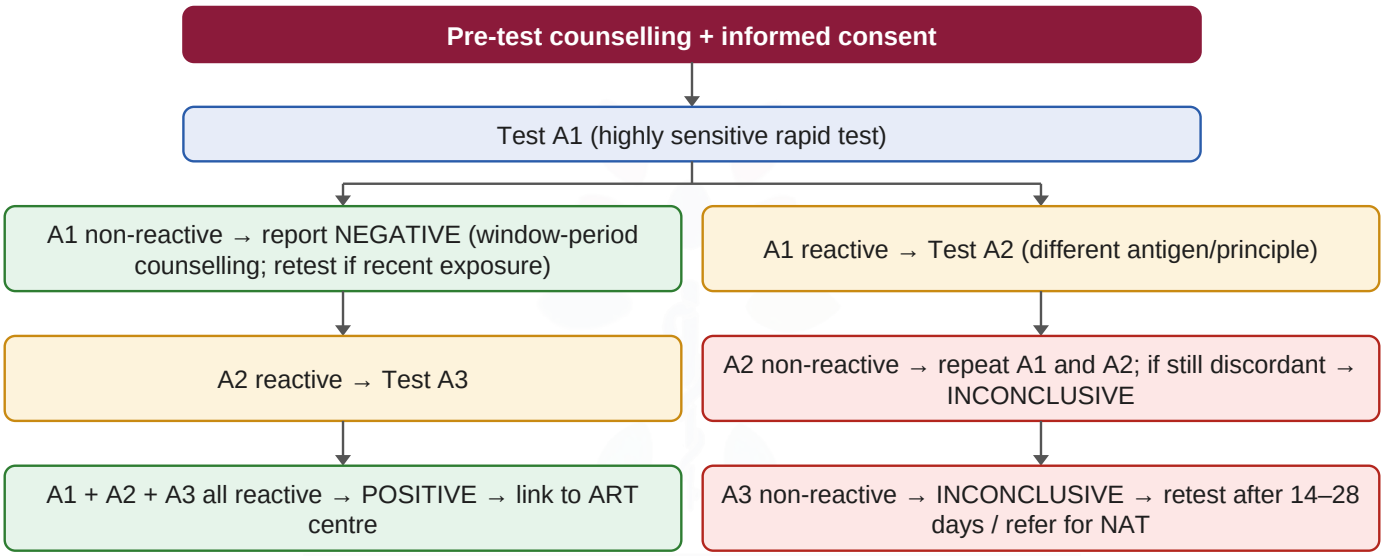
Overview. Integrated Counselling and Testing Centres (ICTCs) use rapid tests of different principles or antigens in sequence. For diagnosis, NACO uses a **three-test strategy**; for blood-bank screening a single sensitive test is used.

The 5 Cs of HIV testing (WHO)

- Consent
- Confidentiality
- Counselling (pre- and post-test)
- Correct results
- Connection (linkage to ART centre)

Who should be offered testing

- Pregnant women (PPTCT) — universal
- TB patients and presumptive TB
- STI clinic attendees
- Key populations every 6 months
- Spouses/partners and children of PLHIV
- Anyone with a WHO stage-defining illness



Purpose	NACO strategy	Tests
Blood safety, organ/semen donation	Strategy I	One highly sensitive test (ELISA/CLIA); reactive unit discarded
Surveillance	Strategy II	Two tests
Diagnosis (symptomatic or asymptomatic)	Strategy III	Three tests of different principle/antigen

- A blood donor whose unit is reactive must be referred to the ICTC for diagnostic testing — the blood bank test is not a diagnosis.
- Retest every newly diagnosed person before starting ART (NACO "retesting for verification").
- Under the HIV/AIDS (Prevention and Control) Act 2017, testing, treatment and research need informed consent and results are confidential.

Clinical pearls

Inconclusive results are common in very early infection, HIV-2 and pregnancy. Retest in 2–4 weeks and send HIV-1 RNA rather than labelling the person positive.

Further reading — tap to open (free) ► NACO (naco.gov.in) · NACO National Guidelines for HIV Care & Treatment 2021

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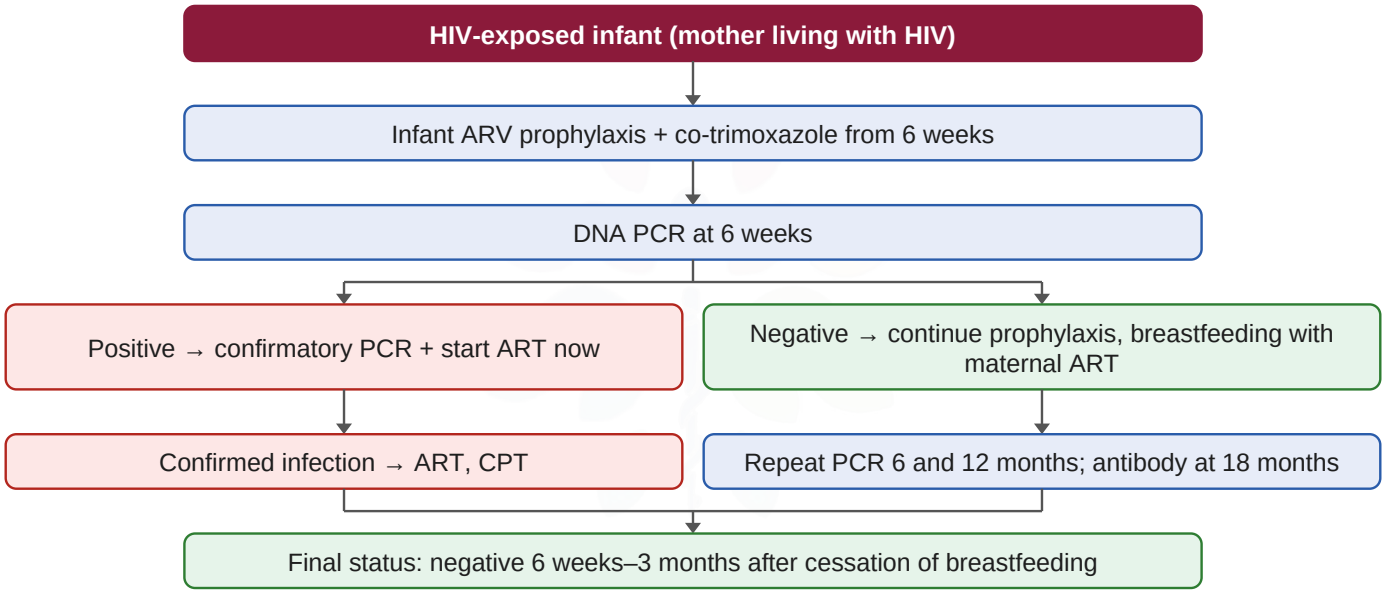
Emergency Physician's ECG Manual
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Early Infant Diagnosis and Difficult Results

Overview. Maternal IgG crosses the placenta, so every HIV-exposed infant is antibody-positive until about 18 months. Diagnosis in infancy therefore needs **virological tests** (HIV-1 DNA PCR on dried blood spot, or RNA).

NACO EID schedule (HIV-exposed infant)
- DNA PCR (DBS) at 6 weeks (birth testing for high-risk infants where available)
- Repeat at 6 months and 12 months
- Antibody test at 18 months (3 tests)
- Repeat 6 weeks–3 months after breastfeeding stops

Positive PCR
- Send a second confirmatory sample immediately
- Start ART on the first positive result — do not wait
- Infant ART: DTG-based (pDTG 10 mg) if ≥4 weeks and ≥3 kg



Difficult situation	Approach
Discordant rapid tests in adult	Retest after 14–28 days; HIV-1 RNA; HIV-2 differentiation
Indeterminate Western blot	Early seroconversion, HIV-2, cross-reacting antibodies (pregnancy, autoimmunity) — NAT
Positive test on PrEP (esp. CAB-LA)	Delayed, blunted antibodies — use HIV-1 RNA; INSTI genotype before ART
Elite controller	Antibody positive, RNA undetectable — proviral DNA PCR
Low-level RNA <5,000 copies with negative Ag/Ab	Possible false positive — repeat both tests

Clinical pearls

Breastfed infants remain at risk for the whole breastfeeding period — the final HIV status can only be declared after weaning. An infant who becomes positive late usually has a mother with unsuppressed viral load.

Further reading — tap to open (free) ► DHHS Pediatric ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Diagnosis, Evaluation & Monitoring · Summary table on page 19 · ARV drug formulary

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CD4 Count — Measurement and Interpretation

Overview. CD4 T-lymphocyte count, measured by flow cytometry (or point-of-care devices), is the best marker of immune status and OI risk. It is no longer used to decide **whether** to start ART — everyone starts — but it decides which OIs to look for and which prophylaxis to give.

Factors that alter CD4 count

- Diurnal variation (lowest in the morning)
- Acute infection, surgery, steroids ↓
- Splenectomy ↑ absolute count (use CD4%)
- HTLV-1 co-infection ↑ (falsely reassuring)
- Lab variation up to 30% — confirm trends

Monitoring schedule (DHHS)

- Baseline at entry to care
- Every 3–6 months for the first 2 years of ART
- If VL suppressed and CD4 300–500 for 2 years: every 12 months
- If CD4 >500 and VL suppressed: optional

CD4 threshold	Action
<350 (NACO) / <200 (DHHS)	Start co-trimoxazole prophylaxis (PCP, toxoplasma)
<200 (WHO) / <100 (minimum)	Serum/plasma CrAg screen; pre-emptive fluconazole if positive and LP negative
≤200 + symptoms or inpatient	Urine LF-LAM for TB
<100 + Toxoplasma IgG positive	Toxoplasma prophylaxis (co-trimoxazole DS daily)
<50	Dilated fundoscopy for CMV retinitis; MAC prophylaxis only if not starting fully suppressive ART
Any CD4	TB preventive therapy after excluding active TB

CD4 response on ART	Interpretation
Expected rise	50–150 cells/µL in year 1, then 50–100 per year until plateau
Immunological non-response	CD4 fails to rise despite VL suppression — older age, low nadir, HCV, AZT, cytopenias; no change of ART needed
Immunological failure (WHO, old)	CD4 ≤250 after clinical failure, or persistent <100 — confirm with viral load

Clinical pearls

A low CD4 count with a suppressed viral load is not treatment failure. Do not change ART on CD4 alone — check the viral load and adherence.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

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Viral Load — Monitoring and Definitions

Overview. Plasma HIV-1 RNA (viral load) is the primary measure of ART success. A fully effective regimen suppresses VL to <50 copies/mL within 8–24 weeks. NACO has moved from targeted to **routine viral-load monitoring** for all PLHIV on ART.

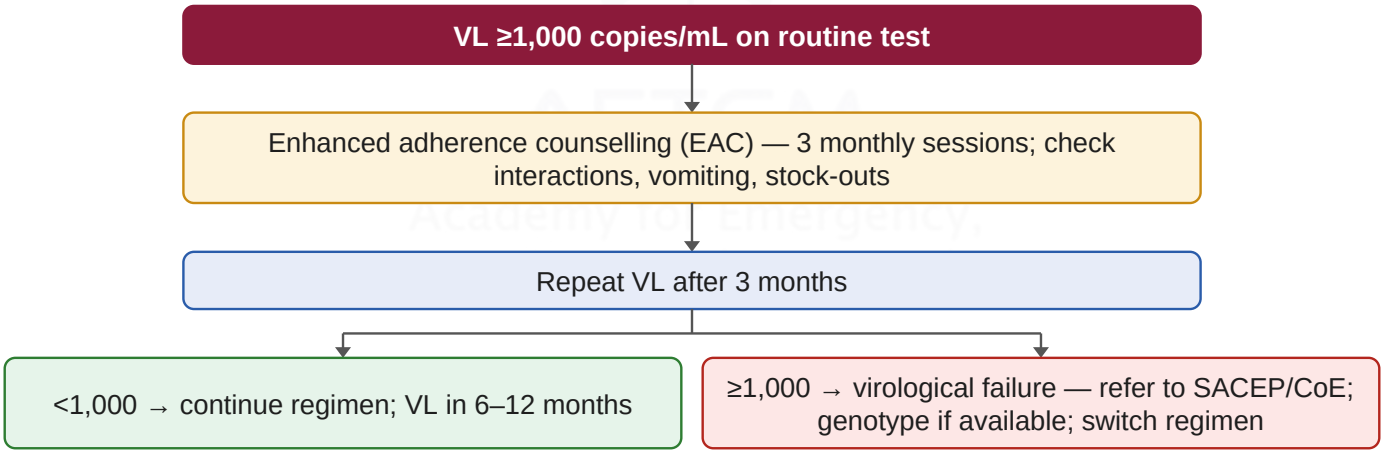
NACO schedule

- VL at 6 months and 12 months after starting ART
- Then every 12 months
- Pregnant/breastfeeding women: at first ANC visit / 32–36 weeks and 3-monthly in breastfeeding
- Whenever failure is suspected

DHHS schedule

- Baseline; 4–8 weeks after starting/changing ART
- Every 4–8 weeks until <50 copies/mL
- Then every 3–4 months; every 6 months after 2 years of stable suppression

Term	Definition
Undetectable / not detected	Below assay limit (usually <20–50 copies/mL)
Suppressed (WHO 2023)	≤1,000 copies/mL; U=U applies to sustained <200
Blip	Isolated detectable VL (usually <200–500) followed by undetectable — no action
Low-level viraemia	Persistent 50–999 (WHO) or 50–199 (DHHS) — adherence, interactions, consider genotype
Virological failure — NACO/WHO	VL ≥1,000 copies/mL on two consecutive tests 3 months apart, after enhanced adherence counselling
Virological failure — DHHS	Confirmed VL >200 copies/mL
Incomplete response	VL >200 at 24 weeks on ART



Clinical pearls

On a dolutegravir regimen, resistance is rare: most failures are adherence failures. Strengthen adherence before switching. The sample must be taken while on the failing regimen for genotyping.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · DHHS Adult & Adolescent ARV Guidelines

Section: Diagnosis, Evaluation & Monitoring · Summary table on page 19 · ARV drug formulary

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Baseline Evaluation of a Newly Diagnosed PLHIV

Overview. The first visit establishes the stage of disease, looks for active opportunistic infections (especially TB and cryptococcosis) and checks for conditions that change the choice of ART — then ART is started rapidly.

History and examination

- Risk factors, partner status, previous ART/PrEP (esp. cabotegravir)
- TB 4-symptom screen: cough, fever, weight loss, night sweats
- Weight, BMI, oral cavity (thrush, OHL, KS)
- Fundus if CD4 <50; neurological exam; skin; lymph nodes
- Mental health, alcohol, drugs, contraception

Counselling

- Lifelong ART, adherence, U=U
- Partner notification and testing
- Disclosure support; legal rights (HIV Act 2017)
- Nutrition, smoking cessation

Investigation	Why
Confirmatory HIV test (NACO retest)	Avoid misdiagnosis before lifelong ART
CD4 count	Stage, OI prophylaxis, AHD
HIV-1 RNA (viral load)	Baseline for response (where available)
Genotype (RT/PR; INSTI if prior CAB-LA PrEP)	Transmitted resistance (DHHS) — do not delay ART
CBC, creatinine/eGFR, urinalysis, LFT	AZT anaemia, TDF renal, hepatotoxicity
Fasting glucose/HbA1c, lipids	Baseline metabolic risk
HBsAg, anti-HBs, anti-HBc; anti-HCV	HBV needs TDF + 3TC; vaccinate if non-immune
RPR/VDRL; other STI tests	Syphilis common co-infection
Chest X-ray; CBNAAT if symptomatic; urine LF-LAM (CD4 ≤200)	Active TB before ART/TPT
Serum CrAg (CD4 <200 WHO; <100 minimum)	Pre-emptive therapy for cryptococcosis
Toxoplasma IgG	Prophylaxis if CD4 <100
Pregnancy test	ART choice, PPTCT
Cervical screening (VIA/HPV/Pap)	High CIN risk
HLA-B*5701 (if abacavir planned); G6PD (dapsone/primaquine)	Hypersensitivity, haemolysis

Clinical pearls

Do not delay ART for tests that are not available. NACO allows same-day ART once TB and cryptococcal meningitis are reasonably excluded clinically.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Diagnosis, Evaluation & Monitoring · Summary table on page 19 · ARV drug formulary

Handbook of Antibiotics
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Advanced HIV Disease (AHD) Package

Overview. About one-third of people in India still present with CD4 <200. They account for most HIV deaths — from TB, cryptococcal meningitis, severe bacterial infections and PCP. WHO and NACO recommend a **package** of interventions for everyone with advanced disease.

Definition

- Adults/adolescents: CD4 <200 cells/µL or WHO stage 3 or 4
- All children <5 years (unless stable on ART)
- Also: people returning to care after interruption with low CD4

Danger signs — admit

- RR >30/min, SpO_2 <90%
- HR >120, SBP <90 mmHg
- Unable to walk unaided
- Temperature ≥39 °C
- Altered sensorium, seizures, severe headache

Component	Intervention	Who
Screening and diagnosis		
TB	Symptom screen, chest X-ray; Xpert MTB/RIF (CBNAAT) or Truenat; urine LF-LAM	All; LAM if CD4 ≤200 or seriously ill
Cryptococcus	Serum/plasma CrAg (lateral flow)	CD4 <200 (WHO) / <100
Others	Toxoplasma IgG, fundoscopy (CD4 <50), histoplasma antigen where endemic	As indicated
Prophylaxis and pre-emptive therapy		
Co-trimoxazole	960 mg once daily	CD4 <350 or stage 3/4 (NACO)
TB preventive therapy	6H or 3HP after excluding active TB	All without active TB
Fluconazole	800 mg/day ×2 weeks, 400 mg ×8 weeks, then 200 mg	CrAg-positive, LP negative
Treatment		
Rapid ART	Within 7 days; same day if no OI	All — defer 4–6 weeks in cryptococcal / 4–8 weeks in TB meningitis
Adherence support	Tailored counselling, home visits, tracing	All

Screen: LAM + CBNAAT + CrAg

Prevent: CPT + TPT + fluconazole

Treat: rapid ART + adherence support

Clinical pearls

A positive serum CrAg with a negative LP still needs fluconazole — and every CrAg-positive patient must have an LP first, because symptomatic meningitis needs amphotericin-based therapy.

Further reading — tap to open (free) ► WHO — managing advanced HIV disease · NACO National Guidelines for HIV Care & Treatment 2021

Section: Diagnosis, Evaluation & Monitoring · Summary table on page 19 · ARV drug formulary

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HIV Drug Resistance Testing

Overview. Resistance arises when the virus replicates under incomplete drug pressure. Genotypic assays sequence the RT, protease and integrase genes; the **Stanford HIVdb** algorithm interprets the mutations. In India, genotyping is available through NACO CoEs/SACEP and private laboratories.

When to test (DHHS)

- At entry to care (transmitted resistance) — do not delay ART
- Virological failure with VL >500–1,000, while on the failing regimen or within 4 weeks of stopping
- Pregnancy; before switching; HIV diagnosed on PrEP (INSTI genotype after CAB-LA)

Types of test

- **Genotype** (RNA) — standard; needs VL >500–1,000
- **Proviral DNA genotype** — archived mutations when VL is low
- **Phenotype** — complex resistance, costly
- **Tropism assay** — before maraviroc

Mutation	Drugs affected	Clinical note
M184V/I	3TC, FTC (high-level)	↓ viral fitness; ↑ susceptibility to TDF and AZT — keep 3TC in regimen
K65R	TDF, TAF, ABC (and 3TC partly)	Selected by TDF failure; ↑ AZT susceptibility
TAMs (M41L, D67N, K70R, L210W, T215Y/F, K219Q)	AZT, d4T; cross-resistance to all NRTIs	Accumulate with thymidine analogue failure
K103N	EFV, NVP	Single mutation — low genetic barrier; ETR/RPV/DOR still active
Y181C, E138K	NVP, EFV, ETR, RPV	E138K selected by RPV
R263K, G118R	DTG (low-level)	Rare in DTG first-line failure
Q148H/K/R ± G140S, N155H	RAL, EVG; DTG/BIC reduced	Use DTG 50 mg BD with optimized background
I50L, I84V, L90M, V82A	ATV, LPV; multiple PIs	DRV/r has the highest barrier

Clinical pearls

Mutations are archived for life even when no longer detected in plasma. Always review the full ART and genotype history before switching — a "new" regimen may contain drugs that are already compromised.

Further reading — tap to open (free) ► Stanford HIV Drug Resistance Database · DHHS Adult & Adolescent ARV Guidelines

Section: Diagnosis, Evaluation & Monitoring · Summary table on page 19 · ARV drug formulary

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SECTION 3 · 16 TOPICS

Antiretroviral Therapy (HAART)

Overview and one-page summary table

Combination ART — historically called HAART — suppresses HIV replication, restores immunity, prevents transmission (U=U) and has turned HIV into a chronic manageable disease. NACO recommends TLD for almost everyone; the DHHS panel (September 2026 update) recommends INSTI-based regimens, now including dolutegravir/lamivudine regardless of baseline viral load.

#	Topic	Key point for the postgraduate	Page
20	Antiretroviral Drug Classes and Sites of Action	NRTI, NNRTI, PI, INSTI, entry/attachment/fusion and capsid inhibitors	29
21	When to Start ART — Rapid Initiation and OI Timing	Treat all, same day/≤7 days; defer 4–6 wk in cryptococcal and 4–8 wk in TB meningitis	30
22	NACO First-line ART — TLD and Alternatives	TLD for adults/adolescents ≥30 kg incl. pregnancy; ABC/AZT + 3TC + DTG if CrCl <50	31
23	DHHS Recommended Initial Regimens (2026)	BIC/TAF/FTC; DTG + TXF/XTC; DTG/3TC regardless of VL (Sept 2026)	32
24	NNRTI- and PI-based Regimens (from the Original Notes)	EFV- or NVP-based and ATV/r-based regimens — now alternatives / second-line	33
25	NRTIs — Drug Profiles	TDF renal/bone; TAF lipids/weight; ABC HLA-B*5701; AZT anaemia; 3TC/FTC well tolerated	34
26	NNRTIs — Drug Profiles	EFV CNS effects; NVP rash/hepatitis; RPV needs food, no PPI; DOR lipid-friendly; low genetic barrier	35
27	Protease Inhibitors — Drug Profiles	Always boosted; DRV/r highest barrier; ATV hyperbilirubinaemia; LPV/r GI and lipids; CYP3A4 interactions	36
28	Integrase Inhibitors (INSTIs) — Drug Profiles	DTG 50 OD (BD with rifampicin); separate from cations; weight gain; BIC, RAL, CAB	37
29	Newer Agents and Long-acting ART	Lenacapavir 6-monthly; CAB/RPV-LA 2-monthly; fostemsavir, ibalizumab, maraviroc for MDR HIV	38
30	Adverse Effects of ART — Organ-wise Approach	Hepatotoxicity, rash/HSR, CNS, renal, bone, haem, metabolic, IRIS — know the culprit drug	39
31	Drug Interactions with ART	Rifampicin, cations, PPIs, statins, anticonvulsants, steroids, contraceptives, antimalarials	40
32	Monitoring on ART and Treatment Failure	Virological failure = VL ≥1,000 ×2 after EAC (NACO) / >200 (DHHS); assess adherence, interactions, resistance	41
33	Second-line, Third-line and Switching ART	NACO: PI/r + 2 NRTIs after DTG failure; DTG + 2 NRTIs after NNRTI failure; DRV/r + DTG third-line	42
34	Immune Reconstitution Inflammatory Syndrome (IRIS)	Paradoxical or unmasking OI 2–12 weeks after ART; continue ART; steroids for TB-IRIS (not KS)	43
35	Adherence, Differentiated Care and U=U	>95% adherence; EAC; multi-month dispensing; undetectable = untransmittable	44

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Name the ARV classes and where each acts
- Choose first-line ART by NACO and DHHS
- Know the dose, toxicity and interactions of each key ARV
- Recognise and manage treatment failure and IRIS



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Antiretroviral Drug Classes and Sites of Action

Overview. Seven classes of antiretrovirals block different steps of the HIV life cycle. A standard regimen combines **two NRTIs with a third drug** (INSTI, NNRTI or boosted PI); two-drug regimens (DTG/3TC) are now accepted.

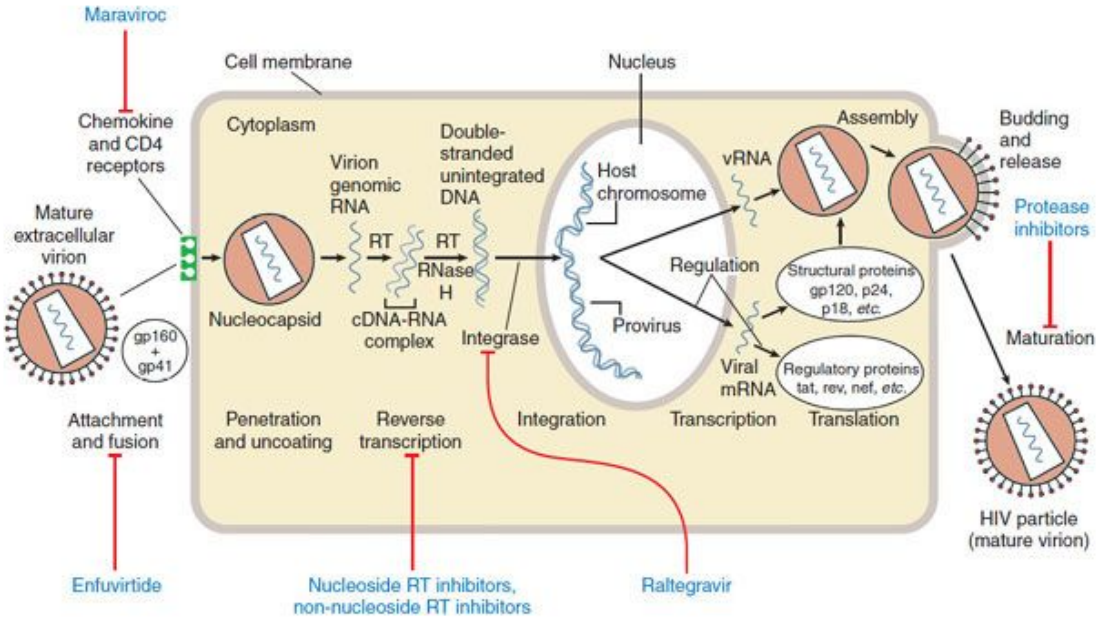


Figure 3. HIV replication cycle and sites of action of antiretroviral drugs

Class	Mechanism	Drugs (India availability in bold)
NRTI	Nucleoside/nucleotide analogues — chain termination of viral DNA by RT	**Tenofovir (TDF)**, TAF, **lamivudine (3TC)**, emtricitabine (FTC), **abacavir**, **zidovudine**; (stavudine, didanosine — obsolete)
NNRTI	Non-competitive binding to RT allosteric pocket	**Efavirenz**, **nevirapine**, rilpivirine, doravirine, etravirine
PI	Block protease → immature non-infectious virions	**Atazanavir/r**, **lopinavir/r**, **darunavir/r** (boosted by ritonavir or cobicistat)
INSTI	Block integrase strand transfer	**Dolutegravir**, **raltegravir**, bictegravir, cabotegravir, elvitegravir
CCR5 antagonist	Blocks co-receptor (R5 virus only)	Maraviroc
Fusion inhibitor	Binds gp41 HR1 — prevents fusion	Enfuvirtide (T-20), SC
Attachment / post-attachment	gp120 attachment (fostemsavir); anti-CD4 mAb (ibalizumab)	Fostemsavir, ibalizumab
Capsid inhibitor	Disrupts capsid assembly, transport and disassembly	Lenacapavir (6-monthly SC)

Clinical pearls

Pharmacokinetic boosters (ritonavir 100 mg, cobicistat 150 mg) have no useful antiviral effect at these doses — they inhibit CYP3A4 to raise PI levels, and cause most of the drug interactions of PI regimens.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

Emergency Physician's ECG Manual
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When to Start ART — Rapid Initiation and OI Timing

Overview. Since the START and TEMPRANO trials (2015), ART is recommended for **everyone with HIV regardless of CD4 count**. NACO "Treat All" offers ART on the same day or within 7 days of diagnosis after counselling; DHHS recommends rapid initiation, ideally the same day, without waiting for genotype or most laboratory results.

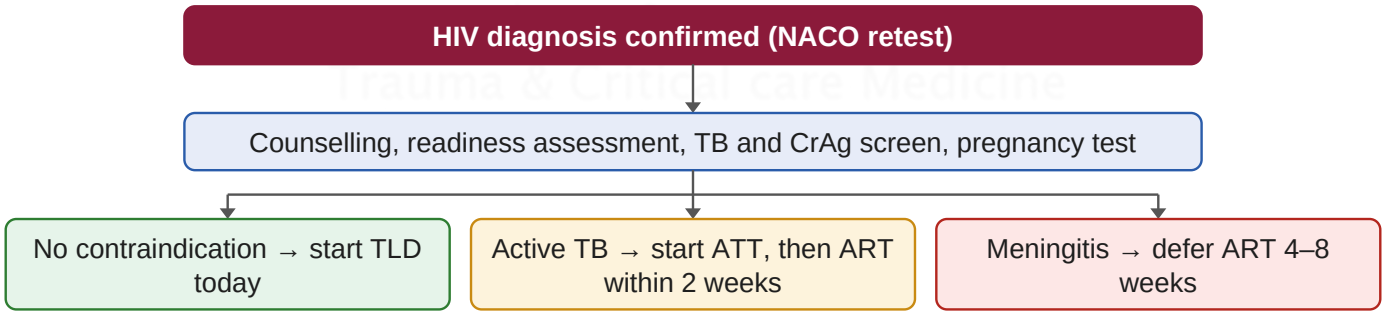
Benefits of early ART

- 57% fewer serious AIDS and non-AIDS events (START)
- Prevents transmission — U=U (HPTN 052: 96% reduction)
- Preserves immune function, reduces reservoir and inflammation
- Reduces TB incidence

Before same-day ART, exclude

- Cryptococcal meningitis (headache, fever, confusion — CrAg/LP)
- TB meningitis
- Active TB (start ATT first)
- Patient not ready — counsel; do not coerce

Opportunistic infection	When to start ART after OI treatment begins
No OI / most OIs (PCP, bacterial, MAC, PML, KS, cryptosporidiosis)	Immediately — within 2 weeks
Pulmonary / extrapulmonary TB (not CNS)	**Within 2 weeks of ATT** (NACO, WHO) — DHHS: within 2 weeks if CD4 <50, within 8 weeks otherwise
TB meningitis	Defer **4–8 weeks** (WHO); early ART increased adverse events
Cryptococcal meningitis	Defer **4–6 weeks** (COAT trial: early ART ↑ mortality)
Toxoplasma encephalitis	Within 2–3 weeks
CMV retinitis	Within 2 weeks (watch for immune recovery uveitis)
Pregnancy	Immediately — any trimester
Acute HIV	Immediately



Clinical pearls

Rapid ART is safe when TB and cryptococcal meningitis have been considered. Patients started on the same day are more likely to be retained in care and suppressed at one year.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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NACO First-line ART — TLD and Alternatives

Overview. NACO (2021, aligned with WHO) recommends **TLD — tenofovir disoproxil fumarate 300 mg + lamivudine 300 mg + dolutegravir 50 mg**, one tablet once daily, as the preferred first-line regimen for all adults and adolescents (≥30 kg), including women of childbearing potential and pregnant women.

Why TLD

- High barrier to resistance — very low DTG resistance at failure
- Active against HIV-1 and HIV-2
- Once-daily single tablet; few side effects
- Rapid viral decline
- Covers hepatitis B (TDF + 3TC)

Before starting

- Creatinine clearance (TDF needs CrCl ≥50)
- HBsAg
- Pregnancy status, contraception plan
- Co-medications: rifampicin, antacids, iron, metformin, anticonvulsants

Situation	NACO regimen	Notes
Adults and adolescents ≥30 kg (preferred)	**TLD**: TDF + 3TC + DTG	Once daily, any time; with or without food
On rifampicin-based ATT	TLD + **additional DTG 50 mg 12 h later**	Continue extra DTG for 2 weeks after rifampicin ends
CrCl <50 mL/min	ABC + 3TC + DTG (or ZDV + 3TC + DTG if Hb ≥8)	3TC dose adjusted; avoid TDF
DTG contraindicated/not tolerated	TLE: TDF + 3TC + EFV	EFV 600 mg at bedtime; not for HIV-2
HIV-2 or HIV-1/2 dual	TLD	Never NNRTI
HBV co-infection	TLD (TDF + 3TC essential)	If CrCl <50 — refer (TAF/entecavir options)
Children ≥4 weeks and ≥3 kg	ABC + 3TC + DTG (pDTG 10 mg dispersible)	Weight-band dosing — see paediatric page
Pregnant / breastfeeding women	TLD	Start same day; any trimester

Drug in TLD	Common ADR	Monitor
Tenofovir DF	Renal tubulopathy, ↓ bone density	Creatinine, urine protein/glucose
Lamivudine	Very well tolerated; rare anaemia	—
Dolutegravir	Insomnia, headache, weight gain, benign creatinine ↑ (~0.1 mg/dL)	Weight, glucose; take ≥2 h before / 6 h after antacids, iron, calcium

Clinical pearls

A rise in serum creatinine of 0.1–0.15 mg/dL in the first month of DTG is due to inhibition of tubular OCT2 — not kidney injury. Metformin levels rise with DTG; do not exceed 1,000 mg/day.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · NACO (naco.gov.in)

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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DHHS Recommended Initial Regimens (2026)

Overview. The DHHS adult and adolescent panel (update of **24 September 2026**) recommends INSTI-based regimens for most people. Based on the DOLCE study, **dolutegravir/lamivudine** is now an initial option regardless of baseline viral load; boosted darunavir plus lamivudine or emtricitabine was added for certain situations.

Recommended for most people with HIV
- **BIC/TAF/FTC** (bictegravir 50/TAF 25/FTC 200 mg) once daily
- **DTG + (TAF or TDF) + (FTC or 3TC)**
- **DTG/3TC** — not if HBV co-infection, or before HBV and genotype results are known

Not recommended as initial therapy
- Any 2-drug regimen with HBV co-infection
- NVP, ETR, unboosted ATV, ddI, d4T
- Monotherapy; 3-NRTI regimens
- DTG/3TC with HIV RNA unknown in someone recently on CAB-LA PrEP

Category	Regimen	Points to note
Certain clinical situations	DRV/r or DRV/c + (TAF or TDF) + (FTC or 3TC)	High barrier — when adherence is uncertain or genotype unavailable
Certain situations (new 2026)	DRV/b + (3TC or FTC) — 2-drug	No HBV; selected people
Certain situations	DOR/TDF/3TC or DOR + TAF/FTC	Lipid-neutral; no rifampicin
Certain situations	RAL + (TAF or TDF) + (FTC or 3TC)	Twice daily (or 1,200 mg OD)
Certain situations	RPV/TAF/FTC or RPV/TDF/FTC	Only if VL <100,000 and CD4 >200; with meal; no PPIs
Certain situations	ABC/3TC/DTG	HLA-B*5701 negative, HBsAg negative; CVD risk
Prior cabotegravir PrEP	DRV/r or DRV/c + (TAF or TDF) + (FTC or 3TC)	Until INSTI genotype available
Approved, under review	Bictegravir/lenacapavir (FDA, Aug 2026)	Not yet in DHHS tables
Switch / optimisation (suppressed)	DTG/3TC, DTG/RPV, CAB/RPV-LA, BIC/TAF/FTC, doravirine/islatravir	No HBV for 2-drug; no prior resistance

- DHHS has removed its detailed interaction tables and refers clinicians to the **Liverpool HIV Drug Interactions** checker.
- New 2026 tables give cash-price estimates of recommended regimens; a "core principles of ART" section and knowledge-gap summaries were added.
- Genotype (RT/PR; plus integrase after CAB-LA exposure) should be sent at entry but must not delay ART.

Clinical pearls

Indian practice (TLD) and DHHS recommendations agree on the backbone principle: a second-generation INSTI (dolutegravir or bictegravir) plus a tenofovir-containing NRTI pair.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · Liverpool HIV Drug Interactions

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

Clinical Medicine In 30 Hours
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NNRTI- and PI-based Regimens (from the Original Notes)

Overview. Earlier HAART guidelines (and the original HIV Medicine notes) listed NNRTI-based (1 NNRTI + 2 NRTIs) and PI-based (1 boosted PI + 2 NRTIs) regimens as first-line. They remain important for examinations, for patients already on them, and as alternative or second-line regimens.

Regimen (sample, from notes)	Status in 2026	Key points
NNRTI-based (1 NNRTI + 2 NRTIs)		
Efavirenz 600 mg at bedtime (2 h after food) + emtricitabine + tenofovir OD	Alternative (TLE) when DTG cannot be used	CNS effects, rash, dyslipidaemia; K103N resistance; CYP inducer
Efavirenz + lamivudine 150 mg BD + zidovudine 300 mg BD	Legacy	AZT anaemia; twice daily
Nevirapine 200 mg OD ×14 days, then 200 mg BD + lamivudine 150 mg BD + zidovudine 300 mg BD	Obsolete in adults; NVP still used for infant prophylaxis	Hepatotoxicity (women CD4 >250, men >400), SJS
Didanosine 250/400 mg OD-based	Withdrawn	Pancreatitis, neuropathy, lactic acidosis
PI-based (1 boosted PI + 2 NRTIs)		
(Atazanavir 300 + ritonavir 100) OD + (3TC or FTC) + (ZDV or TDF)	NACO second-line	Hyperbilirubinaemia, stones; avoid PPIs
Lopinavir/ritonavir 400/100 BD + 2 NRTIs	Second-line; paediatric	GI upset, lipids; heat-stable tablets
Darunavir/ritonavir 800/100 OD (or 600/100 BD) + 2 NRTIs	Third-line (NACO); DHHS "certain situations"	Highest PI barrier; sulfonamide rash
INSTI-based (most preferred)		
Dolutegravir 50 mg OD + lamivudine + tenofovir	**Preferred** — NACO and WHO	TLD single tablet
Raltegravir 400 mg BD + 2 NRTIs	Alternative; neonates; pregnancy	Twice daily; 800 mg BD with rifampicin

Most preferred regimens by class (from the notes, updated)

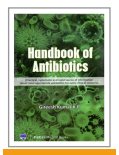
- **INSTI-based:** dolutegravir 50 mg OD + lamivudine + tenofovir (TLD)
- **NNRTI-based:** efavirenz + tenofovir + lamivudine/emtricitabine (TLE)
- **PI-based:** (atazanavir + ritonavir) + (lamivudine or emtricitabine) + (zidovudine or tenofovir)

Clinical pearls

Patients stable on TLE in India have been transitioned to TLD. A person with suppressed VL on an NNRTI can be switched directly; if VL is unknown, NACO advises checking VL first.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · DHHS Adult & Adolescent ARV Guidelines

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary



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NRTIs — Drug Profiles

Overview. Nucleoside/nucleotide reverse transcriptase inhibitors are pro-drugs phosphorylated intracellularly; they lack a 3'-OH group and terminate the growing viral DNA chain. They form the backbone of almost every regimen.

Drug	Adult dose	Renal / liver	Key adverse effects and notes
Tenofovir DF (TDF)	300 mg OD	CrCl 30–49: 300 mg q48h; <30 avoid	Proximal tubulopathy (Fanconi), AKI, ↓ BMD; active vs HBV; lowers lipids
Tenofovir alafenamide (TAF)	25 mg OD (10 mg with cobicistat)	Use if CrCl ≥15 (and on dialysis)	Less renal/bone toxicity; weight gain, ↑ LDL; avoid with rifampicin
Lamivudine (3TC)	300 mg OD or 150 mg BD	CrCl 30–49: 150 mg OD; 15–29: 100 mg	Very well tolerated; HBV active (resistance if alone); M184V
Emtricitabine (FTC)	200 mg OD	Adjust interval CrCl <50	Palmar/plantar hyperpigmentation; HBV active
Abacavir (ABC)	600 mg OD or 300 mg BD	Child-Pugh B/C avoid; no renal adjustment	**Hypersensitivity (HLA-B*5701)** — fever, rash, GI, respiratory; never rechallenge; ↑ MI risk
Zidovudine (AZT, ZDV)	300 mg BD	CrCl <15: 100 mg TDS	Macrocytic anaemia, neutropenia, myopathy, lipoatrophy, nail pigmentation, GI
Stavudine (d4T)	Withdrawn	—	Peripheral neuropathy, lipoatrophy, lactic acidosis, pancreatitis
Didanosine (ddI)	Withdrawn	—	Pancreatitis, neuropathy, non-cirrhotic portal hypertension

Class toxicity	Mechanism	Clinical picture
Lactic acidosis with hepatic steatosis	Mitochondrial DNA polymerase-γ inhibition (d4T > ddI > AZT)	Nausea, abdominal pain, dyspnoea, lactate >5 mmol/L; stop NRTIs
Lipoatrophy	Mitochondrial toxicity (d4T, AZT)	Loss of facial, limb, buttock fat
HBV flare on stopping	TDF, TAF, 3TC, FTC suppress HBV	Hepatitis flare — never stop without alternative HBV cover

Clinical pearls

Abacavir hypersensitivity appears within the first 6 weeks in HLA-B*5701 carriers. Test before prescribing; a rechallenge after a reaction can cause fatal anaphylaxis-like shock.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · Liverpool HIV Drug Interactions

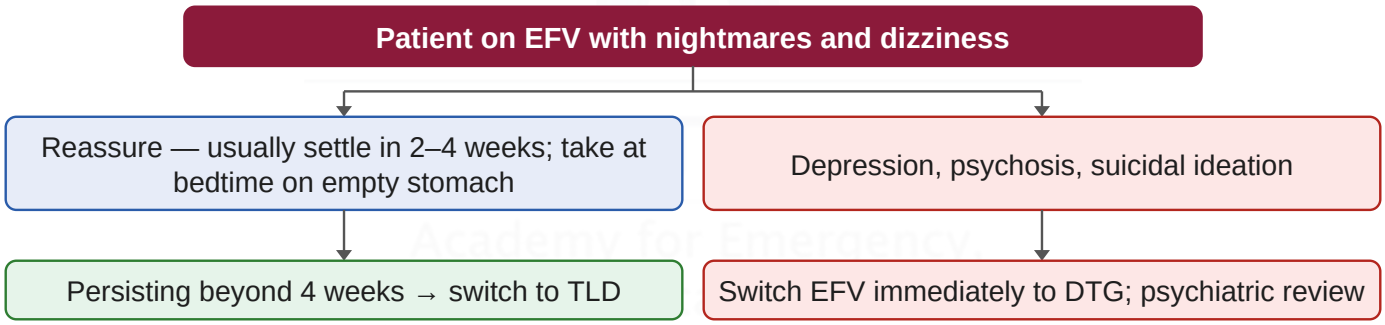
Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary



NNRTIs — Drug Profiles

Overview. NNRTIs bind a hydrophobic pocket near the RT active site, causing a conformational change. They are inactive against HIV-2 and group O, and a single mutation (K103N, Y181C) can cause high-level cross-resistance to first-generation drugs.

Drug	Dose	Adverse effects	Interactions / cautions
Efavirenz (EFV)	600 mg at bedtime, empty stomach (400 mg WHO option)	Vivid dreams, dizziness, insomnia, depression, suicidality; rash; hepatitis; gynaecomastia; dyslipidaemia; false-positive cannabinoid test	CYP3A4/2B6 inducer — ↓ implant contraceptives, ↓ methadone, artemether-lumefantrine, bedaquiline (avoid); OK with rifampicin
Nevirapine (NVP)	200 mg OD ×14 days lead-in, then 200 mg BD	Rash, **SJS/TEN**, hepatotoxicity (first 18 weeks)	Avoid in women CD4 >250, men >400; not with rifampicin
Rilpivirine (RPV)	25 mg OD with a meal; 900 mg IM LA with cabotegravir	Depression, insomnia, headache, QTc ↑	**Contraindicated with PPIs**, rifampicin; H2 blockers 12 h before/4 h after
Doravirine (DOR)	100 mg OD (BD with rifabutin)	Few; lipid-neutral; dizziness	Not with strong inducers (rifampicin, carbamazepine)
Etravirine (ETR)	200 mg BD after food	Rash, rare HSR	Active against K103N virus; many interactions



- NNRTIs have a long half-life: if stopping an NNRTI regimen, continue the NRTI backbone for 1–2 weeks ("tail cover") — or switch to a PI/INSTI.
- EFV levels are higher in slow CYP2B6 metabolisers (*6/*6 genotype — common in Indians and Africans), causing more CNS toxicity.

Clinical pearls

NNRTI failure almost always means resistance to EFV and NVP; switching to DTG-based ART with the NRTI backbone reused is the WHO/NACO strategy.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · Liverpool HIV Drug Interactions

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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Protease Inhibitors — Drug Profiles

Overview. PIs bind the active site of HIV protease, preventing cleavage of Gag-Pol polyproteins so virions remain immature. They have a **high genetic barrier**, making them ideal for second-line ART, but cause metabolic effects and many interactions.

Drug	Dose	Adverse effects	Notes
Atazanavir/ritonavir (ATV/r)	300/100 mg OD with food	Unconjugated hyperbilirubinaemia (jaundice, benign), nephrolithiasis, cholelithiasis, PR prolongation, CKD	Avoid PPIs; H2 blocker timing; not with rifampicin
Lopinavir/ritonavir (LPV/r)	400/100 mg BD (or 800/200 OD in naive)	Diarrhoea, nausea, hypertriglyceridaemia, insulin resistance, PR/QT ↑	Super-boost (LPV/r 800/200 BD or extra RTV) if rifampicin unavoidable
Darunavir/ritonavir (DRV/r)	800/100 mg OD; 600/100 mg BD if PI mutations	Rash (sulfonamide moiety), hepatotoxicity, GI, lipids	Highest barrier; DRV/c (800/150) co-formulated
Ritonavir (RTV) booster	100 mg with each PI dose	GI upset, lipids; potent CYP3A4 inhibitor	Inhaled fluticasone → Cushing syndrome
Cobicistat (COBI) booster	150 mg OD	Raises creatinine (OCT2/MATE1)	Avoid in pregnancy (low levels in 2nd/3rd trimester)

Contraindicated with boosted PIs	Reason / alternative
Rifampicin	PI levels ↓ >75% — use rifabutin 150 mg daily
Simvastatin, lovastatin	Rhabdomyolysis — use pitavastatin, low-dose atorvastatin/rosuvastatin
Oral midazolam, triazolam	Prolonged sedation — use lorazepam
Amiodarone, dronedarone, ergotamine, colchicine (renal/hepatic impairment)	Toxicity
Inhaled/intranasal fluticasone, budesonide; injected triamcinolone	Iatrogenic Cushing, adrenal suppression — use beclomethasone
Sildenafil for pulmonary hypertension; high-dose PDE-5	Hypotension — reduce dose (sildenafil 25 mg q48h)
St John's wort, carbamazepine, phenytoin	Loss of PI effect

Clinical pearls

Jaundice on atazanavir is cosmetic (UGT1A1 inhibition, like Gilbert syndrome) if transaminases are normal — but it affects adherence; switch if the patient is distressed.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · Liverpool HIV Drug Interactions

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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Integrase Inhibitors (INSTIs) — Drug Profiles

Overview. INSTIs block the strand-transfer step that inserts viral DNA into the host chromosome. Second-generation agents (dolutegravir, bictegravir, cabotegravir) have a **high barrier to resistance**, rapid viral decline and few adverse effects — the reason TLD is first-line worldwide.

Drug	Dose	Adverse effects	Interactions / notes
Dolutegravir (DTG)	50 mg OD; **50 mg BD** with rifampicin, carbamazepine or INSTI resistance	Insomnia, headache, weight gain, benign creatinine ↑, rare hepatotoxicity/HSR	Take 2 h before or 6 h after Al/Mg antacids, Ca, Fe, Zn (or together with food for Ca/Fe); metformin max 1 g/day
Bictegravir (BIC)	50 mg (in BIC/TAF/FTC) OD	Similar to DTG; nausea	Not with rifampicin; cation separation
Raltegravir (RAL)	400 mg BD or 1,200 mg OD; **800 mg BD** with rifampicin	CK elevation, myopathy, rash, insomnia	Lower barrier; useful in pregnancy, neonates
Elvitegravir/cobicistat (EVG/c)	150/150 mg OD with food	GI; cobicistat effects	Many CYP3A4 interactions — like boosted PI
Cabotegravir (CAB)	Oral 30 mg; LA 600 mg IM q2 months (or 400 mg monthly) with RPV LA	Injection-site reactions, pyrexia	Not with rifampicin/rifapentine; long PK tail

Issue	Current evidence
Neural tube defects (Tsepamo, 2018)	Signal resolved: prevalence with DTG at conception ~0.11% vs 0.09% — DTG preferred in pregnancy
Weight gain	Greater with INSTIs (DTG, BIC) + TAF, women, Black race, low CD4 — counsel diet/exercise
Neuropsychiatric	Insomnia, depression in 1–5%; take in the morning if insomnia
Creatinine rise	OCT2 inhibition — stable rise ~10–15 µmol/L in first 4 weeks; no true GFR change

Clinical pearls

The commonest reason for DTG failure in India is co-administration with iron, calcium or antacids taken at the same time on an empty stomach — always ask about supplements.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · Liverpool HIV Drug Interactions

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

Emergency Physician's ECG Manual
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Newer Agents and Long-acting ART

Overview. Long-acting injectables and new classes are changing HIV care: they help people with adherence difficulties or pill fatigue and rescue people with multidrug-resistant virus. Most are not yet in the Indian programme but are examined in postgraduate exams.

Agent	Class / target	Regimen	Use and cautions
Cabotegravir + rilpivirine LA	INSTI + NNRTI	600 mg + 900 mg IM gluteal every 2 months (after optional oral lead-in)	Switch in suppressed adults without resistance or HBV; injection-site pain; risk factors for failure: RPV mutations, BMI ≥30, subtype A6/A1
Lenacapavir (LEN)	Capsid inhibitor (first in class)	Oral load then 927 mg SC every 6 months	Heavily treatment-experienced MDR HIV with optimized background; PrEP (twice-yearly); injection nodules; CYP3A inhibitor
Bictegravir/lenacapavir	INSTI + capsid	Oral daily (FDA, Aug 2026)	Under DHHS review
Doravirine/islatravir	NNRTI + NRTTI	Oral once daily	DHHS 2026: optimisation option in suppressed people
Fostemsavir	Attachment inhibitor (gp120)	600 mg ER BD	MDR HIV; QT prolongation; not with strong inducers
Ibalizumab	Post-attachment anti-CD4 monoclonal antibody	2,000 mg IV load, then 800 mg IV every 2 weeks	MDR HIV; no interactions; rash, diarrhoea
Maraviroc	CCR5 antagonist	300 mg BD (150 mg with CYP3A inhibitors, 600 mg with inducers)	Needs R5-only tropism assay; hepatotoxicity, postural hypotension
Enfuvirtide (T-20)	Fusion inhibitor (gp41)	90 mg SC BD	Injection-site nodules in ~98%; ↑ bacterial pneumonia; salvage only
Broadly neutralising antibodies	Env (CD4bs, V3)	Infusions (research)	Cure and long-acting prevention trials

Daily oral ART

2-monthly CAB/RPV-LA injections

6-monthly lenacapavir (treatment and PrEP)

Clinical pearls

Injectable ART needs a reliable injection schedule: if a CAB/RPV-LA dose is missed by more than 7 days, oral bridging or re-loading is required, and the long pharmacokinetic tail risks INSTI resistance.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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Adverse Effects of ART — Organ-wise Approach

Overview. Modern ART is well tolerated, but older drugs and co-administered OI drugs (co-trimoxazole, INH, ATT, fluconazole) still cause most toxicity in Indian practice. Identify the likely culprit by organ and timing.

Organ / problem	Main culprit ARVs	Management
Hepatotoxicity	NVP (early, hypersensitivity), EFV, MVC, DRV/r, TPV; HBV flare on stopping TDF/3TC; INH, ATT, CTX	Grade it; stop all if ALT >5–10× ULN or symptomatic; rechallenge ATT stepwise
Rash / hypersensitivity	NVP (SJS), EFV, ETR, ABC (HLA-B*5701), DRV, RAL; co-trimoxazole	Mild rash: continue with antihistamine; mucosal/systemic: stop and never rechallenge
Neuropsychiatric	EFV, DTG (insomnia), RPV	Switch if persistent or severe
Renal	TDF (Fanconi, AKI), ATV (stones, CKD), IDV	Switch TDF→ABC/TAF; hydrate
Bone	TDF (↓ BMD, osteomalacia)	Vitamin D, calcium; switch to TAF/ABC
Haematological	AZT (anaemia, neutropenia); also CTX, ganciclovir	Switch AZT if Hb <8 g/dL
Metabolic	PIs, EFV (lipids, insulin resistance); INSTIs + TAF (weight gain)	Lifestyle, statin, switch
Cardiovascular	ABC, LPV/r (MI risk)	Avoid in high CVD risk
Mitochondrial	d4T, ddI, AZT — lactic acidosis, lipoatrophy, neuropathy, pancreatitis	Stop; avoid these drugs
GI	LPV/r, AZT, RTV	Symptomatic; take with food
Conduction / QT	ATV, LPV/r (PR); EFV, RPV, fostemsavir (QT)	ECG if other QT drugs

Rash after starting ART + co-trimoxazole

- Grade 1–2: maculopapular, no mucosal involvement, no fever → continue, antihistamine, review in 48 h
- Grade 3–4: mucosal involvement, blisters, fever, ALT ↑ → stop all suspects; admit; restart ART with a different class

Clinical pearls

When a patient develops rash 2 weeks after starting both ART and co-trimoxazole, co-trimoxazole is the commonest culprit — but with nevirapine always assume NVP until proved otherwise.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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Drug Interactions with ART

Overview. Most interactions arise from CYP3A4 induction (rifampicin, EFV, carbamazepine), CYP3A4 inhibition (ritonavir, cobicistat), chelation (INSTIs with polyvalent cations) or pH dependence (ATV, RPV). Check every co-medication on the **Liverpool HIV Drug Interactions** checker.

Co-medication	Interacting ARVs	Effect	What to do
Rifampicin	DTG, RAL	↓ INSTI levels	DTG 50 mg BD; RAL 800 mg BD
Rifampicin	All boosted PIs, RPV, DOR, BIC, TAF, CAB, LEN	↓↓ levels	Avoid; use rifabutin 150 mg/day with PI/r
Rifapentine (3HP)	DTG OD	Modest ↓	Acceptable (no dose change, WHO); avoid with PIs, BIC
Antacids, Ca, Fe, Zn, Mg	DTG, BIC, RAL, CAB	Chelation, ↓ absorption	INSTI 2 h before or 6 h after
PPIs, H2 blockers	ATV, RPV (oral)	↓ absorption	Avoid PPI; H2 blocker spacing
Statins	PI/r, cobicistat	↑ statin	No simvastatin/lovastatin; atorvastatin ≤20 mg; pitavastatin preferred
Metformin	DTG	↑ metformin ~80%	Max 1,000 mg/day; monitor
Carbamazepine, phenytoin, phenobarbital	Most ARVs	↓ ARV levels	Use levetiracetam or valproate
Inhaled fluticasone/ budesonide	RTV, COBI	Cushing syndrome	Use beclomethasone
Hormonal implants, pills	EFV	↓ contraceptive efficacy	Use DTG-based ART or IUD/DMPA
Methadone, buprenorphine	EFV, NVP	↓ opioid → withdrawal	Increase methadone dose
Artemether–lumefantrine	EFV ↓; LPV/r ↑	Treatment failure / toxicity	Monitor; prefer DTG regimen
Bedaquiline	EFV	↓ bedaquiline	Switch EFV to DTG
Sofosbuvir/velpatasvir	EFV; TDF + PI/r	↓ velpatasvir; ↑ tenofovir	Avoid EFV; monitor renal function
Azoles (vori-, itra-, posa-)	PI/r, EFV	Bidirectional	TDM; adjust voriconazole

Clinical pearls

Never prescribe for a person with HIV without asking "what ART are you on?" — interactions with rifampicin, antacids, statins and steroid inhalers are the four most common avoidable errors.

Further reading — tap to open (free) ► Liverpool HIV Drug Interactions · DHHS Adult & Adolescent ARV Guidelines

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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Monitoring on ART and Treatment Failure

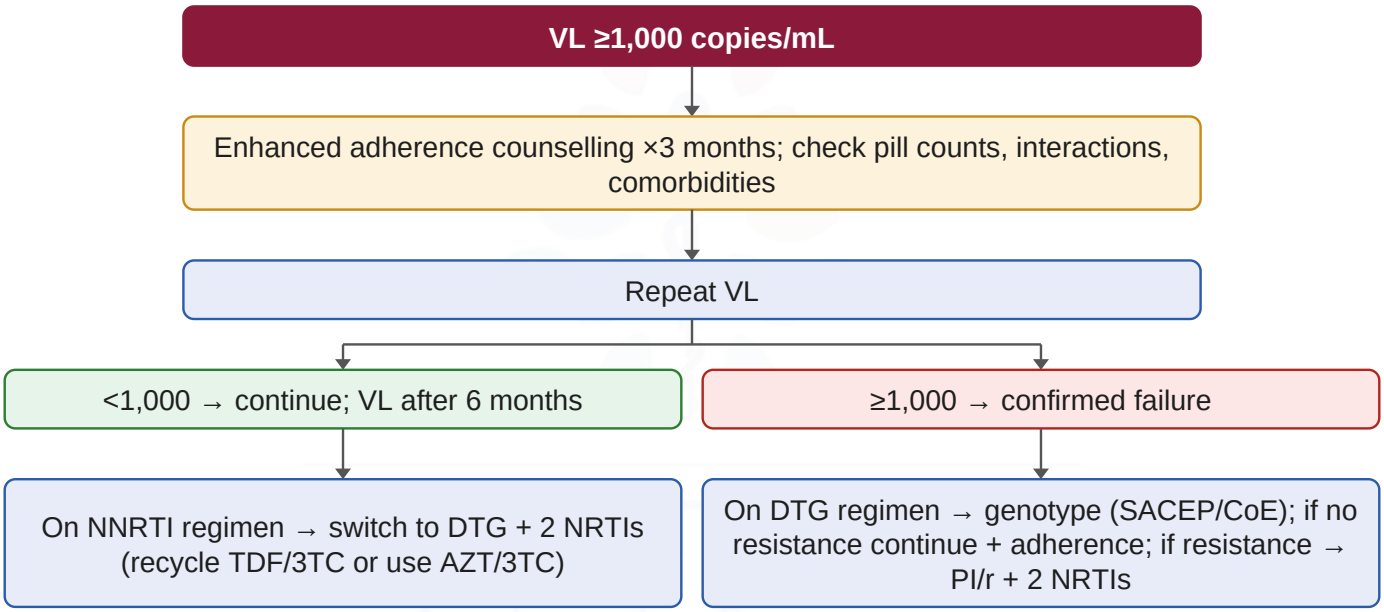
Overview. Failure is defined virologically. Clinical (new stage 4 event after 6 months) and immunological (CD4 ≤250 or persistently <100) definitions are late and inaccurate. In India, suspected failure is reviewed by the State AIDS Clinical Expert Panel (**SACEP**) or Centre of Excellence.

Causes of failure

- Poor adherence (commonest) — depression, alcohol, stigma, cost of travel
- Drug interactions (rifampicin, cations)
- Malabsorption, vomiting
- Pre-existing (transmitted) resistance
- Wrong dose (weight gain in children)

Monitoring on ART (minimum)

- Clinical review monthly → 3–6-monthly when stable
- VL at 6 and 12 months, then yearly
- Creatinine (TDF) at 1, 3 months then yearly
- Hb if AZT; LFT if NVP/EFV/ATT
- Weight, BP, glucose, lipids yearly



Type of failure	WHO / NACO definition
Virological	Persistent VL ≥1,000 copies/mL (two tests 3 months apart, with adherence support) after ≥6 months of ART
Immunological	CD4 ≤250 after clinical failure, or persistent CD4 <100
Clinical	New or recurrent WHO stage 4 event after ≥6 months of ART (exclude IRIS)

Clinical pearls

Do not switch a DTG regimen at the first high viral load: in trials most people resuppressed after adherence support. On the other hand, do not leave someone failing an NNRTI regimen for long — resistance accumulates.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · DHHS Adult & Adolescent ARV Guidelines · Stanford HIV Drug Resistance Database

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

Handbook of Antibiotics
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Second-line, Third-line and Switching ART

Overview. Second-line regimens combine drugs from classes the patient has not failed, ideally guided by genotype. NACO second-line is approved at ART centres after SACEP review; third-line is provided through Centres of Excellence.

First-line that failed	Recommended second-line (NACO/WHO)	NRTI choice
TDF + 3TC + DTG (TLD)	**ATV/r or LPV/r** + 2 NRTIs (DRV/r where available)	AZT + 3TC
ABC or AZT + 3TC + DTG	ATV/r or LPV/r + 2 NRTIs	TDF + 3TC (or FTC)
TDF + 3TC + EFV/NVP (TLE)	**DTG** + 2 NRTIs	AZT + 3TC, or recycle TDF + 3TC (NADIA trial)
AZT + 3TC + EFV/NVP	DTG + TDF + 3TC (TLD)	TDF + 3TC
Children on LPV/r-based	DTG + 2 NRTIs	Per weight band

Third-line / salvage	Principle
NACO third-line (CoE/SACEP)	DRV/r + DTG (50 mg BD) ± optimized NRTIs, genotype-guided
DHHS	Fully active regimen of ≥2 (preferably 3) drugs: DRV/r, DTG BD, plus new agents (lenacapavir, fostemsavir, ibalizumab, maraviroc, enfuvirtide)
Goal	VL <50 even in heavily experienced patients; if impossible, maintain partially active regimen including 3TC (M184V lowers fitness)

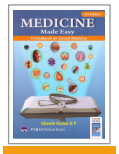
Switching in a suppressed patient (optimisation)	Reason
TLE → TLD	Better tolerability, higher barrier (NACO transition)
TDF → TAF or ABC	Renal impairment, osteoporosis
Triple → DTG/3TC or DTG/RPV	Fewer drugs; no HBV, no M184V/K65R history
Oral → CAB/RPV-LA	Pill fatigue, privacy, adherence (no resistance)
PI/r → INSTI	Lipids, interactions (only if NRTIs fully active)

Clinical pearls

The NADIA trial showed that after NNRTI failure, DTG with recycled TDF/3TC works as well as switching to AZT — even with K65R and M184V present. Never switch a single drug in a failing regimen.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · DHHS Adult & Adolescent ARV Guidelines · Stanford HIV Drug Resistance Database

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary



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Immune Reconstitution Inflammatory Syndrome (IRIS)

Overview. IRIS is a pathological inflammatory response to a pathogen (or antigen) as immunity recovers on ART, usually 2–12 weeks after starting. It occurs in 10–30% of people starting ART with low CD4 counts.

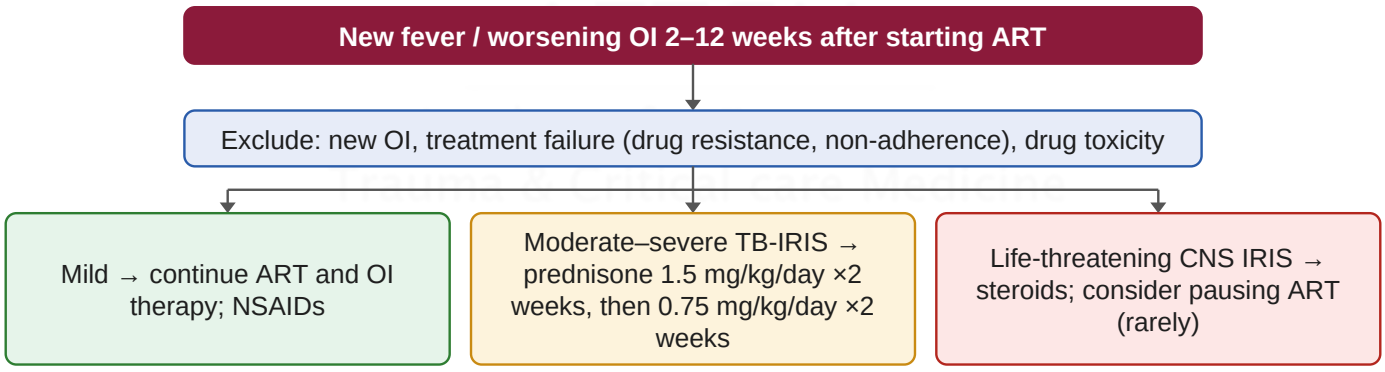
Types

- **Paradoxical**: known OI on treatment worsens after ART (TB, cryptococcal)
- **Unmasking**: previously undiagnosed OI appears after ART (TB, MAC, CMV)

Risk factors

- CD4 <50 cells/µL, high baseline VL
- Short interval between OI treatment and ART
- Disseminated infection, high antigen load
- Rapid fall in VL on ART

Pathogen	IRIS presentation	Specific points
M. tuberculosis	Fever, enlarging nodes (suppurate), worsening infiltrates, effusions, tuberculomas	Commonest in India; exclude drug-resistant TB
Cryptococcus	Recurrent meningitis, raised ICP, culture-negative CSF	Therapeutic LPs; may be fatal
MAC	Focal lymphadenitis, fever	NSAIDs; steroids if severe
CMV	Immune recovery uveitis, vitritis, macular oedema	Periocular/intravitreal steroids
HBV/HCV	Hepatitis flare	Distinguish from drug toxicity
JC virus (PML)	Enhancing PML lesions, oedema	Steroids if mass effect
Kaposi sarcoma	Rapid progression	**Avoid steroids** (worsen KS); chemotherapy
Non-infectious	Sarcoidosis, autoimmune thyroiditis (Graves), alopecia	Months after ART



Clinical pearls

Prophylactic prednisone (40 mg/day ×2 weeks then 20 mg/day ×2 weeks — PredART trial) reduces TB-IRIS in patients with CD4 ≤100 starting ART after ATT, unless rifampicin resistance, KS or hepatitis B are present.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · DHHS Adult & Adolescent ARV Guidelines

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary

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Adherence, Differentiated Care and U=U

Overview. ART works only if taken. Adherence above 95% was essential for older regimens; DTG is more forgiving but missed doses still lead to failure. Stable patients can be seen less often through **differentiated service delivery (DSD)**.

Barriers

- Depression, alcohol, substance use
- Stigma, non-disclosure, fear at workplace
- Distance to ART centre, wage loss
- Pill burden, side effects
- Food insecurity, migration

Tools

- Pill count, self-report, pharmacy refill
- Viral load — the best adherence measure
- Reminders, treatment buddy, phone follow-up
- Peer support (CLHIV/PLHIV networks)
- Enhanced adherence counselling (EAC) — 3 sessions

Differentiated model (NACO)	Who	What
Multi-month dispensing (MMD)	Stable on ART ≥6 months, VL suppressed	3–6 months of ART at a time
Link ART centres / community refill	Stable patients living far away	Refill nearer home
Community-based ART (CBD)	Key populations	Through TI/NGO
Fast-track visits	Stable	Skip clinician review; pharmacy pick-up

U=U — Undetectable = Untransmittable

- People with HIV who maintain viral load <200 copies/mL for ≥6 months do not transmit HIV sexually (HPTN 052, PARTNER 1 and 2, Opposites Attract — zero linked transmissions).
- U=U does not apply to breastfeeding (risk very low but not zero) or to sharing needles.
- Message reduces stigma and motivates adherence; condoms still prevent other STIs.

- **HIV and AIDS (Prevention and Control) Act 2017**: prohibits discrimination in employment, education, health care, housing and insurance; mandates informed consent and confidentiality; provides an Ombudsman in every state.
- Missed-dose rule: take a missed DTG/TLD dose as soon as remembered unless the next dose is due within 4 hours.

Clinical pearls

"Lost to follow-up" in India often means migration or stigma — not refusal. Tracing by outreach workers and linkage to another ART centre recover many patients.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · U=U (Prevention Access Campaign)

Section: Antiretroviral Therapy (HAART) · Summary table on page 28 · ARV drug formulary


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SECTION 4 · 10 TOPICS

OI Prophylaxis, Tuberculosis & Respiratory Disease

Overview and one-page summary table

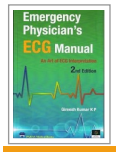
Tuberculosis is the leading cause of death among people with HIV in India, and the lung is the organ most often involved by opportunistic infections. This section covers primary and secondary prophylaxis, TB/HIV co-management, Pneumocystis pneumonia, MAC and the other respiratory infections listed in the original notes.

#	Topic	Key point for the postgraduate	Page
36	Prophylaxis of Opportunistic Infections	CTX for CD4 <350 (NACO)/<200 (DHHS); TPT for all; secondary prophylaxis until CD4 recovers	46
37	Tuberculosis in HIV — Clinical Features and Diagnosis	Atypical, smear-negative, extrapulmonary; CBNAAT/Truenat first; LF-LAM if CD4 ≤200	47
38	Treating TB with ART — HAART with ATT	2HRZE/4HRE daily; TLD + extra DTG 50 mg; rifabutin with PIs; ART within 2 weeks	48
39	TB-IRIS and TB Preventive Therapy	TB-IRIS: prednisone; TPT: 6H or 3HP for all PLHIV after excluding active TB	49
40	Drug-resistant TB in PLHIV	BPaLM 6 months; bedaquiline — avoid EFV (switch to DTG); QT and linezolid toxicity	50
41	Pneumocystis Pneumonia (PCP) — Diagnosis	CD4 <200; subacute dyspnoea, dry cough, exertional desaturation; bilateral GGO; LDH ↑, β-D-glucan ↑	51
42	Pneumocystis Pneumonia — Treatment and Prophylaxis	TMP-SMX 15–20 mg/kg/day TMP ×21 days; prednisone if PaO2 <70; ART within 2 weeks	52
43	Mycobacterium avium Complex (MAC)	CD4 <50; fever, sweats, weight loss, anaemia, ↑ ALP; clarithromycin + ethambutol ± rifabutin	53
44	Bacterial Pneumonia and Other Respiratory Diseases	Pneumococcus commonest; Rhodococcus, Nocardia cavitary; LIP/NSIP; KS and lymphoma of lung	54
45	Endemic and Invasive Fungal Infections	Talaromyces (North-East India) and histoplasmosis: fever, umbilicated papules, cytopenias; L-AmB → itraconazole	55

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Prescribe primary and secondary OI prophylaxis and know when to stop
- Diagnose TB in PLHIV with CBNAAT and LF-LAM
- Co-prescribe ATT and ART safely
- Diagnose and treat PCP, MAC and endemic mycoses



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Prophylaxis of Opportunistic Infections

Overview. Primary prophylaxis prevents a first episode; secondary prophylaxis (maintenance therapy) prevents relapse. Both can be stopped once ART has produced durable immune recovery.

Infection	Start primary prophylaxis	Regimen	Stop when
PCP	CD4 <200 or oral thrush (DHHS); **CD4 <350 or WHO stage 3/4 (NACO)**	Co-trimoxazole 960 mg (1 DS) OD; alt: dapsone 100 mg OD	CD4 >200 for ≥3 months on ART (NACO: >350 for 6 months)
Toxoplasma	Toxo IgG+ and CD4 <100	Co-trimoxazole DS OD; alt: dapsone 50 mg OD + pyrimethamine 50 mg weekly + leucovorin	CD4 >200 for >3 months
Tuberculosis	All PLHIV after excluding active TB	6H (INH 300 mg + B6 ×6 months) or 3HP (weekly INH + rifapentine ×12 doses)	Course completed
Cryptococcus	CrAg+ with negative LP	Fluconazole 800 mg ×2 wk → 400 mg ×8 wk → 200 mg	CD4 >100–200 on ART
MAC	CD4 <50 only if not starting fully suppressive ART	Azithromycin 1,200 mg weekly	On effective ART
Histoplasma	CD4 <150 in hyperendemic areas	Itraconazole 200 mg OD	CD4 >150 for 6 months
Malaria, bacterial infections	Co-trimoxazole also protects	As above	—

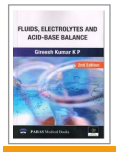
Secondary prophylaxis (maintenance)	Regimen	Stop when (on ART)
PCP	Co-trimoxazole DS OD	CD4 >200 for ≥3 months
Toxoplasma encephalitis	Pyrimethamine 25–50 mg + sulfadiazine 2–4 g/day + leucovorin, or CTX DS BD	CD4 >200 for >6 months, lesions resolved
Cryptococcal meningitis	Fluconazole 200 mg OD (≥1 year)	CD4 ≥100 and VL suppressed ≥3 months (DHHS)
CMV retinitis	Valganciclovir 900 mg OD	CD4 >100 for 3–6 months, inactive lesions
MAC	Clarithromycin + ethambutol	≥12 months treatment, CD4 >100 for 6 months
Cystoisospora	CTX DS three times weekly	CD4 >200 for 6 months
Talaromyces / histoplasma	Itraconazole 200 mg OD	CD4 >100–150 for 6 months

Clinical pearls

Co-trimoxazole prophylaxis lowers mortality in Indian and African cohorts even beyond PCP — it also prevents toxoplasmosis, bacterial pneumonia, diarrhoea and malaria. If a sulfa rash occurs, desensitise or switch to dapsone (check G6PD).

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary


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Tuberculosis in HIV — Clinical Features and Diagnosis

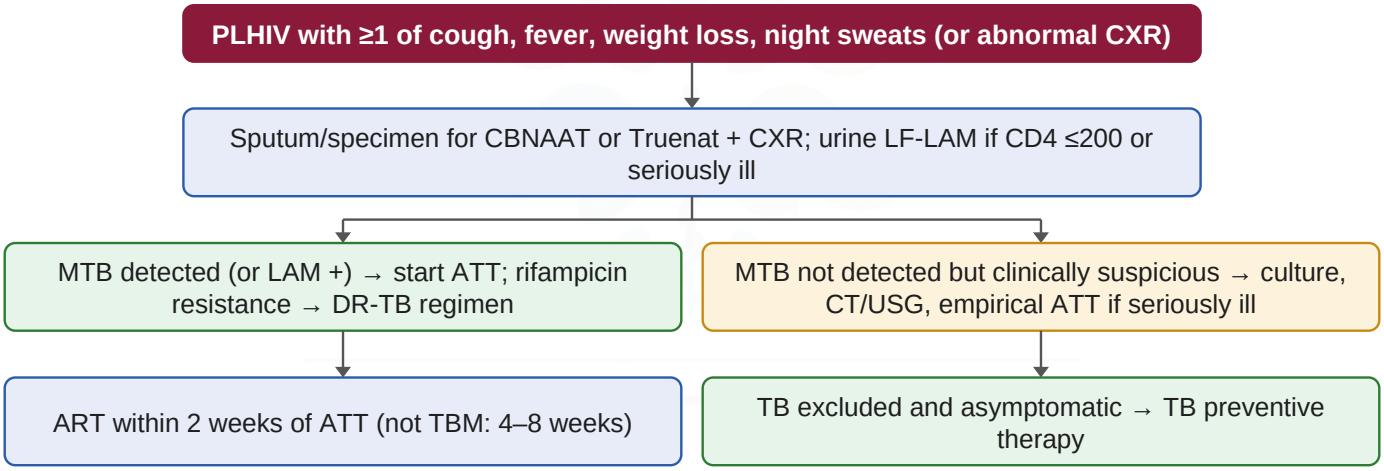
Overview. HIV increases the risk of TB 15–20-fold; TB occurs at any CD4 count and accelerates HIV progression. As CD4 falls, TB becomes **atypical** — smear-negative, non-cavitary, lower-zone or miliary, and extrapulmonary or disseminated.

Clinical clues by CD4

- **CD4 >350**: typical upper-lobe cavitary disease
- **CD4 <200**: lower-zone infiltrates, hilar nodes, miliary, effusions, normal CXR (10–20%)
- Extrapulmonary: lymph node, pleural, pericardial, abdominal, meningeal
- Disseminated TB with sepsis — "TB sepsis"

Diagnostic tests (NTEP/NACO)

- 4-symptom screen at every visit: cough, fever, weight loss, night sweats
- **Upfront NAAT** (CBNAAT/Truenat) on sputum or any specimen
- **Urine LF-LAM**: CD4 ≤200 (or ≤100 outpatients) or seriously ill
- Culture (liquid) and LPA/DST
- CXR, USG abdomen (nodes, splenic microabscesses), FNAC



Feature	Early HIV	Advanced HIV (CD4 <200)
Sputum smear	Often positive	Often negative (paucibacillary)
Chest X-ray	Upper-lobe cavities	Lower/middle-zone, mediastinal nodes, miliary, effusion, normal
Tuberculin/IGRA	Usually positive	Often falsely negative
Extrapulmonary TB	10–20%	>50%; mycobacteraemia common
Mortality	Similar to HIV-negative	High — start ATT and ART promptly

Clinical pearls

In a seriously ill PLHIV with fever and CD4 <100, a positive urine LAM allows ATT to start the same day — LAM testing reduced mortality in the STAMP and LAM-RCT trials.

Further reading — tap to open (free) ► NTEP — Central TB Division · DHHS Adult & Adolescent OI Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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Treating TB with ART — HAART with ATT

Overview. Drug-susceptible TB in PLHIV is treated with the same daily regimen as in HIV-negative people — **2HRZE / 4HRE** (6 months; longer for CNS, bone and joint TB) — plus pyridoxine. The challenge is the rifampicin interaction with ART.

Drug	Daily dose (weight-band FDCs)	Key ADR	With ART
Isoniazid (H)	5 mg/kg (max 300 mg) + pyridoxine 10–25 mg	Hepatitis, peripheral neuropathy	Additive neuropathy with d4T
Rifampicin (R)	10 mg/kg (max 600 mg)	Hepatitis, orange secretions, flu-like, thrombocytopenia	Potent CYP3A4/UGT1A1 inducer
Pyrazinamide (Z)	25 mg/kg	Hepatitis, hyperuricaemia, arthralgia	—
Ethambutol (E)	15 mg/kg	Optic neuritis	Reduce in renal failure
Rifabutin (Rfb)	150 mg daily with PI/r; 300 mg otherwise	Uveitis, neutropenia	Use instead of rifampicin with boosted PIs

ART regimen	With rifampicin-based ATT
TLD	Give **additional DTG 50 mg 12 hours later** (DTG 50 mg BD); continue 2 weeks after rifampicin stops
TLE (EFV 600)	No change
Raltegravir	800 mg BD (or 400 mg BD acceptable per WHO)
LPV/r	Super-boost: LPV/r 800/200 BD or LPV/r + extra RTV (400/400 BD) — or switch rifampicin to rifabutin
ATV/r, DRV/r	Contraindicated with rifampicin — use rifabutin 150 mg daily
BIC, TAF, RPV, DOR, CAB	Avoid

Start ATT

Start ART within 2 weeks (TBM: 4–8 weeks)

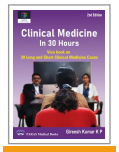
CPT throughout; watch for IRIS and hepatotoxicity

Clinical pearls

Drug-induced liver injury is common when ATT, co-trimoxazole, fluconazole and ART are started together. Start ATT first, ART 2 weeks later, and check LFT at baseline, 2 and 4 weeks.

Further reading — tap to open (free) ► NTEP — Central TB Division · NACO National Guidelines for HIV Care & Treatment 2021 · Liverpool HIV Drug Interactions

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary



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TB-IRIS and TB Preventive Therapy

Overview. Two TB issues follow ART initiation: **paradoxical TB-IRIS** in patients on ATT, and **unmasking TB** in those with undiagnosed infection. Preventive therapy reduces TB incidence by about a third — and with ART by up to 80%.

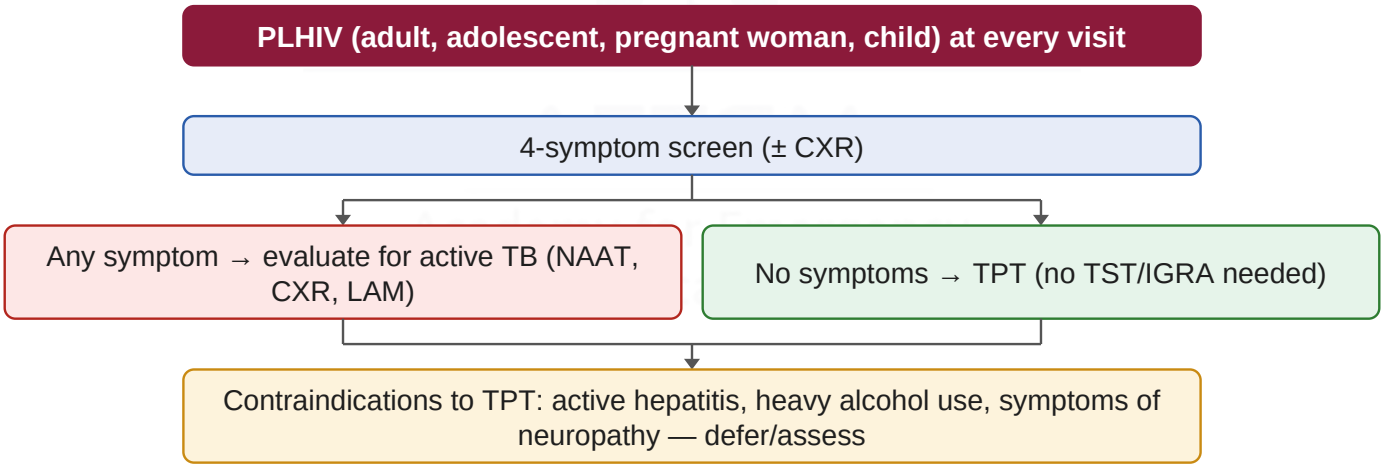
TB-IRIS — diagnosis (INSHI criteria)

- TB diagnosed and responding to ATT before ART
- New/worsening features within 3 months of ART: fever, nodes, infiltrates, effusions, abscesses, tuberculomas
- Exclude MDR-TB, other OI, poor adherence, drug reaction

TB-IRIS — management

- Continue ATT and ART
- Aspirate suppurating nodes/abscesses
- Prednisone 1.5 mg/kg/day ×2 weeks → 0.75 mg/kg/day ×2 weeks
- Prophylactic prednisone (PredART) if CD4 ≤100 starting ART

TPT regimen	Dose	Duration	Notes
6H (isoniazid)	INH 300 mg + pyridoxine daily	6 months	Standard in NACO/NTEP; any ART
3HP	INH 900 mg + rifapentine 900 mg once weekly (≥30 kg)	12 doses	OK with DTG (no dose change) and EFV; not with PIs, NVP, TAF/BIC
1HP	INH 300 + rifapentine 600 mg daily	28 days	WHO option
3HR	INH + rifampicin daily	3 months	Interaction as rifampicin
6Lfx	Levofloxacin daily	6 months	Contacts of MDR-TB



Clinical pearls

Before every course of TPT ask: "Could this be active TB?" Giving INH alone to someone with active TB breeds resistance. Pregnancy is not a contraindication to 6H.

Further reading — tap to open (free) ► NTEP — Central TB Division · NACO National Guidelines for HIV Care & Treatment 2021

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

Handbook of Antibiotics
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Drug-resistant TB in PLHIV

Overview. MDR/RR-TB in PLHIV carries high mortality, especially when diagnosed late. Universal upfront NAAT detects rifampicin resistance at diagnosis. NTEP has adopted the 6-month **BPaLM** regimen for eligible patients.

Regimen (NTEP/WHO)	Drugs	Duration	Eligibility
BPaLM	Bedaquiline, pretomanid, linezolid 600 mg, moxifloxacin	6 months (26 weeks)	≥14 years, FQ-susceptible; not in pregnancy; limited prior exposure
BPaL	As above without moxifloxacin	6–9 months	Fluoroquinolone resistance
Shorter oral Bdq-containing	Bdq, Lfx/Mfx, Cfz, Z, E, high-dose H, Eto	9–11 months	When BPaLM unsuitable
Longer individualised	Bdq, Lzd, Lfx, Cfz, Cs ± Dlm	18–20 months	XDR/complex; extensive EPTB

Interaction / toxicity	Management
Bedaquiline + efavirenz	EFV ↓ bedaquiline — switch to DTG (TLD) before starting
Bedaquiline + LPV/r	↑ bedaquiline — monitor ECG/QTc
QT prolongation (Bdq, Mfx, Cfz, Dlm)	Baseline and serial ECG; stop if QTcF >500 ms; correct K, Mg
Linezolid	Myelosuppression, peripheral and optic neuropathy — monthly CBC, vision; reduce to 300 mg if toxic
Pretomanid	Hepatotoxicity; peripheral neuropathy
Overlapping toxicity with ART	Neuropathy (Lzd), anaemia (AZT + Lzd — avoid), renal (TDF + aminoglycosides — avoid injectables)

NAAT: rifampicin resistance

LPA for FQ/INH; baseline ECG, CBC, LFT, creatinine

BPaLM + TLD; ART within 2 weeks

Clinical pearls

Start ART within 2 weeks in PLHIV with DR-TB just as in drug-susceptible TB. Avoid zidovudine with linezolid (additive marrow toxicity).

Further reading — tap to open (free) ► NTEP — Central TB Division · WHO consolidated TB guidelines — Module 4 (2025)

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

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Pneumocystis Pneumonia (PCP) — Diagnosis

Overview. *Pneumocystis jirovecii* (formerly *P. carinii*) is a fungus that causes pneumonia when CD4 falls below 200 (90%). Onset is **subacute over 2–4 weeks** — unlike bacterial pneumonia. It is less frequent in India than TB but is a major cause of hypoxic respiratory failure in newly diagnosed patients.

Clinical features

- Progressive exertional dyspnoea, dry cough, fever
- Tachypnoea; chest often clear on auscultation
- Desaturation on exertion (6-minute walk/climbing stairs)
- Oral thrush in most
- Pneumothorax (cysts) — think PCP

Investigations

- ABG: hypoxaemia, ↑ A–a gradient
- LDH >500 IU/L (prognostic), serum β-D-glucan ↑ (sensitive)
- Induced sputum/BAL: immunofluorescence, GMS/Giemsa stains, PCR
- CXR: bilateral perihilar interstitial/"bat-wing" haze; normal in 10–25%
- HRCT: diffuse ground-glass opacity ± cysts

Radiology images — Pneumocystis jirovecii pneumonia (Radiopaedia)
Classic chest radiographs and HRCT: bilateral perihilar ground-glass opacities sparing the periphery, "crazy-paving", pneumatoceles/cysts and pneumothorax. Scan the QR code to view the case gallery.
► Tap to open the image gallery (radiopaedia.org)

Severity	Criteria	Treatment route
Mild	PaO_2 ≥70 mmHg on room air, A–a gradient <35	Oral co-trimoxazole
Moderate	PaO_2 50–70 or A–a gradient 35–45	IV/oral co-trimoxazole + **steroids**
Severe	PaO_2 <50, A–a gradient >45, or SpO_2 <90%	IV co-trimoxazole + steroids; ICU, NIV

Differential diagnosis of diffuse infiltrates in PLHIV	Clue
Miliary / disseminated TB	Micronodules, nodes, hepatosplenomegaly; NAAT, LAM
Bacterial pneumonia	Acute onset, lobar, purulent sputum, leucocytosis
CMV pneumonitis	Rare; CD4 <50, retinitis
Histoplasmosis/talaromycosis	Skin papules, cytopenias
Kaposi sarcoma, LIP, NSIP	Mucosal KS; children (LIP)

Clinical pearls

A normal chest X-ray does not exclude PCP — check exercise desaturation and LDH; a negative serum β-D-glucan makes PCP unlikely.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · Radiopaedia — PJP

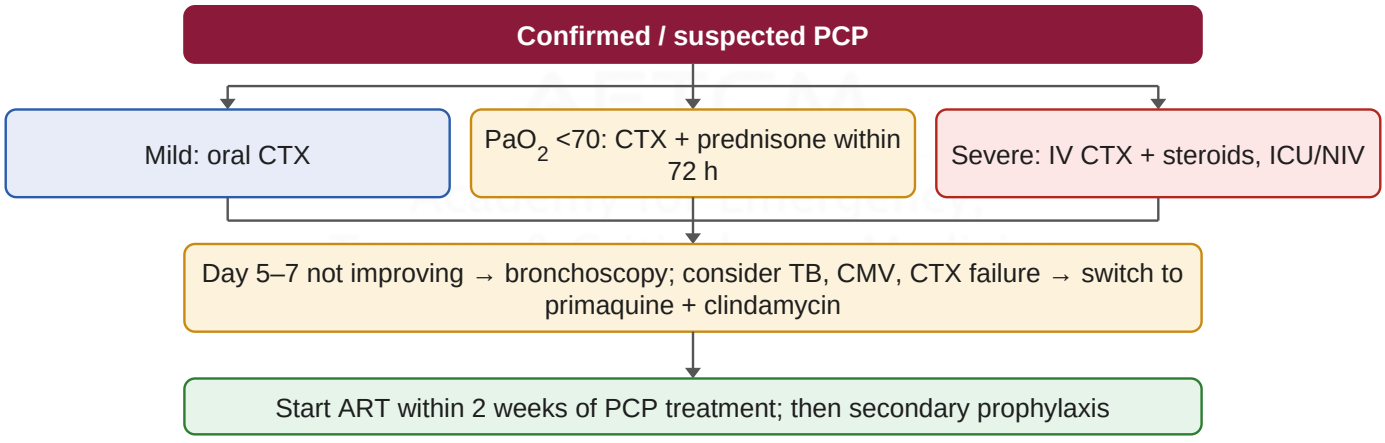
Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

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Pneumocystis Pneumonia — Treatment and Prophylaxis

Overview. Co-trimoxazole is the drug of choice for all severities. Adjunctive corticosteroids, started within 72 hours, reduce mortality in moderate–severe disease. Patients often worsen in the first 3–5 days of therapy — do not change drugs before day 5–7 unless toxicity occurs.

Line	Drug and dose	Duration	Cautions / ADR
First-line	**Co-trimoxazole** TMP 15–20 mg/kg/day + SMX 75–100 mg/kg/day IV or PO in 3–4 divided doses (e.g. 2 DS tabs TDS for 60–70 kg)	21 days	Rash, fever, neutropenia, hyperkalaemia, hepatitis, AKI; adjust if CrCl <30
Alternative (moderate–severe)	Primaquine 30 mg base OD + clindamycin 600 mg IV q8h (or 300–450 mg PO q6–8h)	21 days	G6PD deficiency — haemolysis, methaemoglobinaemia
Alternative (severe)	Pentamidine 4 mg/kg IV OD (over 60 min)	21 days	Hypotension, hypo/hyperglycaemia, pancreatitis, AKI, QT
Alternative (mild)	Dapsone 100 mg OD + TMP 5 mg/kg TDS; or atovaquone 750 mg BD with food	21 days	G6PD; atovaquone less effective
Adjunct	**Prednisone** 40 mg BD days 1–5, 40 mg OD days 6–10, 20 mg OD days 11–21 (IV methylprednisolone = 75% of dose)	21 days	If PaO_2 <70 mmHg or A–a gradient ≥35
Secondary prophylaxis	Co-trimoxazole DS (or SS) OD	Until CD4 >200 ≥3 months	Dapsone 100 mg OD if intolerant



Clinical pearls

Sulfa rash during PCP treatment: if mild, "treat through" with antihistamines; if severe (SJS, mucosal) switch to primaquine–clindamycin. Desensitisation allows later prophylaxis in most patients.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · Radiopaedia — PJP

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

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Mycobacterium avium Complex (MAC)

Overview. MAC (*M. avium*, *M. intracellulare*) are environmental non-tuberculous mycobacteria acquired from water and soil. Disseminated MAC occurs when CD4 is **below 50**. It is less frequently diagnosed in India, where TB is the main mimic.

Signs and symptoms

- Fever, night sweats, weight loss, fatigue
- Diarrhoea, abdominal pain
- Hepatosplenomegaly, abdominal lymphadenopathy
- Focal lymphadenitis (often IRIS)

Laboratory investigations

- Anaemia (marrow), ↑ alkaline phosphatase
- **Mycobacterial blood culture** (lysis-centrifugation/BACTEC)
- Bone marrow, liver or node biopsy — AFB, culture
- CT: bulky mesenteric/retroperitoneal nodes
- Differentiate from TB by culture/PCR (NAAT negative)

Line	Regimen	Duration	Notes
Treatment	**Clarithromycin 500 mg BD** (or azithromycin 500–600 mg OD) + **ethambutol 15 mg/kg OD**	≥12 months and CD4 >100 for ≥6 months	Macrolide susceptibility testing
Add (severe, high load)	Rifabutin 300 mg OD (adjust with PIs/EFV) or amikacin / fluoroquinolone	—	Rifabutin uveitis with clarithromycin
Primary prophylaxis	Azithromycin 1,200 mg weekly	Only if CD4 <50 and not starting fully suppressive ART	Exclude active MAC first
ART	Within 2 weeks of MAC therapy	—	Watch for MAC-IRIS (lymphadenitis)

Interaction	Advice
Clarithromycin + EFV	Clarithromycin ↓, rash ↑ — prefer azithromycin
Clarithromycin + PI/r	Clarithromycin ↑ — reduce dose if CrCl <60
Rifabutin + PI/r	Rifabutin 150 mg daily
Rifabutin + EFV	Rifabutin 450–600 mg daily

Clinical pearls

Fever with a very high alkaline phosphatase, anaemia and CD4 <50 is MAC or disseminated TB — send blood mycobacterial culture before starting empirical therapy that covers both.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary

Emergency Physician's ECG Manual
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Bacterial Pneumonia and Other Respiratory Diseases

Overview. Bacterial pneumonia occurs at any CD4 and is 10–25 times more frequent than in HIV-negative people; ≥2 episodes in 12 months is an AIDS-defining condition. The original notes also list Rhodococcus, fungal infections, idiopathic interstitial pneumonia and neoplasms.

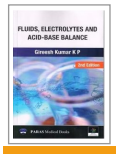
Condition	Features	Diagnosis	Treatment
Bacterial pneumonia (S. pneumoniae, H. influenzae, S. aureus, Gram-negatives)	Acute fever, productive cough, lobar consolidation, bacteraemia common	Blood/sputum culture, urine pneumococcal Ag	Ceftriaxone + azithromycin (ward); add anti-MRSA/pseudomonal if risk; vaccinate (PCV)
Rhodococcus equi	Upper-lobe cavitary pneumonia (like TB), horse/soil exposure	Sputum/BAL culture — Gram-positive coccobacilli, partially acid-fast	Vancomycin or imipenem + rifampicin/macrolide, then oral for months
Nocardia	Nodules, cavities, empyema, brain abscess	Modified AFB stain, culture	Co-trimoxazole high dose ± imipenem/amikacin
Fungal: Cryptococcus, histoplasma, talaromyces, aspergillus	Nodules, cavities, diffuse infiltrates	Serum CrAg, urine histoplasma Ag, BAL galactomannan	Amphotericin B → azole
Lymphoid interstitial pneumonitis (LIP)	Children, slowly progressive, clubbing, parotid enlargement	Diffuse reticulonodular; biopsy	ART; steroids if hypoxic
Non-specific interstitial pneumonitis (NSIP)	Mimics PCP, CD4 often >200	Biopsy	Usually self-limited
Neoplasms: KS, lymphoma, lung cancer	Haemoptysis, nodules, effusion	Bronchoscopy (red KS plaques), biopsy	Chemotherapy + ART
COPD, pulmonary hypertension	Smokers; dyspnoea	PFT, echo	Standard care; stop smoking

Clinical pearls

A PLHIV with an upper-lobe cavity and negative NAAT for TB needs culture for Nocardia, Rhodococcus and fungi — not empirical ATT alone.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: OI Prophylaxis, Tuberculosis & Respiratory Disease · Summary table on page 45 · ARV drug formulary



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Endemic and Invasive Fungal Infections

Overview. Disseminated fungal infections present as fever, weight loss, lymphadenopathy, hepatosplenomegaly, cytopenias and skin lesions when CD4 is below 100. **Talaromycosis** is endemic in Manipur and the North-East; **histoplasmosis** is reported from the Gangetic plains and West Bengal.

Feature	Talaromycosis (T. marneffei)	Histoplasmosis (H. capsulatum)
Distribution	South-East Asia, North-East India	Gangetic plains, West Bengal; worldwide
Skin	**Umbilicated papules with central necrosis** (face, ears, trunk) — mimic molluscum	Papules, ulcers; oral ulcers
Other	Lymphadenopathy, hepatosplenomegaly, pulmonary infiltrates	Adrenal involvement, pancytopenia, sepsis-like
Diagnosis	Skin scraping/marrow: yeast with central septum; culture — red diffusible pigment	Urine/serum histoplasma antigen; marrow; culture
Induction	L-AmB 3–5 mg/kg/day (or AmB-d 0.7 mg/kg) ×2 weeks	L-AmB 3 mg/kg/day ×1–2 weeks
Consolidation	Itraconazole 200 mg BD ×10 weeks	Itraconazole 200 mg TDS ×3 days then BD ≥12 months
Maintenance	Itraconazole 200 mg OD until CD4 >100 for 6 months	Until CD4 >150 for 6 months, ≥1 year therapy

Other fungi	Setting	Treatment
Invasive aspergillosis	CD4 <50, neutropenia, steroids	Voriconazole (interactions with PI/r, EFV)
Mucormycosis	Diabetes, steroids	L-AmB + surgery
Pulmonary cryptococcosis	Nodules/infiltrates; check CSF	Fluconazole 400 mg (if CNS excluded)
Candidaemia	Lines, broad-spectrum antibiotics	Echinocandin

Clinical pearls

In a febrile PLHIV from the North-East with "molluscum" on the face and pancytopenia, scrape a lesion and look for septate yeasts — talaromycosis is rapidly fatal without amphotericin.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

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SECTION 5 · 9 TOPICS

Neurological Diseases in HIV

Overview and one-page summary table

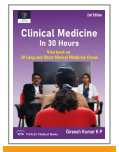
Neurological disease affects up to 40% of PLHIV during life and is a frequent cause of admission and death. The approach depends on the CD4 count and on whether there is a focal lesion, meningitis, encephalopathy, myelopathy or neuropathy. Cryptococcal and tuberculous meningitis dominate in India.

#	Topic	Key point for the postgraduate	Page
46	Approach to Neurological Disease in HIV	Focal lesion + CD4 <100 → toxo empirical; meningitis → CrAg/CSF; encephalopathy → HAND/PML	57
47	Cryptococcal Meningitis — Diagnosis	Subacute headache, fever; CSF opening pressure often >25 cmH2O; CrAg >95% sensitive	58
48	Cryptococcal Meningitis — Treatment	Single L-AmB 10 mg/kg + 5FC + fluconazole 1,200 ×2 wk (WHO); consolidation 800 mg ×8 wk; ART at 4–6 wk	59
49	Cerebral Toxoplasmosis	CD4 <100, Toxo IgG+, ring lesions in basal ganglia; pyrimethamine + sulfadiazine + leucovorin ≥6 weeks	60
50	Progressive Multifocal Leukoencephalopathy (PML)	JC virus; subacute focal deficits; non-enhancing white-matter lesions; no specific drug — start ART	61
51	Primary CNS Lymphoma	CD4 <50, EBV-driven; periventricular enhancing lesion; CSF EBV PCR, PET hot; HD-methotrexate + ART	62
52	HIV-associated Neurocognitive Disorder (AIDS Dementia Complex)	ANI, MND, HAD (Frascati); IHDS ≤10 screen; ART with good CNS penetration	63
53	Aseptic Meningitis, Vacuolar Myelopathy and Other Meningitides	HIV aseptic meningitis (acute HIV); TB meningitis; neurosyphilis; vacuolar myelopathy ~ SACD with normal B12	64
54	Peripheral Neuropathy and Myopathy	Distal sensory polyneuropathy (HIV, d4T, INH); CMV polyradiculopathy; AZT myopathy	65

Tap a topic name or page number to open its full page.

Learning objectives for this section

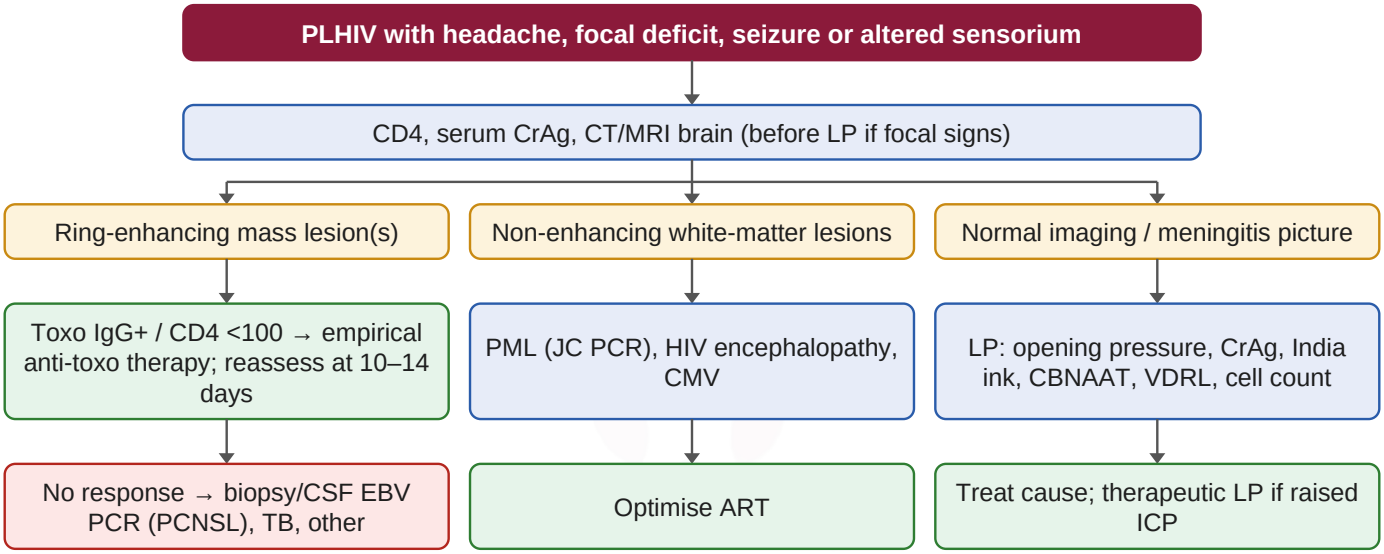
- Use CD4 count and imaging to approach focal brain lesions
- Treat cryptococcal meningitis and manage raised ICP
- Treat cerebral toxoplasmosis empirically and know when to biopsy
- Classify HAND and peripheral neuropathy



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Approach to Neurological Disease in HIV

Overview. Ask three questions: Is it **meningitis**, a **focal mass lesion**, or **diffuse** (encephalopathy, myelopathy, neuropathy)? What is the **CD4** count? Is the patient on ART (IRIS, drug toxicity)?



Syndrome	Causes in PLHIV
Focal mass lesions	Toxoplasmosis, tuberculoma/TB abscess, PCNSL, cryptococcoma, bacterial abscess, Nocardia, Chagas (Americas)
Meningitis	Cryptococcal, tuberculous, bacterial, syphilitic, aseptic (HIV), lymphomatous
Encephalopathy / dementia	HAND, PML, CMV encephalitis, metabolic, drugs (EFV), neurosyphilis
Myelopathy	Vacuolar myelopathy, CMV/HSV/VZV myelitis, TB (Pott), HTLV-1, B12 deficiency
Neuropathy	Distal sensory polyneuropathy, drug toxicity (d4T, INH, linezolid), CMV polyradiculopathy, mononeuritis multiplex, GBS/CIDP
Stroke	Vasculitis (VZV, TB, syphilis), accelerated atherosclerosis
Seizures	Any mass lesion, cryptococcosis, HAND; check ART interactions with anticonvulsants

Imaging clue	Toxoplasmosis	PCNSL	Tuberculoma
Number	Multiple	Single or few	Multiple, conglomerate
Site	Basal ganglia, grey–white junction	Periventricular, corpus callosum, subependymal	Basal cisterns, cortex
Enhancement	Ring; **eccentric target sign**	Irregular/solid; subependymal spread	Ring, with basal meningitis
Thallium SPECT / FDG-PET	Cold	Hot	Variable

Clinical pearls

In India, tuberculoma and toxoplasmosis are equally common causes of ring-enhancing lesions in PLHIV — look for TB elsewhere (CXR, abdomen) and check toxoplasma IgG before choosing empirical therapy.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary

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Cryptococcal Meningitis — Diagnosis

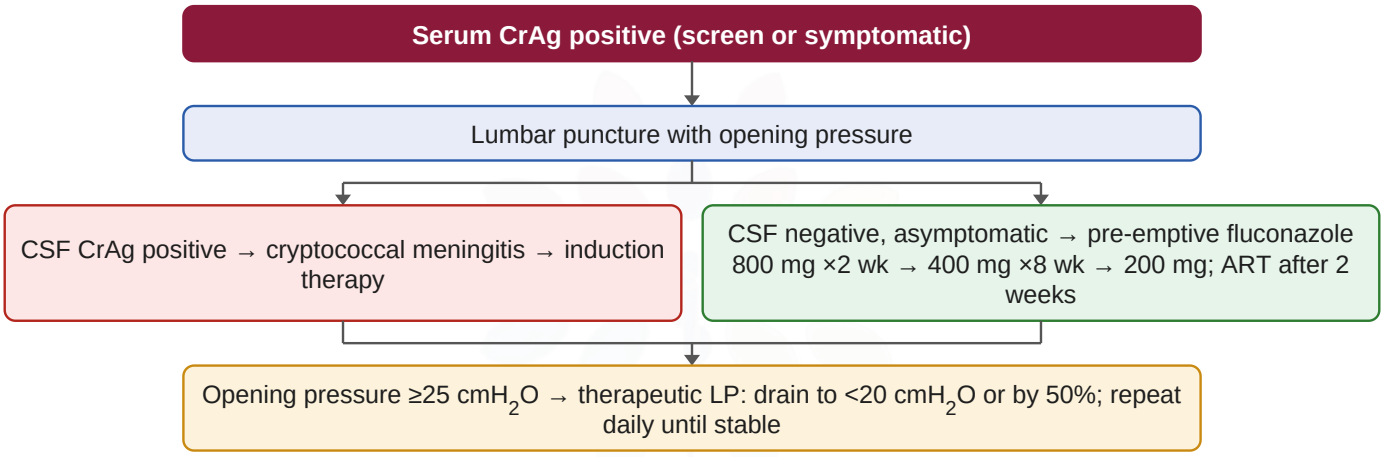
Overview. *Cryptococcus neoformans* is acquired by inhalation (pigeon droppings, soil) and disseminates to the meninges when CD4 is **below 100**. It causes ~15% of AIDS deaths worldwide. Raised intracranial pressure is the major cause of early death and blindness.

Clinical features

- Subacute headache (weeks), fever, malaise
- Neck stiffness absent in up to 70%
- Visual loss, diplopia (CN VI palsy), papilloedema
- Altered sensorium, seizures — poor prognosis
- Skin papules (molluscum-like), pneumonia

Investigations

- Serum/plasma CrAg (lateral flow) — positive weeks before symptoms
- **LP with opening pressure** (often >25 cmH_2O)
- CSF: low cells, mildly ↑ protein, low glucose — may be near-normal
- CSF CrAg, India ink (70–80%), fungal culture
- Blood culture; CT if focal signs



Poor prognostic factors	Comment
Altered mental status (GCS <15)	Strongest predictor of death
High CSF fungal burden / CrAg titre >1:1,024	—
Low CSF white cells (<20/μL)	Poor inflammatory response
Raised opening pressure untreated	Blindness, death
Hyponatraemia, anaemia, seizures	—

Test	Sensitivity	Note
CSF CrAg (LFA)	>98%	Rapid, cheap — test of choice
Serum CrAg	>95%	Screening at CD4 <200 (WHO), <100 minimum
India ink	70–80%	Operator dependent
CSF culture	90%	Quantitative culture tracks response

Clinical pearls

Always measure opening pressure — a manometer can be improvised with an IV extension set and a ruler. Do not use acetazolamide, mannitol or steroids for raised ICP in cryptococcal meningitis.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · WHO cryptococcal guidelines 2022

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Cryptococcal Meningitis — Treatment

Overview. Treatment has three phases — **induction, consolidation and maintenance**. The WHO 2022 preferred induction (AMBITION-cm trial) is a **single high dose of liposomal amphotericin B** with 2 weeks of flucytosine and fluconazole; DHHS prefers L-AmB 3–4 mg/kg daily with flucytosine for at least 2 weeks.

Phase	Regimen	Duration
Induction — WHO preferred	**L-AmB 10 mg/kg single dose** + flucytosine 100 mg/kg/day (in 4 doses) + fluconazole 1,200 mg/day	14 days
Induction — DHHS preferred	L-AmB 3–4 mg/kg/day + flucytosine 25 mg/kg QID	≥2 weeks (and CSF culture sterile)
Induction — if L-AmB unavailable (common in India)	AmB deoxycholate 1 mg/kg/day + flucytosine ×1 week, then fluconazole 1,200 mg/day ×1 week	2 weeks
Induction — no flucytosine	AmB-d 1 mg/kg/day + fluconazole 1,200 mg/day; or fluconazole 1,200 + 5FC (oral, no AmB)	2 weeks
Consolidation	Fluconazole 800 mg/day (400 mg if 5FC-based induction per WHO)	8 weeks
Maintenance	Fluconazole 200 mg/day	≥1 year; stop when CD4 ≥100 (DHHS) / ≥200 (WHO) with suppressed VL

Amphotericin B toxicity	Prevention
Nephrotoxicity, hypokalaemia, hypomagnesaemia	1 L normal saline before each dose; KCl 40 mEq/day + Mg; creatinine and K three times weekly
Infusion reactions (fever, rigors)	Paracetamol, slow infusion (4 h for AmB-d)
Anaemia, phlebitis	Hb weekly; peripheral line rotation

Induction 2 weeks + therapeutic LPs

Consolidation fluconazole 800 mg ×8 weeks

Maintenance 200 mg; ART at 4–6 weeks

- **Defer ART 4–6 weeks** after starting antifungals (COAT trial — early ART increased mortality).
- Fluconazole raises levels of some drugs; it is safe with TLD.
- Cryptococcal IRIS: recurrent headache with sterile CSF after ART — therapeutic LPs, continue ART, steroids if severe.
- Relapse: check adherence to fluconazole, susceptibility; reinduce.

Clinical pearls

Daily therapeutic lumbar punctures until opening pressure is normal are as important as antifungals — they prevent blindness and death. A lumbar drain or VP shunt is for persistent raised pressure.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · WHO cryptococcal guidelines 2022

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary



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Cerebral Toxoplasmosis

Overview. *Toxoplasma gondii* encephalitis results from reactivation of latent cysts when CD4 falls **below 100**. Diagnosis is usually presumptive: compatible imaging + positive IgG + response to empirical therapy within 10–14 days.

Clinical features

- Headache, fever, confusion
- Focal deficits: hemiparesis, aphasia, ataxia
- Seizures
- Movement disorders (basal ganglia — hemichorea)
- Chorioretinitis, pneumonitis (rare)

Investigations

- Toxoplasma IgG positive (>95%) — negative IgG makes it unlikely
- MRI > CT: multiple ring-enhancing lesions with oedema
- Site: basal ganglia, thalamus, grey–white junction
- "Eccentric target sign" (MRI), "concentric target" (T2)
- CSF PCR (specific, low sensitivity); biopsy if no response

Radiology images — Neurotoxoplasmosis (Radiopaedia)

MRI/CT examples of multiple ring-enhancing lesions at the corticomedullary junction and basal ganglia with surrounding oedema, the eccentric target sign, and comparison with primary CNS lymphoma. Scan or tap to view.

► Tap to open the image gallery (radiopaedia.org)

Line	Regimen	Duration / notes
Preferred	**Pyrimethamine** 200 mg once, then 50 mg (<60 kg) or 75 mg (≥60 kg) OD + **sulfadiazine** 1,000 mg (<60 kg) or 1,500 mg (≥60 kg) q6h + **leucovorin** 10–25 mg OD	≥6 weeks (longer if extensive)
Alternative (widely used in India)	**Co-trimoxazole** TMP 5 mg/kg + SMX 25 mg/kg IV/PO BD	≥6 weeks — as effective, cheaper
Sulfa allergy	Pyrimethamine + leucovorin + clindamycin 600 mg IV/PO q6h; or atovaquone	≥6 weeks
Adjuncts	Dexamethasone only for mass effect/midline shift (taper quickly); anticonvulsants if seizures (levetiracetam)	Steroids confuse response to therapy
Maintenance	Pyrimethamine 25–50 mg + sulfadiazine 2–4 g/day + leucovorin, or CTX DS BD	Until CD4 >200 for >6 months
ART	Start within 2–3 weeks	—

Clinical pearls

Clinical improvement in 1 week and radiological improvement by 2 weeks confirm the diagnosis. If there is no response by day 10–14, or IgG is negative, think lymphoma or TB and proceed to CSF EBV PCR, PET or biopsy.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · Radiopaedia — neurotoxoplasmosis

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Progressive Multifocal Leukoencephalopathy (PML)

Overview. PML is a demyelinating disease caused by reactivation of **JC polyomavirus** in oligodendrocytes, usually with CD4 <200. It progresses over weeks and, without immune recovery, is fatal within months.

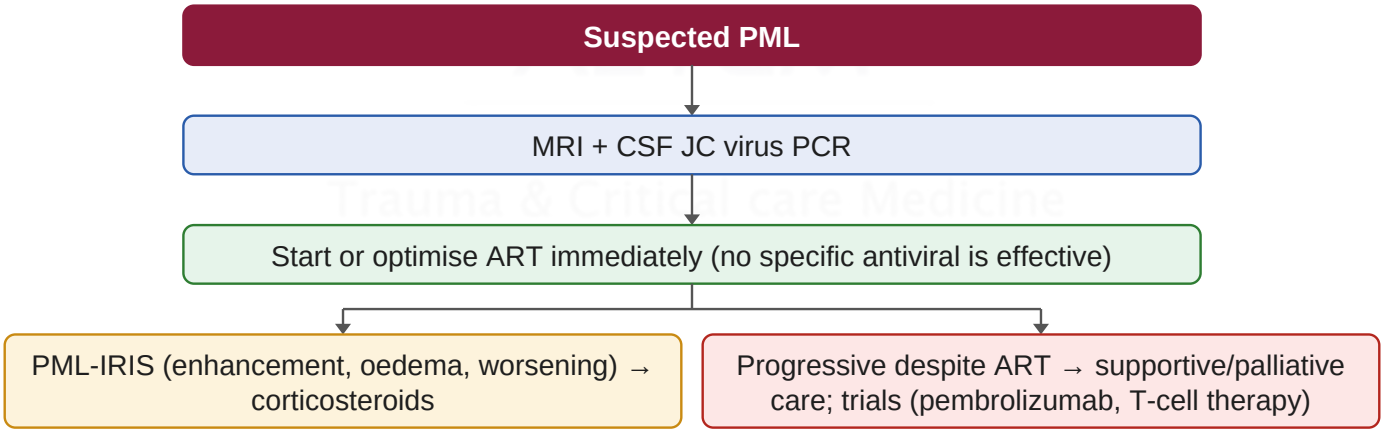
Clinical features

- Subacute focal deficits: hemiparesis, visual field defect (cortical blindness), aphasia, ataxia
- Cognitive decline
- No fever, no headache — patient is alert
- Seizures in ~20%

Diagnosis

- MRI: asymmetric, T2/FLAIR hyperintense **subcortical white-matter** lesions involving U-fibres
- No mass effect; usually no enhancement (enhances in PML-IRIS)
- CSF JC virus PCR (sensitivity ~75%, specificity >95%)
- Brain biopsy if PCR negative

Feature	PML	HIV encephalopathy	CMV encephalitis
Onset	Subacute, focal	Insidious, global	Subacute delirium
MRI	Asymmetric subcortical WM; U-fibres	Symmetric periventricular WM, atrophy	Periventricular enhancement (ventriculitis)
CSF	JC PCR +	Non-specific	CMV PCR +
CD4	<200	<200	<50
Treatment	ART (immune recovery)	ART (CNS-penetrating)	Ganciclovir + foscarnet



Clinical pearls

Cidofovir, cytarabine and mefloquine have failed in trials. Survival with ART is now 50% or more at one year, but residual deficits are common.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary

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Primary CNS Lymphoma

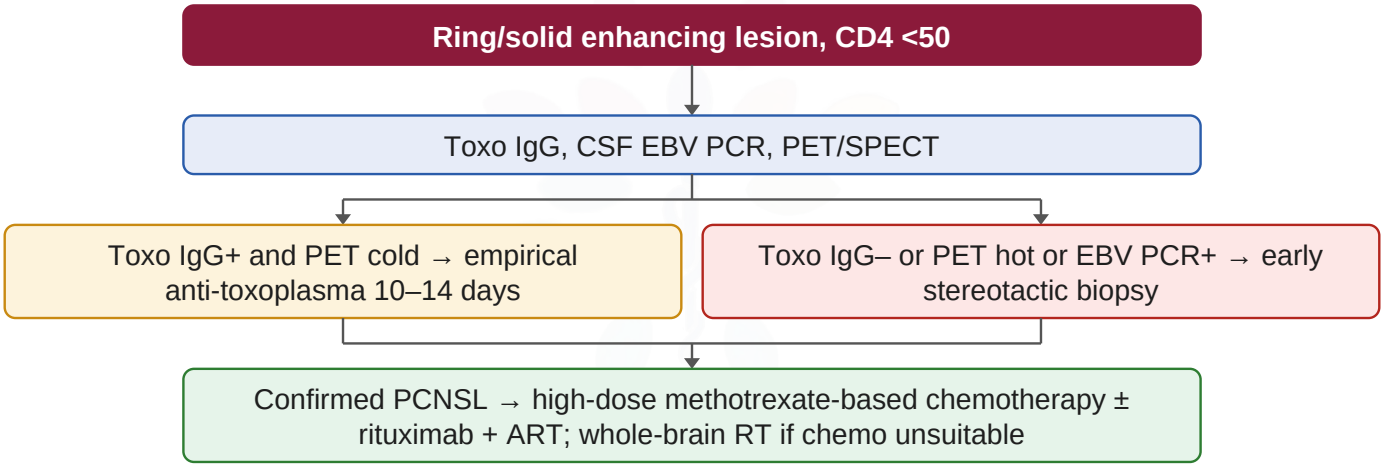
Overview. AIDS-related primary CNS lymphoma is a high-grade B-cell (diffuse large B-cell) lymphoma, almost always **EBV-positive**, occurring with CD4 **below 50**. It is the main differential of toxoplasmosis and became much less common with ART.

Clinical features

- Subacute confusion, personality change, lethargy
- Focal deficits, seizures
- B symptoms uncommon
- Ocular involvement possible (slit lamp)

Diagnosis

- MRI: single or few irregularly enhancing periventricular lesions, subependymal spread, corpus callosum
- CSF EBV DNA PCR (sensitive, not specific); CSF cytology/flow
- Thallium SPECT or FDG-PET: hot lesion
- Stereotactic biopsy is definitive
- Avoid steroids before biopsy (lympholytic)



Treatment component	Detail
Chemotherapy	High-dose methotrexate (3–8 g/m²) ± rituximab, cytarabine; glucarpidase if MTX toxicity
ART	Start immediately; avoid AZT (marrow) and PI/cobicistat interactions with chemotherapy — DTG-based preferred
Radiotherapy	Palliative whole-brain RT if chemotherapy not possible
Supportive	Dexamethasone after biopsy for oedema; CTX prophylaxis; G-CSF
Prognosis	Median survival improved from 1–3 months (untreated) to years with ART + HD-MTX

Clinical pearls

A single lesion, a negative toxoplasma IgG and a CD4 below 50 point to lymphoma — do not waste two weeks on empirical toxoplasma therapy in such a patient.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · NCCN — AIDS-related B-cell lymphomas

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary

BUY NOW ›

HIV-associated Neurocognitive Disorder (AIDS Dementia Complex)

Overview. HIV enters the CNS early via infected monocytes. Chronic inflammation causes a **subcortical dementia** with psychomotor slowing, poor concentration and apathy. Severe dementia (HAD) is now rare on ART, but milder forms persist in 20–50%.

Frascati classification

- **ANI** — asymptomatic neurocognitive impairment (tests abnormal, no functional loss)
- **MND** — mild neurocognitive disorder (mild functional impact)
- **HAD** — HIV-associated dementia (marked impairment)

Features of HAD

- Cognitive: slowness, forgetfulness, poor concentration
- Motor: slow movements, unsteady gait, tremor, hyperreflexia
- Behaviour: apathy, withdrawal, depression-like
- Late: mutism, incontinence, paraparesis

Evaluation	Findings / purpose
International HIV Dementia Scale (IHDS)	Motor speed, psychomotor speed, memory recall; score ≤10/12 → further testing
MRI	Atrophy, symmetric periventricular/deep white-matter T2 hyperintensities
CSF	Exclude cryptococcus, syphilis, CMV, JC; CSF HIV RNA (CSF escape)
Blood	B12, TSH, RPR, glucose, sodium; depression screen
Drug review	EFV, benzodiazepines, anticholinergics, alcohol

Management	Detail
ART	Start/optimise; DTG-based regimens achieve adequate CSF levels
CSF viral escape	CSF HIV RNA higher than plasma — genotype CSF, optimise regimen
Symptomatic	Treat depression (SSRIs — check interactions), physiotherapy, cognitive rehabilitation, caregiver support
Comorbidities	Control vascular risk factors, alcohol cessation

Clinical pearls

Before labelling HAND, exclude depression, neurosyphilis, B12 deficiency, hypothyroidism and drug effects — all treatable and common in PLHIV.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · DHHS Adult & Adolescent ARV Guidelines

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary



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Aseptic Meningitis, Vacuolar Myelopathy and Other Meningitides

Overview. Besides cryptococcus, meningitis in PLHIV may be due to HIV itself, tuberculosis, syphilis, bacteria or lymphoma. Spinal cord disease (myelopathy) is mainly vacuolar myelopathy, a degenerative disorder of advanced HIV.

Condition	Features	CSF / tests	Treatment
HIV aseptic meningitis	Acute HIV or any stage; headache, fever, CN palsies (V, VII, VIII)	Lymphocytes 20–300, protein ↑, glucose normal	Self-limited; ART
Tuberculous meningitis	Subacute, cranial nerve palsies, hydrocephalus, infarcts	Lymphocytic, protein ↑↑, glucose ↓, ADA ↑; CBNAAT Ultra	ATT (9–12 months) + dexamethasone; ART after 4–8 weeks
Neurosyphilis	Meningitis, stroke (meningovascular), uveitis, dementia	CSF VDRL (specific), FTA-ABS	Aqueous penicillin G 18–24 MU/day ×10–14 days (or ceftriaxone 2 g ×10–14 days)
Bacterial meningitis	Acute; pneumococcus, Listeria (low CD4)	Neutrophilic	Ceftriaxone + vancomycin ± ampicillin
Lymphomatous meningitis	Cranial neuropathies	Cytology, flow cytometry	Intrathecal chemotherapy

Vacuolar myelopathy

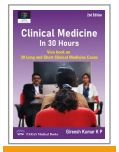
Aspect	Detail
Pathology	Vacuolation of lateral and posterior columns of thoracic cord — resembles subacute combined degeneration
Clinical	CD4 <200; slowly progressive spastic paraparesis, sensory ataxia (posterior columns), bladder dysfunction; no sensory level
Types (from notes)	Vacuolar myelopathy; pure sensory ataxia (posterior columns); paraesthesia/dysaesthesia (dorsal horn)
Diagnosis of exclusion	Normal B12/methylmalonic acid; MRI normal or atrophy; exclude HTLV-1, CMV, HSV, VZV, TB, compression
Treatment	ART; physiotherapy, antispasticity drugs (baclofen, tizanidine — interactions), bladder care

Clinical pearls

Every PLHIV with meningitis needs a CSF VDRL and a serum RPR — neurosyphilis progresses faster in HIV and is curable with penicillin.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · CDC STI Treatment Guidelines — syphilis

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary


BUY NOW ›

Peripheral Neuropathy and Myopathy

Overview. Peripheral neuropathy is the commonest neurological complication of HIV. **Distal sensory polyneuropathy (DSP)** is due to HIV itself or to neurotoxic drugs (stavudine, didanosine, isoniazid, linezolid). Myopathy may be inflammatory (HIV) or drug-induced (zidovudine).

Type	Timing / CD4	Features	Management
Distal sensory polyneuropathy (HIV or toxic)	Late; CD4 <200	Painful burning feet, glove–stocking loss, ↓ ankle jerks	Stop neurotoxic drugs; pyridoxine with INH; analgesics
Inflammatory demyelinating (GBS, CIDP)	Early (seroconversion), CD4 >500	Ascending weakness, areflexia; CSF pleocytosis (unlike classic GBS)	IVIG or plasmapheresis
Mononeuritis multiplex	Early (vasculitis) or late (CMV)	Multiple nerve palsies	Steroids if vasculitic; ganciclovir if CMV
CMV lumbosacral polyradiculopathy	CD4 <50	Rapid flaccid paraparesis, saddle anaesthesia, urinary retention	CSF neutrophils, CMV PCR; ganciclovir ± foscarnet
Autonomic neuropathy	Advanced	Postural hypotension, diarrhoea	Supportive
HIV myopathy (polymyositis-like)	Any	Proximal weakness, ↑ CK	Steroids
Zidovudine myopathy	Long-term AZT	Proximal weakness, myalgia, ragged-red fibres	Stop AZT
Statin/RAL myopathy, pyomyositis	—	Myalgia, ↑ CK; focal tender muscle (S. aureus)	Stop drug; drain abscess

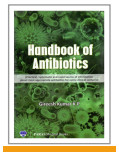
Neuropathic pain (DSP)	Dose	Interaction note
Pregabalin / gabapentin	75–150 mg BD / 300–1,200 mg TDS	Renal adjustment; no ARV interaction
Amitriptyline / nortriptyline	10–75 mg at night	↑ levels with PI/r — low dose
Duloxetine	30–60 mg OD	Modest ↑ with ritonavir
Capsaicin 8% patch	30–60 min application	Evidence in HIV-DSP

Clinical pearls

Ask every patient on INH-containing ATT or TPT about tingling feet — pyridoxine 10–25 mg daily (50–100 mg if symptomatic) prevents most isoniazid neuropathy.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Neurological Diseases in HIV · Summary table on page 56 · ARV drug formulary



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SECTION 6 · 8 TOPICS

Oral, Gastrointestinal & Liver Diseases

Overview and one-page summary table

The mouth is a window to immune status: thrush and hairy leukoplakia often lead to the HIV diagnosis. Chronic diarrhoea and wasting remain common in India, and liver disease — viral hepatitis and drug toxicity — is now a leading cause of non-AIDS death in PLHIV.

#	Topic	Key point for the postgraduate	Page
55	Oral Diseases — Candidiasis, Hairy Leukoplakia, Ulcers	Thrush: fluconazole 100 mg ×7–14 d; OHL (EBV) — no treatment; aphthous ulcers — topical steroid/thalidomide	67
56	Oesophagitis	Odynophagia: candida commonest (empirical fluconazole 200–400 mg ×14–21 d); no response → endoscopy for CMV/HSV/aphthous	68
57	Diarrhoea in HIV — Approach and Bacterial Causes	Acute: Salmonella, Shigella, Campylobacter, C. difficile; chronic + low CD4: parasites, CMV, MAC	69
58	Parasitic Diarrhoea — Cryptosporidium, Microsporidia, Cystoisospora	Modified ZN stain; Cystoisospora — co-trimoxazole; Cryptosporidium — ART + nitazoxanide	70
59	CMV Colitis and HIV Enteropathy	CMV colitis CD4 <50 — ulcers on colonoscopy, inclusion bodies on biopsy; ganciclovir 3–6 weeks	71
60	Liver Disease in HIV	Viral hepatitis, DILI (ATT, CTX, NVP, EFV), granulomatous hepatitis (TB, MAC), AIDS cholangiopathy, MASLD	72
61	HIV–Hepatitis B Co-infection	ART must include TDF (or TAF) + 3TC/FTC; never 3TC alone; never stop tenofovir without HBV cover	73
62	HIV–Hepatitis C Co-infection	DAA cure >95% as in HIV-negative: SOF/VEL 12 weeks or G/P 8 weeks; check ART interactions	74

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Recognise and treat oral candidiasis, OHL and aphthous ulcers
- Approach acute and chronic diarrhoea by CD4
- Treat cryptosporidiosis, cystoisosporiasis and CMV colitis
- Manage HBV and HCV co-infection with ART

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Oral Diseases — Candidiasis, Hairy Leukoplakia, Ulcers

Overview. Oral lesions occur in up to 80% of untreated PLHIV and are WHO stage markers. They indicate falling CD4 and are indications for co-trimoxazole prophylaxis.

Lesion	CD4 / cause	Appearance	Treatment
Pseudomembranous candidiasis (thrush)	<500; *Candida albicans*	White curd-like plaques that scrape off leaving red base	**Fluconazole 100 mg OD** (200 mg day 1) ×7–14 days; or clotrimazole troches 10 mg 5×/day, miconazole buccal 50 mg OD, nystatin
Erythematous (atrophic) candidiasis	<500	Red patches on palate, depapillated tongue	As above
Angular cheilitis	Any	Fissures at angles of mouth	Topical azole
Oral hairy leukoplakia	<300; EBV	White corrugated plaques on lateral tongue — do **not** scrape off	None needed; ART; valacyclovir/podophyllin if cosmetic
Aphthous ulcers (posterior oropharynx)	Low CD4	Large, deep, painful ulcers → odynophagia, weight loss	Topical/intralesional steroids; prednisolone; thalidomide 200 mg OD for major ulcers
HSV stomatitis	Any	Painful vesicles, ulcers on keratinised mucosa	Acyclovir/valacyclovir
Necrotising ulcerative gingivitis /periodontitis	Low CD4	Painful, bleeding gums, bone loss	Debridement, chlorhexidine, metronidazole
Kaposi sarcoma	Any	Purple macule/nodule on palate, gums	ART ± chemotherapy
Oral warts (HPV), salivary gland disease	On ART	Papillomatous lesions; parotid swelling (DILS)	Cryotherapy; ART

Thrush → fluconazole 7–14 days

Refractory → itraconazole solution 200 mg/d or posaconazole; check adherence, azole resistance

Start/optimise ART; CPT

Clinical pearls

Thrush in a young adult without antibiotics, steroids, diabetes or dentures is HIV until proved otherwise. Routine long-term fluconazole prophylaxis for recurrent thrush is not recommended — ART is the answer.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

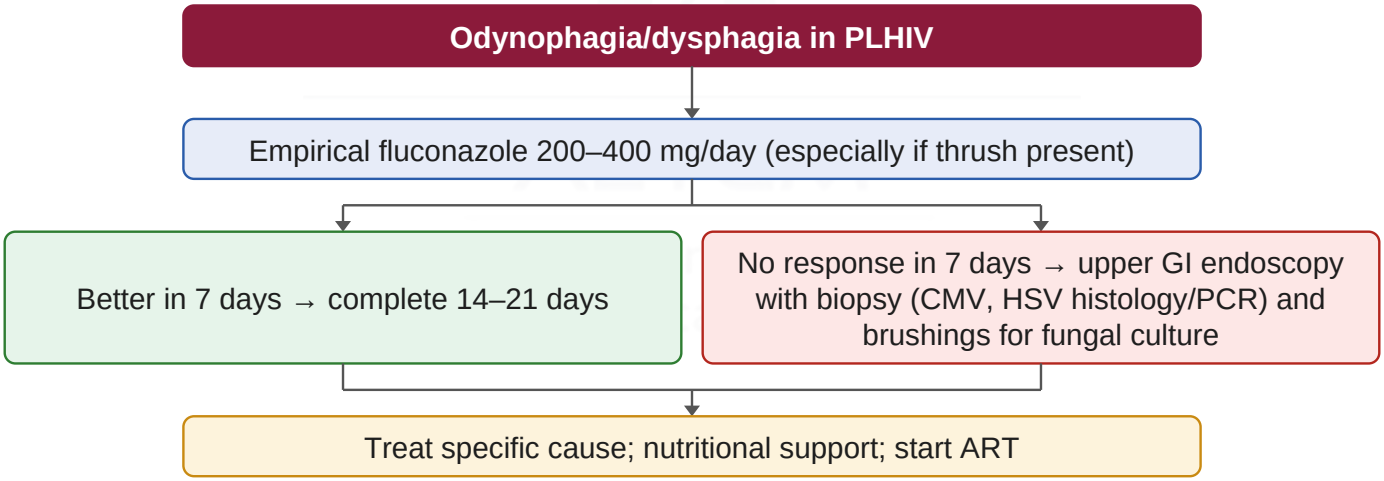


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Oesophagitis

Overview. Dysphagia and odynophagia in a PLHIV with CD4 <100 are most often due to *Candida* oesophagitis (AIDS-defining). CMV, HSV and idiopathic (aphthous) ulcers account for most of the rest.

Cause	Clinical / endoscopic clue	Treatment
***Candida* (50–70%)**	Oral thrush in most; white plaques on endoscopy	**Fluconazole 200–400 mg OD ×14–21 days**; alt: itraconazole solution, voriconazole, echinocandin IV, AmB
CMV	Large shallow distal ulcers; fever; CD4 <50	Ganciclovir 5 mg/kg IV q12h → valganciclovir 900 mg BD; 3–6 weeks
HSV	Multiple small, deep "volcano" ulcers; oral HSV	Acyclovir 5 mg/kg IV q8h → oral 400 mg 5×/day or valacyclovir 1 g TDS ×14–21 days
Aphthous (idiopathic) ulcers	Large deep ulcers; biopsy negative for viruses	Prednisolone 40 mg/day tapered; thalidomide
Pill oesophagitis	Doxycycline, NSAIDs, potassium, zidovudine	Stop drug, PPI
Others	TB, MAC, KS, lymphoma, GERD	Specific



Clinical pearls

Over 75% of patients with odynophagia respond to empirical fluconazole within a week — endoscopy is for non-responders, not the first step.

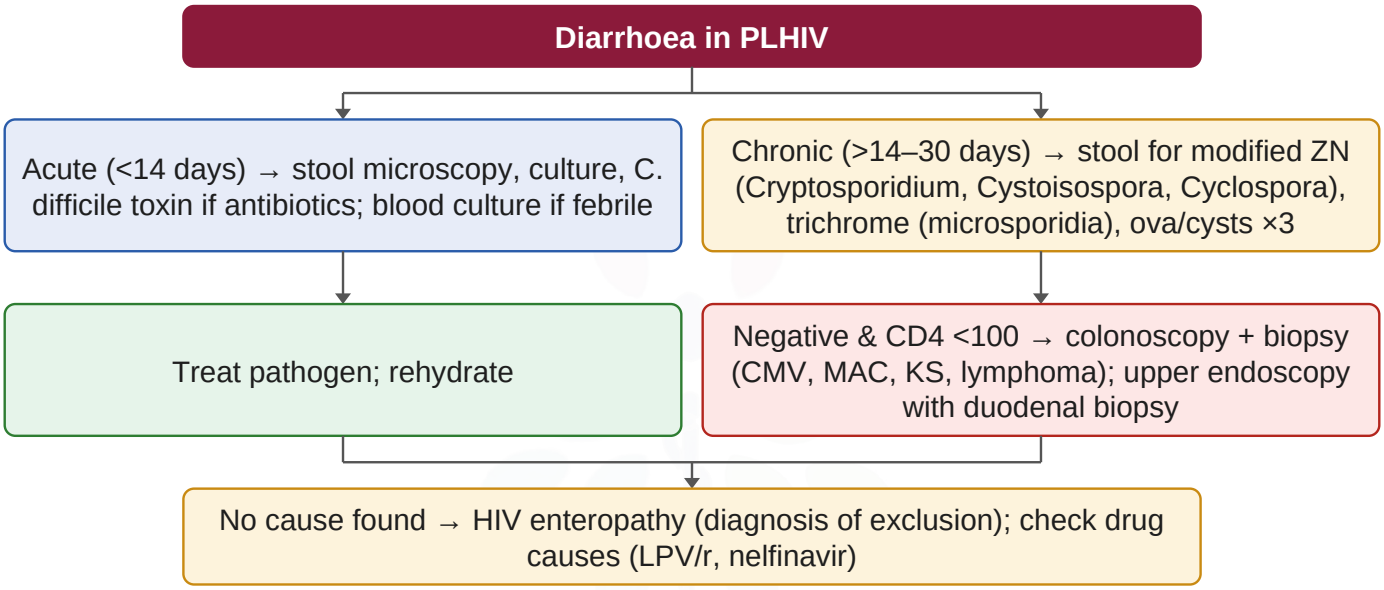
Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

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Diarrhoea in HIV — Approach and Bacterial Causes

Overview. Diarrhoea affects up to 50% of untreated PLHIV in India and is a major cause of wasting. Pathogens depend on CD4: bacteria at any count; opportunistic parasites, CMV and MAC when CD4 is <100. ART-related diarrhoea (LPV/r) is also common.



Bacterial pathogen	Feature in HIV	Treatment
Non-typhoidal *Salmonella*	Bacteraemia (recurrent = AIDS-defining), 20–100× commoner	Ciprofloxacin 500–750 mg BD (or ceftriaxone); 7–14 days (CD4 ≥200), 2–6 weeks if CD4 <200 or bacteraemia
Shigella	Dysentery, bacteraemia	Azithromycin 500 mg OD ×5 days or ceftriaxone (high quinolone resistance in India)
Campylobacter	Bacteraemia, prolonged illness	Azithromycin 500 mg OD ×5 days
C. difficile	Antibiotic exposure, hospitalisation	Oral vancomycin 125 mg QID or fidaxomicin ×10 days
Enteroaggregative *E. coli*, *Vibrio*	Watery diarrhoea	Rehydration; azithromycin if severe

Clinical pearls

Do not give loperamide to a febrile patient with bloody diarrhoea. In chronic diarrhoea with low CD4, ART itself is the most effective treatment for parasitic diarrhoea.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

Emergency Physician's ECG Manual
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Parasitic Diarrhoea — Cryptosporidium, Microsporidia, Cystoisospora

Overview. These coccidian and microsporidian parasites cause profuse watery diarrhoea, malabsorption and wasting when CD4 is <100. Chronic infection (>1 month) is AIDS-defining. Diagnosis needs **special stains** — request them specifically.

Feature	Cryptosporidium	Cystoisospora (Isospora) belli	Microsporidia
Organism	*C. parvum, C. hominis*	*Cystoisospora belli*	*Enterocytozoon bieneusi, Encephalitozoon intestinalis*
Clinical	Profuse watery diarrhoea (up to 10 L/day), cramps; cholangitis, pancreatitis	Watery diarrhoea, eosinophilia (unique), fever	Chronic diarrhoea, cholangiopathy; disseminated (keratoconjunctivitis, sinusitis)
Stool diagnosis	Modified acid-fast (ZN): 4–6 µm red oocysts; antigen EIA/PCR	Modified ZN: large 20–30 µm oval oocysts; UV autofluorescence	Modified trichrome (Weber) stain: 1–3 µm spores; PCR
Specific treatment	Nitazoxanide 500–1,000 mg BD ×14 days (modest benefit)	**Co-trimoxazole DS QID ×10 days** (or BD ×7–10 days); alt: pyrimethamine + leucovorin, ciprofloxacin	Albendazole 400 mg BD (E. intestinalis); fumagillin (E. bieneusi)
Key measure	**ART — immune recovery cures**; rehydration, antimotility	Secondary prophylaxis CTX DS three times weekly	ART
Prevention	Boil/filter water; avoid contact with animal/human faeces	CTX prophylaxis	Hand hygiene

Other parasites	Note
Cyclospora cayetanensis	Modified ZN 8–10 µm; CTX DS BD ×7–10 days
Giardia*, *Entamoeba histolytica	Not more frequent in HIV; usual therapy (tinidazole/metronidazole)
Strongyloides stercoralis	Hyperinfection with steroids (HTLV-1 more than HIV) — ivermectin 200 µg/kg ×2 days before steroids

Clinical pearls

Eosinophilia in a PLHIV with chronic watery diarrhoea suggests Cystoisospora (or Strongyloides) — and Cystoisospora responds dramatically to co-trimoxazole, which is cheap and available everywhere.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

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CMV Colitis and HIV Enteropathy

Overview. CMV colitis occurs with CD4 **below 50** and presents with fever, abdominal pain, diarrhoea (often bloody) and weight loss; complications include haemorrhage and perforation. **HIV (AIDS) enteropathy** is chronic diarrhoea without an identifiable pathogen.

CMV colitis — diagnosis

- Colonoscopy: patchy erythema, subepithelial haemorrhage, shallow or deep ulcers (often right colon)
- Biopsy: "owl's eye" intranuclear inclusions; immunohistochemistry/PCR
- Blood CMV PCR supportive but not diagnostic
- Dilated fundus examination — concurrent retinitis

HIV enteropathy

- Chronic diarrhoea >1 month, malabsorption, weight loss
- Villous atrophy, crypt hyperplasia on duodenal biopsy
- Direct HIV effect on enterocytes, GALT inflammation
- Diagnosis only after a full work-up
- Responds to ART; crofelemer for ART-associated diarrhoea

Drug (CMV GI disease)	Dose	Duration	Toxicity
Ganciclovir IV	5 mg/kg q12h	21–42 days, or until symptoms resolve; switch to oral when tolerating	Neutropenia, thrombocytopenia, renal — dose by CrCl
Valganciclovir PO	900 mg BD	For milder disease / step-down	Same as ganciclovir
Foscarnet IV	90 mg/kg q12h (or 60 mg/kg q8h)	Ganciclovir resistance or neutropenia	Nephrotoxicity, ↓ Ca/Mg/K/PO4, genital ulcers, seizures
Maintenance	Usually not needed for GI disease	Unless relapse or retinitis	—

Chronic diarrhoea, CD4 <50 → Colonoscopy + biopsy (CMV, MAC, KS, lymphoma) → CMV → ganciclovir; none → enteropathy → ART, nutrition

Clinical pearls

Start ART within 2 weeks of CMV treatment. Abdominal pain with peritonism in a patient with CMV colitis is perforation until proved otherwise — get an erect X-ray/CT and surgical opinion.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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Liver Disease in HIV

Overview. Liver disease is now a leading non-AIDS cause of death in PLHIV. Causes include viral hepatitis (HBV, HCV), drug-induced liver injury, opportunistic infiltration, biliary disease and fatty liver.

Category (from notes)	Causes	Clues and tests
Hepatitis viruses	HBV, HCV, HAV, HEV, HDV	Serology, HBV DNA, HCV RNA; HBV flare when TDF/3TC stopped or with IRIS
Granulomatous hepatitis	TB, MAC, histoplasma, talaromyces, CMV, drugs (sulfonamides)	Fever, ↑ ALP out of proportion; liver biopsy — granulomas, AFB, culture
Biliary tract — cholangitis (AIDS cholangiopathy)	Cryptosporidium, microsporidia, CMV; CD4 <100	RUQ pain, ↑ ALP; papillary stenosis, sclerosing cholangitis on MRCP/ERCP — sphincterotomy, ursodeoxycholic acid, ART
Acalculous cholecystitis	CMV, cryptosporidium	USG thickened gallbladder
Drug-induced liver injury	ATT (H, R, Z), CTX, fluconazole, NVP, EFV, MVC, DRV; NRTIs (steatosis)	Temporal relation; grade by ALT
Neoplasms	Lymphoma, KS, HCC (HBV/HCV)	Imaging, AFP
Metabolic	MASLD (fatty liver) — weight gain, PIs, old NRTIs	USG, FibroScan
Non-cirrhotic portal hypertension	Didanosine (past)	Varices with preserved liver function

DILI grade (ALT)	Action
Grade 1–2 (<5× ULN), asymptomatic	Continue; repeat LFT in 1–2 weeks
Grade 3 (5–10× ULN) or any jaundice/symptoms	Stop suspected hepatotoxins (ATT, CTX, NVP); manage as DILI
Recovery	Reintroduce ATT stepwise (R → H → ± Z); safer ART (DTG)

Clinical pearls

Before blaming ART for jaundice, check HBsAg and whether TDF/3TC was recently stopped — a hepatitis B flare can be fatal and is prevented by keeping tenofovir in the regimen.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · DHHS Adult & Adolescent ARV Guidelines

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

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HIV–Hepatitis B Co-infection

Overview. About 5–10% of PLHIV in India are HBsAg positive. HIV accelerates HBV-related fibrosis and HCC. Treat **both viruses with one regimen**: TLD (TDF + 3TC) is ideal.

Baseline evaluation

- HBsAg, anti-HBc, anti-HBs at HIV diagnosis
- If HBsAg+: HBeAg, HBV DNA, ALT, platelet count, APRI/FIB-4, FibroScan
- Anti-HDV (delta) in North-East/PWID
- USG ± AFP every 6 months if cirrhosis

Prevention

- Vaccinate all non-immune PLHIV (anti-HBs <10 mIU/mL)
- Double-dose (40 µg) at 0, 1, 2, 6 months or Heplisav-B
- Check anti-HBs 1–2 months after; revaccinate non-responders
- Isolated anti-HBc: check HBV DNA; vaccinate

Situation	Recommended approach
HIV + HBV, CrCl ≥50	**TLD** (TDF + 3TC + DTG) or BIC/TAF/FTC — lifelong
CrCl 30–49 / osteoporosis	TAF + FTC/3TC based regimen (DHHS); NACO — refer
CrCl <30, tenofovir contraindicated	Fully suppressive ART + **entecavir** (adjusted dose) — never entecavir alone without ART (selects M184V)
Switching ART	Keep TDF/TAF in the new regimen; DTG/3TC, CAB/RPV and other 2-drug regimens are **not** suitable
Stopping TDF/3TC	Risk of severe HBV flare — avoid; if unavoidable monitor ALT, HBV DNA
HDV co-infection	Bulevirtide (where available), peg-IFN
HBV-IRIS	ALT flare 4–8 weeks after ART — continue ART, distinguish from DILI

HBsAg positive at HIV diagnosis

Start TLD regardless of HBV DNA/ALT

ALT, HBV DNA at 3–6 months; HCC surveillance if cirrhosis

Clinical pearls

Lamivudine alone (or as the only HBV-active drug) produces HBV YMDD resistance in ~90% of co-infected people by 4 years — tenofovir must always be part of the regimen.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines · National Viral Hepatitis Control Programme

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

Handbook of Antibiotics
BUY NOW ›

HIV–Hepatitis C Co-infection

Overview. HCV co-infection is concentrated among people who inject drugs (North-East, Punjab) and MSM. The older notes used **pegylated interferon + ribavirin**; today **direct-acting antivirals (DAAs)** cure over 95% of co-infected people with the same regimens as HIV-negative patients.

Evaluation

- Anti-HCV at baseline and yearly in PWID/MSM
- HCV RNA (confirms viraemia), genotype if needed
- Fibrosis: APRI, FIB-4, FibroScan
- HBsAg (HBV reactivation risk with DAAs)

NVHCP (India)

- Free DAAs through model treatment centres
- SOF + daclatasvir 12 weeks (non-cirrhotic)
- SOF/VEL 12 weeks — pan-genotypic
- 24 weeks / + ribavirin for decompensated cirrhosis

DAA regimen	Duration	Interactions with ART
Sofosbuvir/velpatasvir (SOF/VEL)	12 weeks	Avoid **EFV**, ETR, NVP (↓ VEL); TDF + boosted PI → monitor creatinine
Glecaprevir/pibrentasvir (G/P)	8 weeks	Contraindicated with ATV; avoid EFV, other PI/r, cobicistat
Sofosbuvir + daclatasvir	12 weeks	Daclatasvir 30 mg with PI/r (↑), 90 mg with EFV (↓)
Ledipasvir/sofosbuvir	12 weeks	↑ TDF levels — monitor renal
Pegylated IFN + ribavirin (historical)	48 weeks	Low cure (~30–40%); ribavirin + AZT anaemia, + ddI lactic acidosis
Compatible ART	DTG, BIC, RAL, RPV, DOR, TDF /TAF/3TC/ FTC	TLD is compatible with all major DAAs

- Rifampicin and carbamazepine are contraindicated with all DAAs.
- SVR12 (undetectable HCV RNA 12 weeks after treatment) = cure; reinfection possible — continue harm reduction.
- Amiodarone + sofosbuvir: severe bradycardia — avoid.

Clinical pearls

Treat HIV first (start ART), then treat HCV with a DAA chosen to avoid interactions — on TLD almost every DAA can be used without dose change.

Further reading — tap to open (free) ► AASLD–IDSA HCV Guidance · National Viral Hepatitis Control Programme

Section: Oral, Gastrointestinal & Liver Diseases · Summary table on page 66 · ARV drug formulary

BUY NOW ›

SECTION 7 · 9 TOPICS

Eye, Skin, Blood & Other Systems

Overview and one-page summary table

HIV affects every organ. This section follows the original notes through ophthalmic, cutaneous, haematological, cardiovascular, renal, metabolic and immune-mediated problems, and generalised wasting — the conditions that now dominate long-term care of PLHIV on ART.

#	Topic	Key point for the postgraduate	Page
63	Cytomegalovirus (CMV) Retinitis	CD4 <50; painless floaters, field loss; "pizza-pie" retinitis; valganciclovir 900 mg BD ×21 d ± intravitreal	76
64	Other Eye Problems	HIV retinopathy (cotton-wool spots), HZO, ARN, PORN (VZV, CD4 <50), toxo, syphilis, cryptococcal papilloedema	77
65	Herpes Zoster and Herpes Simplex	Zoster: acyclovir 800 mg 5×/d or valacyclovir 1 g TDS ×7–10 d; disseminated → IV acyclovir; HSV: valacyclovir	78
66	Other Skin Problems in HIV	Seborrhoeic dermatitis, PPE, eosinophilic folliculitis, molluscum, scabies, drug rash, bacillary angiomatosis	79
67	Haematological Problems	Anaemia (AZT, MAC, parvovirus B19), neutropenia (drugs), ITP, lymphoma; G-CSF; B12/folate	80
68	Cardiovascular Disease in HIV	MI risk 1.5–2×; REPRIEVE: pitavastatin for PLHIV 40–75 y; cardiomyopathy, pericardial TB, PAH	81
69	Kidney and Genitourinary Disease	HIVAN (collapsing FSGS), HIVICK, TDF tubulopathy, ATV stones; DTG/BIC/COBI raise creatinine without GFR fall	82
70	Metabolic and Endocrine Problems	Weight gain (INSTI/TAF), lipodystrophy, dyslipidaemia, diabetes, bone loss, adrenal and gonadal disorders	83
71	Immune-mediated Problems and Generalised Wasting	DILS, autoimmunity, drug hypersensitivity; HIV wasting = >10% weight loss + diarrhoea/fever >30 days	84

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Diagnose and treat CMV retinitis and other eye diseases
- Treat zoster, HSV and common HIV dermatoses
- Manage cytopenias, kidney disease and metabolic complications
- Assess cardiovascular risk and use statins appropriately



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Cytomegalovirus (CMV) Retinitis

Overview. CMV retinitis was once the commonest cause of blindness in AIDS and remains frequent in India among people presenting with CD4 **below 50**. It is a full-thickness necrotising retinitis that spreads along vessels and can cause retinal detachment.

Clinical features

- Painless floaters, flashes, blurred vision, scotomas
- Often asymptomatic (peripheral lesions) — screen CD4 <50
- Fundus: white granular retinitis with haemorrhages ("pizza-pie", "cottage cheese and ketchup")
- Minimal vitritis; brushfire border
- Bilateral in up to one-third

Investigations

- **Dilated indirect ophthalmoscopy** — clinical diagnosis
- Fundus photography for follow-up
- Aqueous/vitreous CMV PCR if atypical
- Blood CMV PCR — not diagnostic
- Look for CMV elsewhere (colitis, oesophagitis)

Fundus images — CMV retinitis (EyeRounds, University of Iowa)

Atlas entry with colour fundus photographs: broad retinal whitening with intraretinal haemorrhages along the arcades, cotton-wool spots of HIV retinopathy, and later glial scarring after treatment. Scan or tap to view.

► Tap to open the image gallery (webeye.ophth.uiowa.edu)

Lesion	Treatment
Immediately sight-threatening (within 1,500 µm of fovea or adjacent to optic disc)	**Intravitreal ganciclovir 2 mg** (or foscarnet 2.4 mg) 1–4 doses over 7–10 days **+ oral valganciclovir 900 mg BD ×14–21 days**, then 900 mg OD
Peripheral lesion	Valganciclovir 900 mg BD ×14–21 days, then 900 mg OD maintenance
Alternatives	Ganciclovir 5 mg/kg IV q12h; foscarnet 90 mg/kg IV q12h; cidofovir 5 mg/kg weekly ×2 (with probenecid)
Stop maintenance	CD4 >100 for 3–6 months on ART and lesions inactive; ophthalmic review every 3 months
ART	Within 2 weeks — watch for immune recovery uveitis (IRU)

Clinical pearls

Every PLHIV with CD4 <50 should have a dilated fundus examination, even without symptoms — early peripheral retinitis is easy to treat; macular disease is not reversible.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · EyeRounds — CMV retinitis atlas

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

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Other Eye Problems

Overview. Up to 70% of untreated PLHIV develop eye disease. Apart from CMV retinitis, important conditions include HIV microvasculopathy, varicella-zoster eye disease, syphilitic and toxoplasma uveitis, and neuro-ophthalmic signs of cryptococcal meningitis.

Condition	Features	Treatment
HIV retinopathy (microvasculopathy)	Cotton-wool spots, microaneurysms, haemorrhages; asymptomatic	None; ART — distinguish from early CMV
Herpes zoster ophthalmicus	V1 dermatome rash, Hutchinson sign (nasal tip), keratitis, uveitis	Acyclovir 800 mg 5×/day or valacyclovir 1 g TDS ×7–10 days; IV acyclovir 10 mg/kg TDS ×7 days if severe; ophthalmology
Acute retinal necrosis (ARN)	VZV/HSV; CD4 often higher; marked vitritis, peripheral necrosis, rapid	**Acyclovir IV 10 mg/kg TDS ×10–14 days** → valacyclovir 1 g TDS; + intravitreal ganciclovir/foscarnet
Progressive outer retinal necrosis (PORN)	VZV, CD4 <50; no vitritis, posterior pole, very rapid, bilateral	IV ganciclovir + foscarnet ± intravitreal; poor prognosis
Ocular toxoplasmosis	Retinochoroiditis with vitritis ("headlight in fog")	As cerebral toxo; check CNS
Ocular syphilis	Uveitis, retinitis, optic neuritis	Treat as neurosyphilis — IV penicillin
Cryptococcal	Papilloedema, CN VI palsy, optic neuropathy, choroiditis	Therapeutic LPs, antifungals
Immune recovery uveitis	Vitritis, CME after ART in prior CMV retinitis	Periocular/intravitreal steroids
Adnexal	Molluscum on lids, KS of conjunctiva, conjunctival squamous carcinoma	Local therapy, ART

Clinical pearls

Zoster in the ophthalmic division with a vesicle on the nasal tip (Hutchinson sign) means nasociliary nerve involvement — urgent ophthalmology review and antivirals within 72 hours.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

Emergency Physician's ECG Manual
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Herpes Zoster and Herpes Simplex

Overview. **Herpes zoster** occurs at any CD4 count (often the first sign of HIV) and is 15–25 times more frequent; it may be multidermatomal, recurrent or disseminated. **HSV** causes recurrent orolabial and genital ulcers; chronic ulcers >1 month are AIDS-defining.

Condition	Treatment (DHHS / notes)	Duration
Localised dermatomal zoster	**Valacyclovir 1 g TDS**, famciclovir 500 mg TDS, or acyclovir 800 mg 5×/day	7–10 days (longer if slow to heal)
Disseminated, visceral, ophthalmic, facial severe	**Acyclovir IV 10 mg/kg q8h** (adjust renal), then oral	10–14 days
Orolabial HSV	Valacyclovir 1 g BD, famciclovir 500 mg BD or acyclovir 400 mg TDS	5–10 days
Genital HSV (initial/recurrent)	As above	5–14 days
Severe mucocutaneous HSV	Acyclovir IV 5 mg/kg q8h → oral	Until healed
Chronic suppression (frequent recurrences)	Valacyclovir 500 mg BD or acyclovir 400 mg BD	Ongoing; reassess on ART
Acyclovir-resistant HSV	Foscarnet 80–120 mg/kg/day IV in 2–3 doses; topical cidofovir/imiquimod	Until healed

Zoster complication	Note
Post-herpetic neuralgia	Pregabalin, gabapentin, amitriptyline, lidocaine patch
Varicella pneumonia, hepatitis, encephalitis	IV acyclovir
VZV vasculopathy (stroke)	IV acyclovir + steroids
Prevention	Recombinant zoster vaccine (RZV, 2 doses) for PLHIV ≥18 years — inactivated, safe at any CD4

Clinical pearls

Shingles in a young adult is an indication for an HIV test. Isolate patients with disseminated zoster (airborne and contact precautions) from immunocompromised and pregnant contacts.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

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Other Skin Problems in HIV

Overview. Skin disease affects over 90% of PLHIV at some stage and is frequently the reason for presentation. Many conditions improve dramatically with ART but may flare as IRIS in the first months.

Condition	Clue	Treatment
Seborrhoeic dermatitis	Greasy scaly erythema of face, scalp, chest; severe and early	Ketoconazole 2% cream/shampoo, mild topical steroid
Pruritic papular eruption (PPE)	Itchy papules on extremities — insect-bite hypersensitivity; WHO stage 2	Antihistamines, topical steroids, ART
Eosinophilic folliculitis	Itchy urticarial follicular papules on face, upper trunk; CD4 <250; often IRIS	Topical steroids, phototherapy, itraconazole, isotretinoin
Molluscum contagiosum	Umbilicated papules on face, giant lesions; low CD4	Cryotherapy, curettage, ART (exclude talaromyces/cryptococcus)
Crusted (Norwegian) scabies	Hyperkeratotic crusts, minimal itch, highly contagious	Oral ivermectin 200 µg/kg (days 1, 2, 8 ± more) + permethrin 5%
Dermatophytosis, onychomycosis	Extensive tinea, proximal white subungual onychomycosis	Topical/oral terbinafine or itraconazole (interactions)
Psoriasis, reactive arthritis	Severe, sudden-onset, erythrodermic	ART, acitretin, phototherapy; avoid methotrexate if CD4 low
Bacillary angiomatosis	*Bartonella*: red vascular papules — mimic KS	Doxycycline or erythromycin ≥3 months
Secondary syphilis	Palmar–plantar rash, malignant (ulceronodular) syphilis	Benzathine penicillin 2.4 MU IM
Drug eruptions	CTX, NVP, EFV, ABC, DRV — up to 100× commoner	Stop culprit; SJS/TEN → burns unit care
Pigmentation, nail changes	AZT (blue nails), FTC (palms), clofazimine	Reassure

Clinical pearls

Itchy papules in a PLHIV are a diagnostic exercise: PPE (extremities), eosinophilic folliculitis (face and upper trunk), scabies (webs, genitals), drug eruption (timing). A skin biopsy settles most doubtful cases.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines

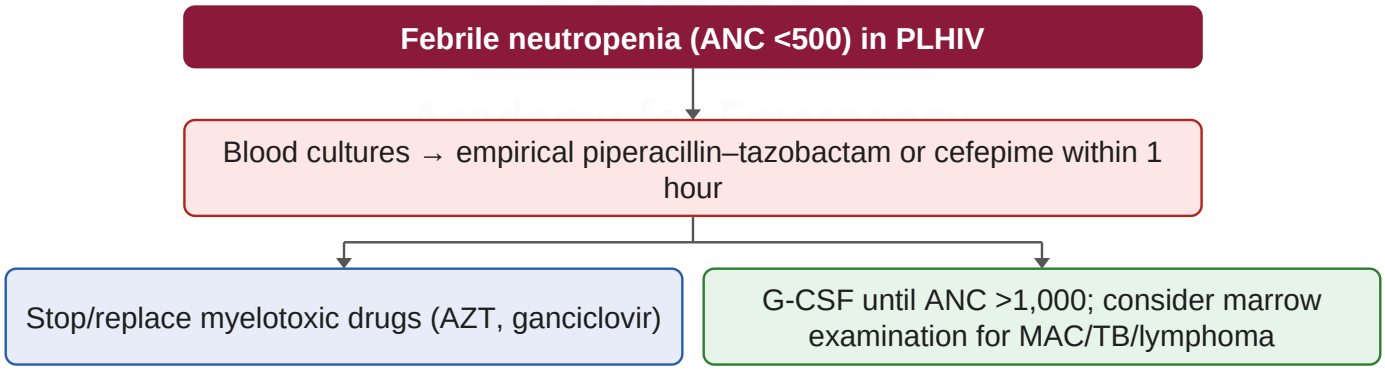
Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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Haematological Problems

Overview. Cytopenias are common and multifactorial — HIV itself, opportunistic infiltration of marrow, nutritional deficiency and myelotoxic drugs. The notes cover persistent generalised lymphadenopathy, marrow suppression, neutropenia and supplementation.

Problem	Causes in PLHIV	Management
Anaemia (commonest)	Anaemia of chronic disease, AZT (macrocytic), marrow infiltration (MAC, TB, histoplasma, lymphoma), parvovirus B19 (pure red-cell aplasia), GI blood loss (KS, CMV), haemolysis (dapsone, primaquine — G6PD), B12/folate/iron deficiency	Treat cause; switch AZT if Hb <8; IVIG for parvovirus B19; B12 and folic acid supplementation; transfuse if symptomatic
Neutropenia	Drugs: AZT, ganciclovir, valganciclovir, CTX, pyrimethamine, chemotherapy; HIV; marrow infiltration	Review drugs; G-CSF (filgrastim 5 µg/kg/day SC) if ANC <500 with infection; GM-CSF — molgramostim, sargramostim (from notes)
Thrombocytopenia	HIV-associated ITP (any CD4), TTP (fatal; ADAMTS13 ↓), drugs, marrow, hypersplenism	ART (first-line for HIV-ITP), steroids, IVIG, anti-D; TTP — plasma exchange, caplacizumab
Lymphopenia	CD4 depletion	ART
Thrombosis	2–10× ↑ VTE; protein S deficiency, antiphospholipid antibodies	Anticoagulate — check DOAC interactions with PI/r
Lymphadenopathy	PGL, TB, lymphoma, KS, Castleman	See PGL page; biopsy suspicious nodes



Clinical pearls

Multicentric Castleman disease (HHV-8) — fever, nodes, splenomegaly, cytopenias, high CRP — mimics TB and lymphoma; rituximab-based therapy is effective.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · DHHS Adult & Adolescent ARV Guidelines

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Cardiovascular Disease in HIV

Overview. PLHIV have 1.5–2 times the risk of myocardial infarction and stroke because of chronic inflammation, traditional risk factors (smoking is very common), and some ARVs. In India, pericardial effusion is still most often tuberculous.

Condition	Key features	Management
Atherosclerotic CVD	MI, stroke at younger age; ABC, LPV/r, older PIs implicated	Risk-factor control; switch ABC/LPV/r if high risk
Statin for primary prevention	**REPRIEVE trial**: pitavastatin 4 mg reduced MACE by 35% in PLHIV with low–moderate risk	DHHS: statin for PLHIV aged 40–75 even with low 10-year risk (pitavastatin, atorvastatin, rosuvastatin)
HIV cardiomyopathy	Dilated cardiomyopathy, CD4 <100 (WHO stage 4); myocarditis (HIV, toxo, CMV)	Standard HF therapy + ART
Pericardial effusion	TB commonest in India; also bacterial, lymphoma, KS	Pericardiocentesis, ATT; steroids not routinely
Pulmonary arterial hypertension	0.5% of PLHIV; dyspnoea, RV failure	Echo; bosentan/sildenafil (interactions with PI/r)
Endocarditis	PWID — S. aureus, tricuspid	IV antibiotics
Arrhythmia, QT	PI/r (PR), EFV, RPV, methadone, Bdq, fluoroquinolones	ECG; avoid combinations
Hypertension, diabetes, dyslipidaemia	More prevalent on ART	Usual targets; check drug interactions (amlodipine ↑ with PI/r)

Statin with ART	Advice
Simvastatin, lovastatin	Contraindicated with PI/r and cobicistat
Atorvastatin	Max 20 mg with PI/r
Rosuvastatin	Max 10–20 mg with ATV/r, LPV/r
Pitavastatin, pravastatin	Minimal interaction — preferred
With DTG, BIC, RAL, DOR, RPV	No significant interaction

Clinical pearls

Smoking cessation does more for the life expectancy of a suppressed PLHIV than any change in ART — PLHIV who smoke lose more life-years to smoking than to HIV.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

Handbook of Antibiotics
BUY NOW ›

Kidney and Genitourinary Disease

Overview. Kidney disease in PLHIV ranges from HIV-associated nephropathy to drug nephrotoxicity, immune-complex glomerulonephritis and the usual diabetic and hypertensive CKD. Check urine protein and eGFR at baseline and yearly.

Condition	Features	Management
HIV-associated nephropathy (HIVAN)	Collapsing FSGS; heavy proteinuria, large echogenic kidneys, rapid progression; APOL1 risk alleles (African ancestry); low CD4	ART (definitive), ACE inhibitor/ARB; dialysis, transplant
HIV immune-complex kidney disease (HIVICK)	IgA nephropathy, MPGN (often HCV/HBV), lupus-like	ART; treat hepatitis
Tenofovir DF nephrotoxicity	Proximal tubulopathy (Fanconi: glycosuria with normal glucose, phosphaturia, hypokalaemia), AKI, nephrogenic DI	Switch to TAF or ABC; correct phosphate
Atazanavir	Nephrolithiasis, crystalline nephropathy, CKD	Hydration; switch
Other drug nephrotoxicity	Amphotericin, foscarnet, cidofovir, CTX (↑ K), pentamidine, aminoglycosides, NSAIDs	Monitor, hydrate, dose-adjust
Pseudo-rise in creatinine	DTG, BIC, cobicistat, RPV, TMP inhibit tubular creatinine secretion — rise ~0.1–0.15 mg/dL	No action; use cystatin C if unsure
Genitourinary	STIs (syphilis, gonorrhoea, chancroid), genital ulcers, HPV warts, prostatitis, UTI	Treat; partner management

ARV	Dose adjustment in renal impairment (CrCl, mL/min)
TDF	30–49: 300 mg q48h (avoid if possible); <30: avoid (q72–96h / weekly after dialysis only if no option)
3TC	30–49: 150 mg OD; 15–29: 150 mg then 100 mg OD; <15: 50 mg then 25 mg OD
AZT	<15 or dialysis: 100 mg TDS or 300 mg OD
FTC	30–49: 200 mg q48h; 15–29: q72h
DTG, ABC, EFV, PIs, RAL	No adjustment
Fixed-dose TLD	Do not use if CrCl <50 — give components separately

Clinical pearls

Glycosuria with a normal blood glucose in a patient on tenofovir is Fanconi syndrome until proved otherwise — check serum phosphate and urine protein.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

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Metabolic and Endocrine Problems

Overview. As PLHIV live longer, metabolic disease becomes central to care. Some complications are drug-related (older NRTIs, PIs, EFV, INSTIs) and others reflect HIV, ageing and lifestyle.

Problem	Causes / features	Management
Weight gain / obesity	INSTIs (DTG, BIC) + TAF; women, low baseline CD4; "return to health" plus excess	Diet, exercise; GLP-1 agonists; switching rarely reverses
Lipoatrophy	d4T, AZT — facial, limb, buttock fat loss	Switch; fillers
Lipohypertrophy	Visceral fat, buffalo hump, breast enlargement — older PIs	Lifestyle; tesamorelin (where available)
Dyslipidaemia	LPV/r, RTV, EFV (↑ TG, LDL); TDF lowers lipids	Statin (see interactions); fibrate for TG >500
Diabetes / insulin resistance	PIs, older NRTIs, weight gain, HCV, pentamidine (dysglycaemia)	Metformin (≤1 g with DTG), SGLT2i, GLP-1
Bone loss, osteoporosis, osteonecrosis	TDF, HIV, low BMI, vitamin D deficiency, steroids; avascular necrosis of hip	DXA in ≥50 years/risk; Ca, vit D; bisphosphonate; switch TDF
Adrenal insufficiency	CMV adrenalitis, TB, histoplasma, ketoconazole, rifampicin, megestrol	Short Synacthen test; hydrocortisone
Iatrogenic Cushing	Ritonavir/cobicistat + inhaled/nasal fluticasone, triamcinolone	Switch steroid to beclomethasone
Thyroid	Graves disease as IRIS (months after ART); sick euthyroid	Standard therapy
Hypogonadism	Low testosterone, ED, amenorrhoea	Testosterone if indicated
Hyponatraemia	SIADH (pneumonia, CNS), adrenal, TMP (hyperkalaemia)	Treat cause

Clinical pearls

Screen every PLHIV yearly for weight, BP, glucose/HbA1c and lipids — the ART clinic is often the only place a young adult in India is seen regularly.

Further reading — tap to open (free) ► DHHS Adult & Adolescent ARV Guidelines

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary



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Immune-mediated Problems and Generalised Wasting

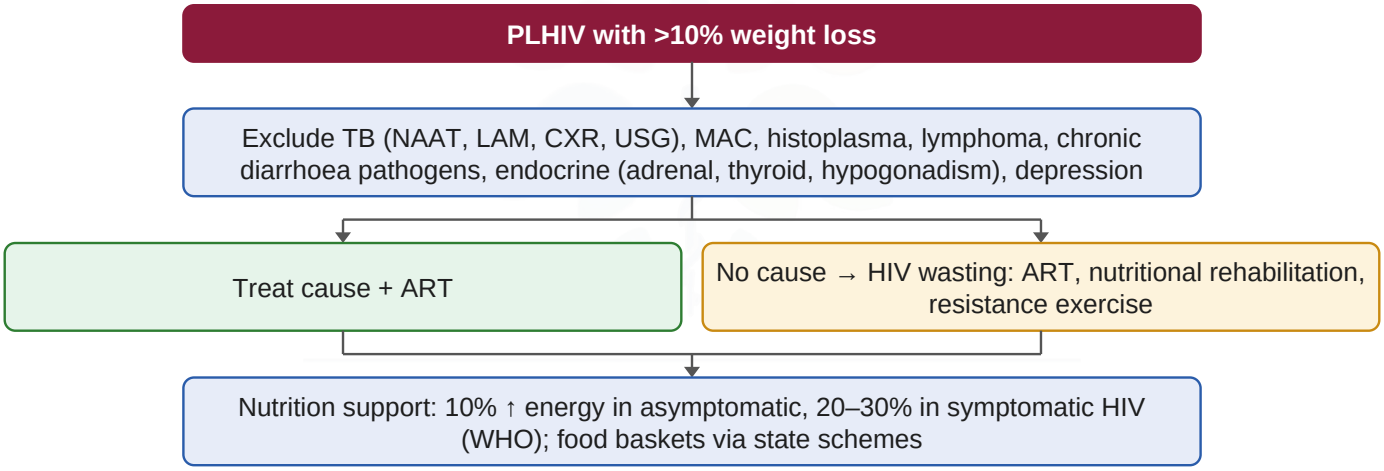
Overview. Immune dysregulation in HIV paradoxically increases autoimmune and hypersensitivity disorders. **HIV wasting syndrome** — an AIDS-defining condition — remains common in late presenters in India.

Immune-mediated problems

- Drug hypersensitivity (sulfonamides 50–60%!, NVP, ABC)
- DILS — parotid swelling, sicca, CD8 lymphocytosis (Sjögren-like)
- Reactive arthritis, psoriatic arthritis
- Vasculitis (PAN-like), polymyositis
- ITP, autoimmune haemolysis, antiphospholipid antibodies
- Sarcoidosis, Graves (IRIS)

HIV wasting syndrome (CDC)

- Involuntary weight loss >10% of baseline
- Plus chronic diarrhoea (≥2 loose stools/day >30 days) or chronic weakness with fever >30 days
- No other cause (TB, MAC, malignancy, depression, food insecurity)



Intervention for wasting	Detail
ART	Most effective measure — weight regained within months
Diet	Energy and protein-dense diet; small frequent meals; treat oral/oesophageal lesions
Appetite stimulants	Megestrol acetate (adrenal suppression), dronabinol
Anabolic agents	Testosterone (if hypogonadal), oxandrolone; resistance training
Micronutrients	Multivitamins, B12/folate, iron if deficient

Clinical pearls

Co-trimoxazole allergy in HIV is ten times commoner than in the general population — and graded challenge or desensitisation succeeds in most, preserving this life-saving prophylaxis.

Further reading — tap to open (free) ► DHHS Adult & Adolescent OI Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

Section: Eye, Skin, Blood & Other Systems · Summary table on page 75 · ARV drug formulary

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SECTION 8 · 3 TOPICS

Neoplastic Diseases in HIV

Overview and one-page summary table

Three cancers are AIDS-defining — Kaposi sarcoma, aggressive B-cell non-Hodgkin lymphoma and invasive cervical cancer — and all are driven by oncogenic viruses (HHV-8, EBV, HPV). With ART, non-AIDS-defining cancers (anal, Hodgkin, lung, liver) now cause more deaths.

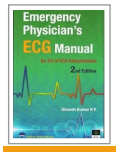
#	Topic	Key point for the postgraduate	Page
72	Kaposi Sarcoma (KS)	HHV-8 vascular tumour; purple plaques skin/mouth/GI/lung; ACTG TIS staging; ART ± liposomal doxorubicin/paclitaxel	86
73	Lymphomas and HIV	DLBCL, Burkitt, PCNSL, PEL, plasmablastic, Hodgkin; R-CHOP / DA-EPOCH-R + ART; outcomes now near HIV-negative	87
74	Cervical, Anal and Other Non-AIDS Cancers	Women with HIV: HPV-based screening from 25 y every 3–5 y (WHO); VIA in India; HPV vaccine; anal cancer screening (MSM)	88

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Recognise and stage Kaposi sarcoma
- List HIV-associated lymphomas and their treatment principles
- Screen women with HIV for cervical cancer

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Kaposi Sarcoma (KS)

Overview. Kaposi sarcoma is a multifocal vascular tumour of lymphatic endothelial origin caused by **human herpesvirus 8 (KSHV)**. It is rare in India compared with Africa but must be recognised. KS can occur at **any CD4 count**, even with well-controlled HIV.

Clinical features

- Violaceous macules, plaques, nodules — legs, face, nose tip, genitals
- Oral palate/gum lesions (predict visceral disease)
- Lymphoedema (legs, face)
- GI KS: bleeding, obstruction
- Pulmonary KS: dyspnoea, haemoptysis, bloody effusion

Diagnosis

- Biopsy: spindle cells, slit-like vascular spaces, extravasated RBCs
- **LANA-1 (HHV-8) immunostaining**
- Differential: bacillary angiomatosis, pyogenic granuloma, haemangioma
- CXR/CT, endoscopy if symptoms; bronchoscopy for lung KS

Clinical images and review — Kaposi sarcoma with high CD4 count (Frontiers in Medicine, 2025)

Case report and literature review of widespread KS (skin, tongue, palate, nodes, lungs) in a young adult with CD4 627 cells/µL — the authors conclude that KS can occur at any CD4 count. Scan or tap to open the article and photographs.

► Tap to open the image gallery (www.frontiersin.org)

ACTG TIS staging	Good risk (0) — all of	Poor risk (1) — any of
T — Tumour	Skin and/or nodes and/or minimal oral disease	Oedema/ulceration, extensive oral, GI or other visceral KS
I — Immune	CD4 ≥150 (≥200 in ART era)	CD4 <150
S — Systemic illness	No OI, thrush or B symptoms; KPS ≥70	OI, thrush, B symptoms, KPS <70, other HIV illness

Extent	Treatment
Limited cutaneous (T0)	**ART alone** — regression in many; local: radiotherapy, intralesional vinblastine, cryotherapy, alitretinoin gel
Advanced (T1), visceral, rapidly progressive, KS-IRIS	ART + **liposomal doxorubicin 20 mg/m² every 3 weeks** (first-line) or **paclitaxel** 100 mg/m² every 2 weeks; pomalidomide; India: paclitaxel/vincristine–bleomycin where liposomal agents unavailable
Avoid	**Corticosteroids** (worsen KS — fatal flares)

Clinical pearls

KS can flare as IRIS weeks after ART — continue ART and add chemotherapy; do not give steroids, and look for associated HHV-8 diseases (Castleman, primary effusion lymphoma, KICS).

Further reading — tap to open (free) ► Frontiers in Medicine — KS case and review · DHHS Adult & Adolescent OI Guidelines

Section: Neoplastic Diseases in HIV · Summary table on page 85 · ARV drug formulary

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Lymphomas and HIV

Overview. PLHIV have a 10–20-fold higher risk of non-Hodgkin lymphoma, mostly aggressive B-cell tumours, many EBV- or HHV-8-driven. With ART and modern chemotherapy, cure rates approach those of HIV-negative patients.

Lymphoma	CD4	Virus	Features
Diffuse large B-cell (DLBCL)	Usually <200	EBV (some)	Commonest; extranodal (GI, bone marrow, CNS)
Burkitt lymphoma	Often >200	EBV (30–50%)	Rapidly growing, tumour lysis, CNS spread
Primary CNS lymphoma	<50	EBV (~100%)	See neurology section
Primary effusion lymphoma	<200	HHV-8 + EBV	Lymphomatous effusions (pleura, pericardium, peritoneum) without mass
Plasmablastic lymphoma	Low	EBV	Oral cavity/jaw; aggressive
Hodgkin lymphoma (non-AIDS-defining)	200–500	EBV (~100%)	Mixed cellularity, advanced stage, marrow involvement
Multicentric Castleman (lymphoproliferative)	Any	HHV-8	Fever, nodes, splenomegaly, cytopenia

Principle of treatment	Detail
Chemotherapy	R-CHOP or DA-EPOCH-R for DLBCL; CODOX-M/IVAC or DA-EPOCH-R for Burkitt; ABVD for Hodgkin
Concurrent ART	Continue/start ART during chemotherapy — DTG-based preferred; avoid AZT (marrow) and boosted PIs/cobicistat (vincristine, doxorubicin interactions)
Rituximab	Avoid if CD4 <50 (infection risk) in some protocols
CNS prophylaxis	Intrathecal methotrexate for Burkitt/high-risk DLBCL
OI prophylaxis	CTX for PCP, fluconazole, acyclovir; HBV prophylaxis (tenofovir) before rituximab
Supportive	G-CSF, tumour lysis prevention (allopurinol/rasburicase, hydration)

- Lymphoma risk falls with ART but remains above the general population — a new node, fever or raised LDH in a suppressed patient still needs a biopsy.
- In India, TB and lymphoma co-exist; send biopsy for both histopathology and mycobacterial culture/NAAT.

Clinical pearls

EBV DNA in plasma or CSF, high LDH and extranodal disease at a low CD4 count suggest lymphoma — refer early to oncology; untreated aggressive lymphoma kills within weeks.

Further reading — tap to open (free) ► NCCN — cancer in people with HIV · DHHS Adult & Adolescent OI Guidelines

Section: Neoplastic Diseases in HIV · Summary table on page 85 · ARV drug formulary

CBME-BASED INTERNAL MEDICINE
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Cervical, Anal and Other Non-AIDS Cancers

Overview. Women living with HIV have a six-fold higher risk of cervical cancer, with faster progression of CIN. Anal cancer is markedly increased in MSM with HIV. Other non-AIDS cancers — lung, liver (HBV/HCV), Hodgkin, head and neck — reflect smoking, oncogenic viruses and ageing.

Screening of women with HIV	Recommendation
WHO (2021)	HPV-DNA primary screening from age **25**, every **3–5 years**; screen, triage and treat
DHHS (OI guidelines)	Age 21–29: cytology at diagnosis, then yearly ×3, then every 3 years if normal; ≥30: cytology + HPV co-testing every 3 years
NACO / India	VIA/VILI or Pap at ART centres/ICTC linkage — at diagnosis and yearly
Positive screen	Colposcopy; thermal ablation or LEEP; invasive cancer → oncology (stage and treat as HIV-negative with ART)

Cancer	Risk factor	Prevention / screening
Anal cancer	HPV-16; MSM, history of anogenital warts	Digital anorectal exam yearly; anal cytology / high-resolution anoscopy in MSM ≥35 (ANCHOR trial: treating HSIL ↓ cancer 57%)
Hepatocellular carcinoma	HBV, HCV, alcohol, MASLD	USG ± AFP every 6 months in cirrhosis/HBV
Lung cancer	Smoking (2–3× more common)	Low-dose CT 50–80 y with ≥20 pack-years; cessation
Head and neck (oropharyngeal)	HPV, tobacco, alcohol	Oral examination
Hodgkin lymphoma	EBV	Biopsy nodes
Conjunctival squamous carcinoma	HPV, UV light	Excise suspicious lesions

HPV vaccination in PLHIV

- HPV vaccine (3 doses: 0, 1–2, 6 months) for all PLHIV aged 9–26; shared decision up to 45 years
- India: Cervavac (quadrivalent, Serum Institute) and Gardasil available; national rollout for girls 9–14
- Vaccinate regardless of CD4

Clinical pearls

Screen-and-treat the cervix at the same visit (VIA + thermal ablation) in Indian ART centres — loss to follow-up between screening and treatment is the main reason screening fails.

Further reading — tap to open (free) ► WHO cervical screening guideline 2021 · DHHS Adult & Adolescent OI Guidelines

Section: Neoplastic Diseases in HIV · Summary table on page 85 · ARV drug formulary

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SECTION 9 · 8 TOPICS

Special Populations & Prevention

Overview and one-page summary table

Elimination of vertical transmission, care of HIV-exposed infants and children, vaccination, post-exposure and pre-exposure prophylaxis together make up the prevention cascade. These topics are frequent long-answer questions in MD and DNB examinations and daily practice in emergency departments.

#	Topic	Key point for the postgraduate	Page
75	HIV in Pregnancy — PPTCT	Universal testing; TLD same day any trimester; VL at 32–36 wk; vaginal delivery if VL ≤1,000; IV AZT if VL >1,000	90
76	The HIV-exposed Infant — Prophylaxis and Follow-up	Low risk: NVP 6 weeks; high risk: AZT + NVP (enhanced) up to 12 weeks; CTX from 6 weeks; EID by PCR	91
77	Children and Adolescents — Diagnosis and ART	ABC + 3TC + DTG (pDTG 10 mg) from 4 weeks and 3 kg; LPV/r or RAL in neonates; TLD ≥30 kg	92
78	Vaccination in PLHIV	Inactivated vaccines at any CD4; live vaccines (MMR, varicella, YF) only if CD4 ≥200; HBV double dose, PCV, influenza, HPV, RZV	93
79	Occupational Exposure — Risk Assessment and First Aid	Wash with soap and water; assess exposure and source; start PEP within 2 h (≤72 h); infectious vs non-infectious fluids	94
80	Post-exposure Prophylaxis — Regimens and Follow-up	TLD ×28 days (NACO); DHHS/CDC: BIC/TAF/FTC or DTG + TDF/FTC; test at baseline, 6 weeks, 3 and 6 months	95
81	Pre-exposure Prophylaxis (PrEP)	Oral TDF/FTC daily (or 2-1-1 for MSM); CAB-LA every 2 months; lenacapavir twice yearly; test HIV every visit	96
82	HIV Prevention and the National AIDS Control Programme	NACP-V (2021–26): 95-95-95, EMTCT of HIV & syphilis, TI, OST, condoms, PrEP; HIV Act 2017	97

Tap a topic name or page number to open its full page.

Learning objectives for this section

- Manage HIV in pregnancy, delivery and breastfeeding (PPTCT)
- Prescribe infant prophylaxis and paediatric ART
- Vaccinate PLHIV correctly
- Manage occupational and non-occupational exposures (PEP) and offer PrEP

Handbook of Antibiotics
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HIV in Pregnancy — PPTCT

Overview. Without intervention, 15–45% of infants born to women with HIV are infected; with maternal ART and infant prophylaxis the risk is **below 1%**. India's Prevention of Parent-to-Child Transmission (PPTCT) programme offers universal antenatal HIV and syphilis testing and lifelong ART (Option B+).

Antenatal care

- Test all pregnant women (repeat in 3rd trimester if high risk)
- Start **TLD** the same day — dolutegravir is preferred in all trimesters
- Women already on ART: continue (switch EFV/NVP to TLD)
- VL at first visit, at 32–36 weeks (and 4 weeks after starting)
- Screen syphilis, HBV, TB; CTX if indicated; folic acid

DHHS preferred regimens

- DTG + TDF/FTC (or 3TC) or TAF/FTC
- BIC/TAF/FTC (now preferred)
- Alternatives: DRV/r + 2 NRTIs, RAL
- Avoid cobicistat (low levels in 2nd/3rd trimester)
- Insufficient data: CAB/RPV-LA, lenacapavir

Maternal VL near delivery	Mode of delivery	Intrapartum IV zidovudine
≤50 copies/mL	Vaginal delivery	Not required
50–999 copies/mL	Vaginal delivery (CS only for obstetric indications)	Consider (DHHS)
>1,000 or unknown	**Scheduled caesarean at 38 weeks** (before labour/membrane rupture)	**Yes** — 2 mg/kg over 1 h, then 1 mg/kg/h until delivery (start 3 h before CS)

Intrapartum and postpartum practice	Detail
Avoid	Prolonged rupture of membranes, artificial rupture, fetal scalp electrodes, instrumental delivery, episiotomy where possible
Continue ART	Throughout labour and lifelong postpartum
Breastfeeding (NACO)	Exclusive breastfeeding for 6 months with mother on ART and infant prophylaxis; complementary feeds after 6 months; continue to 12 months+
Breastfeeding (DHHS)	Shared decision-making; supported if mother suppressed on ART; replacement feeding if AFASS
Contraception	All methods with DTG; EFV ↓ implant efficacy
Monitoring	VL every 3 months during breastfeeding (NACO: 6-monthly); retest HIV-negative breastfeeding women

Clinical pearls

A woman first diagnosed in labour should receive TLD immediately (plus single-dose NVP per local protocol/IV AZT) and her infant should get high-risk (enhanced) prophylaxis.

Further reading — tap to open (free) ► DHHS Perinatal Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

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The HIV-exposed Infant — Prophylaxis and Follow-up

Overview. Every HIV-exposed infant receives antiretroviral prophylaxis from birth (ideally within 6 hours), co-trimoxazole from 6 weeks and early infant diagnosis. The intensity of prophylaxis depends on maternal viral suppression.

Risk category	Definition	NACO prophylaxis (breastfed)
Low risk	Mother on ART ≥4 weeks before delivery with suppressed VL	**Nevirapine** daily ×6 weeks
High risk	Mother diagnosed in pregnancy/labour, on ART <4 weeks, or VL >1,000, or seroconverted in pregnancy/breastfeeding	**Enhanced: AZT + NVP** for 6 weeks, then NVP alone (or continued dual) to complete 12 weeks

DHHS (non-breastfed)	Regimen
Low risk	Zidovudine 4 weeks (2 weeks if mother suppressed throughout pregnancy)
High risk	Presumptive HIV therapy: ZDV + 3TC + NVP (treatment dose) or ZDV + 3TC + RAL, for 2–6 weeks
Confirmed infection	Full ART

Infant NVP dose (prophylaxis)	Daily dose
Birth–6 weeks: 2.0–2.49 kg	10 mg OD
Birth–6 weeks: ≥2.5 kg	15 mg OD
6 weeks–6 months	20 mg OD
6–9 months	30 mg OD
Zidovudine (≥35 weeks)	4 mg/kg BD

Birth: ARV prophylaxis within 6 h; BCG, OPV, HBV vaccine

6 weeks: DNA PCR; start CTX; routine vaccines

6, 12, 18 months: PCR/antibody; final status after weaning

- Co-trimoxazole for the infant from 6 weeks until HIV infection is excluded and breastfeeding has stopped.
- BCG is given at birth in India unless the infant is symptomatic of HIV; avoid BCG in infants known to be infected (disseminated BCG risk).

Clinical pearls

The highest-risk infants are those whose mothers were diagnosed late or acquired HIV while breastfeeding — retest HIV-negative pregnant and breastfeeding women in high-risk settings.

Further reading — tap to open (free) ► DHHS Perinatal Guidelines · DHHS Pediatric ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

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Children and Adolescents — Diagnosis and ART

Overview. Without ART, half of infected infants die by age 2. All children with HIV start ART immediately. Paediatric dolutegravir (10 mg dispersible tablets) has simplified treatment across age groups.

Age / weight	Preferred first-line (WHO/NACO)	Alternative
Neonates (<4 weeks)	AZT + 3TC + RAL (or NVP)	AZT + 3TC + NVP
≥4 weeks and ≥3 kg to <20 kg	**ABC + 3TC + DTG** (pDTG dispersible)	ABC + 3TC + LPV/r
20–<30 kg	ABC + 3TC + DTG 50 mg film-coated	TDF-based if older
≥30 kg (adolescents)	**TLD**	TLE

Weight band	pDTG 10 mg dispersible dose
3–<6 kg	5 mg (½ tablet) OD
6–<10 kg	15 mg OD
10–<14 kg	20 mg OD
14–<20 kg	25 mg OD
≥20 kg	50 mg film-coated (or 30 mg dispersible) OD

Special paediatric issue	Point
Diagnosis	DNA PCR <18 months; antibody after 18 months
Clinical clues	Failure to thrive, recurrent pneumonia, persistent thrush, parotid enlargement, LIP, developmental delay
Dosing	Recalculate at every visit by weight band
Adherence	Caregiver-dependent; disclosure process from age 6–8 (partial) to 10–12 (full)
Adolescents	Transition to adult care; sexual and reproductive health; mental health; highest failure rates
Vaccination	Routine schedule; avoid BCG if symptomatic; measles at 6 months extra dose (WHO)

Clinical pearls

Taste and pill burden drive paediatric adherence. Dispersible DTG (strawberry-flavoured) and ABC/3TC dispersible tablets have replaced bitter lopinavir syrup in most children.

Further reading — tap to open (free) ► DHHS Pediatric ARV Guidelines · NACO National Guidelines for HIV Care & Treatment 2021

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Vaccination in PLHIV

Overview. Vaccine responses are weaker at low CD4 counts, so vaccines work best after immune recovery on ART — but inactivated vaccines should not be delayed. **Live vaccines are contraindicated when CD4 is below 200** (below 15% in children).

Vaccine	Recommendation for adults with HIV	Note
Pneumococcal	PCV20 single dose (or PCV15 followed by PPSV23 ≥8 weeks later)	All PLHIV
Influenza (inactivated)	Annually	No live attenuated nasal vaccine
Hepatitis B	Heplisav-B 2 doses, or double-dose (40 µg) at 0, 1, 2, 6 months	Check anti-HBs; revaccinate non-responders
Hepatitis A	2 doses (MSM, PWID, liver disease, travel)	Check response
HPV	3 doses through age 26; shared decision 27–45	Any CD4
Tdap / Td	Tdap once, then Td/Tdap every 10 years; Tdap each pregnancy	—
Recombinant zoster (RZV)	2 doses, ≥18 years	Inactivated — safe at any CD4
Meningococcal (MenACWY)	2 doses 8 weeks apart; booster every 5 years	HIV is an indication (ACIP)
COVID-19	Per current national schedule; additional doses if CD4 low	—
Mpox (JYNNEOS/MVA-BN)	At-risk MSM and contacts	Non-replicating — safe
Rabies, typhoid (Vi)	As for general population (rabies PEP: full schedule + RIG; no shortening)	Avoid oral Ty21a if CD4 <200
MMR, varicella (live)	Only if CD4 ≥200 and non-immune	Contraindicated if CD4 <200
Yellow fever (live)	Travel only if CD4 ≥200	Waiver letter otherwise
BCG (live)	Not recommended in adults; infants per national programme	Disseminated BCG risk

Clinical pearls

A vaccine given when CD4 is very low may need repeating after immune recovery (e.g. hepatitis B, pneumococcal) — document anti-HBs response.

Further reading — tap to open (free) ► CDC adult immunisation schedule · DHHS Adult & Adolescent OI Guidelines

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Occupational Exposure — Risk Assessment and First Aid

Overview. Health-care workers are exposed to HIV mainly through needle-stick injuries. The average risk after percutaneous exposure to HIV-infected blood is about **0.3%** and after mucous membrane exposure **0.09%**; PEP reduces it by more than 80%.

HIV infectious fluids
- Blood and visibly bloody fluids
- Semen, vaginal secretions
- CSF, synovial, pleural, peritoneal, pericardial, amniotic fluid
- Breast milk; tissue, organ, culture fluid

Not infectious (unless visibly bloody)
- Urine, faeces, vomitus
- Saliva, sputum, nasal secretions
- Sweat, tears

First aid — do immediately	Do not
Wash wounds and skin with soap and running water	Do not scrub, squeeze or suck the wound
Flush mucous membranes/eyes with water or saline	Do not use bleach, alcohol or antiseptics on wound
Remove contaminated clothing; report to PEP in-charge	Do not delay — PEP is most effective within 2 hours

Category of exposure (NACO)	Definition
Mild	Mucous membrane or non-intact skin exposure to small volume; superficial injury with solid needle
Moderate	Mucous membrane exposure to large volume; percutaneous superficial injury with solid needle
Severe	Percutaneous injury with large-bore hollow needle, deep injury, visible blood on device, needle used in source patient's artery/vein

Factors increasing transmission risk	Source evaluation
Deep injury, hollow-bore needle, visible blood, device in vessel	Rapid HIV test of source with consent; HBsAg, anti-HCV
Source with high VL (acute HIV, advanced AIDS)	Source on ART with suppressed VL — still offer PEP; consider source ART history
Delay in PEP initiation	Unknown source: assess epidemiological risk

Exposure → first aid

Assess exposure, source status; baseline HIV, HBV, HCV tests of exposed

PEP if indicated (TLD ×28 days) — within 72 h

Clinical pearls

Do not wait for the source patient's test result to start PEP — begin the first dose immediately and stop if the source turns out HIV-negative (and not in a window period).

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · CDC — HIV PEP

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Post-exposure Prophylaxis — Regimens and Follow-up

Overview. PEP is indicated for occupational and non-occupational (sexual, injecting, sexual assault) exposures to potentially infectious material from a source who is HIV-positive or of unknown status. Start as soon as possible — ideally within 2 hours, and **not after 72 hours** — and continue for **28 days**.

Guideline	Preferred PEP regimen	Alternatives
NACO (2021)	**TLD** — TDF 300 + 3TC 300 + DTG 50 mg OD ×28 days	TDF + 3TC + LPV/r or ATV/r
CDC/DHHS (2025 nPEP update)	BIC/TAF/FTC OD, or DTG 50 mg + (TDF or TAF) + (FTC or 3TC)	DRV/r + TDF/FTC; RAL + TDF/FTC
Earlier regimens (original notes)	Tenofovir 300 mg + emtricitabine 200 mg OD + (darunavir 800 mg or atazanavir 300 mg or fosamprenavir 1,400 mg) + ritonavir 100 mg OD; or tenofovir + emtricitabine + zidovudine	Historical — superseded by INSTI-based PEP

Follow-up	Exposed person
Baseline	HIV test (rapid/Ag-Ab), HBsAg + anti-HBs, anti-HCV, creatinine, pregnancy test; STI tests after sexual exposure
During PEP	Adherence and side-effect review at 1–2 weeks; creatinine if TDF
HIV testing (NACO)	6 weeks, 3 months and 6 months
HIV testing (CDC 2025)	4–6 weeks and 12 weeks (Ag/Ab + NAT)
Hepatitis B	Unvaccinated/non-responder: HBIG + vaccine within 24 h (≤7 days)
Hepatitis C	HCV RNA at 3–6 weeks, anti-HCV at 4–6 months
Precautions	Condoms, no blood/organ donation, avoid pregnancy/breastfeeding decision counselling until negative

- PEP after sexual assault: add emergency contraception and STI prophylaxis (ceftriaxone, azithromycin/doxycycline, metronidazole).
- Repeated PEP use is a reason to offer PrEP (transition from PEP to PrEP without a gap if HIV-negative).

Clinical pearls

Seroconversion despite PEP is rare and usually follows delayed initiation, poor adherence or continued exposure. Any febrile illness during follow-up should prompt an HIV RNA test.

Further reading — tap to open (free) ► NACO National Guidelines for HIV Care & Treatment 2021 · CDC — HIV PEP

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CBME-BASED INTERNAL MEDICINE
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Pre-exposure Prophylaxis (PrEP)

Overview. PrEP is the use of antiretrovirals by HIV-negative people at substantial risk to prevent infection. Taken consistently, oral PrEP reduces sexual acquisition by >90%; long-acting injectables are even more effective because adherence is easier. In India PrEP is available through demonstration projects and the private sector.

PrEP option	Regimen	Who	Notes
Oral TDF/FTC (or TDF/3TC)	1 tablet daily	All at-risk people incl. women, PWID, pregnant	Protective after 7 days (anal) / 21 days (vaginal)
Event-driven ("2-1-1")	2 tablets 2–24 h before sex, 1 at 24 h and 1 at 48 h	Cis-gender MSM only	IPERGAY
Oral TAF/FTC	Daily	MSM, transgender women (not receptive vaginal sex)	Renal/bone advantage
Cabotegravir LA	600 mg IM; 2 injections 1 month apart, then every 2 months	All at-risk adults	HPTN 083/084: superior to oral; RNA testing each visit
Lenacapavir	927 mg SC every 6 months (+ oral loading)	All at-risk adults/adolescents	PURPOSE 1 and 2: ~99–100% efficacy; FDA 2025, WHO-recommended 2025
Dapivirine vaginal ring	Monthly ring	Women (WHO)	Moderate efficacy

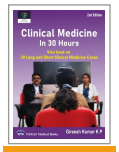
Before and during PrEP	Detail
Exclude HIV	Rapid/Ag-Ab test (and RNA if recent exposure or CAB-LA); acute HIV symptoms
Baseline	Creatinine (oral TDF needs CrCl ≥60), HBsAg (vaccinate; TDF stopping can flare HBV), STI screen, pregnancy
Follow-up	HIV test every 3 months (every 2 months with CAB-LA); creatinine 6–12-monthly; STI screen
Seroconversion on PrEP	Genotype (INSTI after CAB-LA); start full ART (DRV/r-based until results if CAB exposure)

Clinical pearls

PrEP does not prevent other STIs — combine with condoms and STI screening. Doxycycline 200 mg within 72 h after sex (doxy-PEP) reduces syphilis and chlamydia in MSM and is now recommended by CDC for selected people.

Further reading — tap to open (free) ► WHO — HIV prevention · NACO National Guidelines for HIV Care & Treatment 2021

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HIV Prevention and the National AIDS Control Programme

Overview. Prevention combines biomedical, behavioural and structural interventions. India's National AIDS and STD Control Programme Phase V (2021–2026) aims to end AIDS as a public-health threat by 2030.

Pillar	Interventions
Biomedical	Treatment as prevention (U=U), PrEP, PEP, condoms, male circumcision (high-prevalence settings), STI treatment, safe blood (NAT screening), infection control
Vertical transmission	Universal antenatal testing, lifelong ART for mothers, infant prophylaxis, EID — goal: elimination of vertical transmission of HIV and syphilis
Key populations	Targeted interventions for FSW, MSM, TG, PWID, migrants, truckers; needle–syringe programmes, opioid substitution therapy; community-based testing, self-testing
Behavioural	Information and education, life-skills in schools (Adolescence Education Programme), Red Ribbon Clubs
Structural	HIV/AIDS (Prevention and Control) Act 2017 — anti-discrimination, confidentiality, Ombudsman; social protection schemes
Care cascade	ICTC → ART centre → Link ART centres → CoE/SACEP; free CD4, VL, ART, OI drugs; Care & Support Centres

Prevent new infections | Test and link — first 95 | Treat all — second 95 | Suppress — third 95 (U=U)

Toll-free and services	Detail
NACO helpline	1097 — information, counselling, referral
ICTC / PPTCT	Free counselling and testing in all district hospitals and many PHCs
ART centres	Free lifelong ART, CD4/VL, OI drugs; TB/HIV coordination with NTEP

Clinical pearls

Combination prevention works best: a person with HIV on suppressive ART, a partner on PrEP and condoms for STI prevention together make transmission vanishingly rare.

Further reading — tap to open (free) ► NACO (naco.gov.in) · NACO National Guidelines for HIV Care & Treatment 2021

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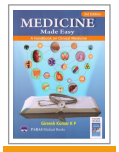
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REFERENCE 1

Opportunistic Infections — Treatment at a Glance

First-line treatment, duration and secondary prophylaxis — adults (DHHS/NACO)

Infection	First-line treatment	Duration	Secondary prophylaxis / ART timing
PCP	Co-trimoxazole TMP 15–20 mg/kg/day in 3–4 doses ± prednisone (PaO_2 <70)	21 days	CTX DS OD · ART within 2 weeks
Toxoplasma encephalitis	Pyrimethamine + sulfadiazine + leucovorin, or CTX 5/25 mg/kg BD	≥6 weeks	Pyr + sulfa or CTX DS BD · ART 2–3 weeks
Cryptococcal meningitis	L-AmB 10 mg/kg ×1 + 5FC + fluconazole 1,200 mg ×14 d (WHO); therapeutic LPs	2 + 8 weeks	Fluconazole 200 mg · ART at 4–6 weeks
Tuberculosis (DS)	2HRZE/4HRE daily + pyridoxine	6 months (9–12 CNS/bone)	TLD + extra DTG 50 mg · ART within 2 weeks (TBM 4–8)
MDR/RR-TB	BPaLM	6 months	Switch EFV → DTG
MAC	Clarithromycin 500 mg BD + ethambutol 15 mg/kg ± rifabutin	≥12 months	Until CD4 >100 ×6 months · ART within 2 weeks
CMV retinitis	Valganciclovir 900 mg BD ± intravitreal ganciclovir	14–21 days induction	Valganciclovir 900 mg OD · ART within 2 weeks
CMV colitis/oesophagitis	Ganciclovir 5 mg/kg IV q12h → valganciclovir	3–6 weeks	Usually none
Oral candidiasis	Fluconazole 100 mg OD	7–14 days	Not routine
Oesophageal candidiasis	Fluconazole 200–400 mg OD	14–21 days	Not routine
HSV mucocutaneous	Valacyclovir 1 g BD / acyclovir 400 mg TDS	5–10 days	Suppression if frequent
Herpes zoster	Valacyclovir 1 g TDS (IV acyclovir 10 mg/kg q8h if disseminated)	7–10 days	—
Cystoisospora	CTX DS QID ×10 days (or BD)	7–10 days	CTX DS thrice weekly
Cryptosporidium	ART + nitazoxanide 500–1,000 mg BD	14 days	ART
Microsporidia	Albendazole 400 mg BD (E. intestinalis)	≥3 weeks	ART
Histoplasmosis	L-AmB 3 mg/kg 1–2 wk → itraconazole 200 mg BD	≥12 months	Itraconazole until CD4 >150
Talaromycosis	AmB 2 weeks → itraconazole 200 mg BD 10 weeks	12 weeks	Itraconazole 200 mg OD
PML	ART (no specific drug)	—	Steroids for PML-IRIS
Non-typhoidal Salmonella	Ciprofloxacin 500–750 mg BD / ceftriaxone	2–6 weeks if CD4 <200	Long-term if recurrent bacteraemia
Syphilis (early)	Benzathine penicillin 2.4 MU IM once	Single dose	Neurosyphilis: IV penicillin 10–14 days
Kaposi sarcoma	ART ± liposomal doxorubicin / paclitaxel	—	Avoid steroids



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REFERENCE 2

Antiretroviral Drug Formulary

Dose, renal and hepatic adjustment, key adverse effects and interactions — adults

Drug (abbreviation)	Class	Adult dose	Renal	Hepatic	Key ADR / DDI
Nucleoside/nucleotide RT inhibitors					
Tenofovir DF (TDF)	NRTI	300 mg OD	CrCl 30–49 q48h; <30 avoid	No change	Renal tubulopathy, ↓ BMD; HBV flare on stop
Tenofovir alafenamide (TAF)	NRTI	25 mg OD (10 mg with COBI)	CrCl ≥15 / HD	Avoid C	Weight, lipids; no rifampicin
Lamivudine (3TC)	NRTI	300 mg OD / 150 mg BD	CrCl <50 reduce	No change	Well tolerated; M184V
Emtricitabine (FTC)	NRTI	200 mg OD	CrCl <50 interval	No change	Skin hyperpigmentation
Abacavir (ABC)	NRTI	600 mg OD / 300 mg BD	No change	Child-Pugh A 200 mg BD; B/C avoid	HLA-B*5701 HSR; MI
Zidovudine (AZT/ZDV)	NRTI	300 mg BD	CrCl <15: 100 mg TDS	Reduce	Anaemia, neutropenia, myopathy
Non-nucleoside RT inhibitors					
Efavirenz (EFV)	NNRTI	600 mg HS (400 mg option)	No change	Caution B; avoid C	CNS, rash, lipids; inducer
Nevirapine (NVP)	NNRTI	200 mg OD ×14 d → 200 mg BD	No change	Avoid B/C	SJS, hepatitis; infant prophylaxis
Rilpivirine (RPV)	NNRTI	25 mg OD with meal	No change	Avoid C	No PPI; QT; depression
Doravirine (DOR)	NNRTI	100 mg OD	No change	Avoid C	Lipid-neutral; no inducers
Etravirine (ETR)	NNRTI	200 mg BD after food	No change	Caution	Rash; interactions
Protease inhibitors and boosters					
Atazanavir/ritonavir (ATV/r)	PI	300/100 mg OD	No change (avoid in HD if PI-experienced)	Avoid B/C	Bilirubin ↑, stones; no PPI
Lopinavir/ritonavir (LPV/r)	PI	400/100 mg BD	No change	Caution	GI, lipids, PR/QT
Darunavir/ritonavir (DRV/r)	PI	800/100 OD; 600/100 BD	No change	Avoid C	Sulfa rash, hepatitis
Ritonavir (RTV); cobicistat (COBI)	Booster	100 mg / 150 mg	COBI ↑ creatinine	Caution	CYP3A4 inhibition — many DDIs
Integrase inhibitors					
Dolutegravir (DTG)	INSTI	50 mg OD; 50 mg BD with rifampicin/INSTI resistance	No change	Avoid C	Insomnia, weight; cations; metformin ≤1 g
Bictegravir (BIC)	INSTI	50 mg (in BIC/TAF/FTC)	CrCl ≥30 (≥15 HD)	Avoid C	No rifampicin; cations
Raltegravir (RAL)	INSTI	400 mg BD / 1,200 mg OD; 800 mg BD with rifampicin	No change	No change	CK ↑, rash
Cabotegravir (CAB)	INSTI	Oral 30 mg; LA 600 mg IM q2 months (+ RPV 900 mg)	No change	Avoid C	ISR; no rifamycins
Entry, attachment, capsid and others					
Maraviroc (MVC)	CCR5 antagonist	300 mg BD (150 / 600 mg)	Caution CrCl <30	Caution	Hepatotoxicity; tropism assay
Enfuvirtide (T-20)	Fusion inhibitor	90 mg SC BD	No change	No change	Injection nodules
Fostemsavir	Attachment inhibitor	600 mg BD	No change	No change	QT; no strong inducers
Ibalizumab	Post-attachment mAb	2,000 mg IV then 800 mg q2 weeks	No change	No change	Rash, diarrhoea



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Drug (abbreviation)	Class	Adult dose	Renal	Hepatic	Key ADR / DDI
Lenacapavir (LEN)	Capsid inhibitor	Oral load → 927 mg SC q6 months	No change	Avoid C	Injection nodules; CYP3A inhibitor
Fixed-dose combinations (India)					
TLD	NRTI + INSTI	TDF 300 + 3TC 300 + DTG 50, OD	Not if CrCl <50	—	NACO first-line
TLE	NRTI + NNRTI	TDF 300 + 3TC 300 + EFV 600, OD	Not if CrCl <50	—	Alternative
ZL (AZT/3TC), AL (ABC/3TC)	NRTI pair	300/150 BD; 600/300 OD	Use separate drugs if CrCl <50	—	Renal and second-line backbones

OI drug	Adult dose	Renal adjustment	Key ADR / interactions
Co-trimoxazole (TMP–SMX)	Prophylaxis 960 mg OD; PCP 15–20 mg/kg/day TMP	CrCl 15–30: 50%; <15 avoid	Rash/SJS, ↑ K, cytopenias, ↑ creatinine
Dapsone	100 mg OD	No change	Haemolysis (G6PD), methaemoglobinaemia
Pyrimethamine + leucovorin	200 mg load then 50–75 mg OD + 10–25 mg	No change	Marrow suppression
Sulfadiazine	1–1.5 g q6h	Reduce; hydrate	Crystalluria, rash
Primaquine	30 mg base OD	No change	G6PD haemolysis
Clindamycin	600 mg IV q8h / 300–450 mg PO q6h	No change	C. difficile
Pentamidine	4 mg/kg IV OD	Reduce	Hypotension, dysglycaemia, pancreatitis
Fluconazole	100–1,200 mg OD by indication	CrCl <50: 50%	QT, hepatotoxicity; ↑ some drugs
Itraconazole	200 mg OD–TDS	No change	Interactions with PI/r, EFV; heart failure
Amphotericin B deoxycholate / liposomal	0.7–1 mg/kg / 3–4 (10 single) mg/kg	Monitor	Nephrotoxicity, ↓ K/Mg, infusion reactions
Flucytosine	25 mg/kg QID	Reduce	Marrow suppression, hepatitis
Valganciclovir / ganciclovir	900 mg BD/OD / 5 mg/kg IV q12h	Reduce	Neutropenia, thrombocytopenia
Foscarnet	90 mg/kg IV q12h	Reduce	Nephrotoxicity, electrolytes, seizures
Acyclovir / valacyclovir	400–800 mg 3–5×/day; IV 5–10 mg/kg q8h / 1 g BD–TDS	Reduce	Crystalluria, neurotoxicity in renal failure
Clarithromycin / azithromycin	500 mg BD / 500–600 mg OD; 1,200 mg weekly	Clarith. CrCl <30: 50%	QT; clarith. CYP3A4 interactions
Ethambutol	15 mg/kg OD	Thrice weekly if CrCl <30	Optic neuritis
Rifabutin	300 mg OD (150 mg with PI/r)	CrCl <30: 50%	Uveitis, neutropenia
Nitazoxanide	500–1,000 mg BD	No change	GI upset
Albendazole	400 mg BD	No change	Hepatitis, marrow
Isoniazid + pyridoxine	300 mg + 10–25 mg OD	No change	Hepatitis, neuropathy



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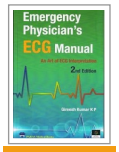
REFERENCE 3

High-yield Postgraduate Examination Questions

Long-answer, short-note and viva topics — with the page to revise from

Long-answer questions (MD/DNB)	Revise
Discuss the life cycle of HIV and the sites of action of antiretroviral drugs. Add a note on newer drugs.	Life cycle, ARV classes, newer agents
Describe the NACO guidelines for initiation and monitoring of ART in adults. How will you diagnose and manage treatment failure?	NACO first-line, failure
Discuss the diagnosis and management of TB in a person with HIV, including drug interactions and IRIS.	TB dx, ATT + ART, IRIS
Approach to a PLHIV with altered sensorium and focal deficits.	CNS approach
Cryptococcal meningitis — diagnosis, management of raised ICP and antifungal therapy.	Cryptococcal Rx
Prevention of parent-to-child transmission of HIV in India.	PPTCT, infant
Post-exposure prophylaxis for a health-care worker after needle-stick injury.	PEP
Advanced HIV disease — definition and package of care.	AHD

Short notes	Viva one-liners
Acute retroviral syndrome	Which HIV test turns positive first? — HIV RNA (NAT)
WHO clinical staging	Window period of 4th-generation test? — ~18–45 days
U=U	Drug doubled with rifampicin? — dolutegravir (50 mg BD)
PCP — steroid indications	Steroids in PCP when? — PaO_2 <70 mmHg or A–a gradient ≥35
Abacavir hypersensitivity	Gene tested before abacavir? — HLA-B*5701
IRIS	ART after cryptococcal meningitis? — after 4–6 weeks
CMV retinitis	CD4 threshold for CMV and MAC? — <50
Oral hairy leukoplakia	Virus causing OHL? KS? PCNSL? — EBV, HHV-8, EBV
Kaposi sarcoma staging	Drug class of lenacapavir? — capsid inhibitor
HIV-2	HIV-2 resistant to? — all NNRTIs and enfuvirtide
NACO testing strategy	Stain for Cryptosporidium? — modified Ziehl–Neelsen
TB preventive therapy (3HP)	Eosinophilia + diarrhoea in HIV? — Cystoisospora
Doravirine; rilpivirine	Contraindicated with PPIs? — rilpivirine, atazanavir
Tenofovir alafenamide vs disoproxil	Trial supporting statins in PLHIV? — REPRIEVE (pitavastatin)
Vacuolar myelopathy	Single-dose L-AmB trial in cryptococcal meningitis? — AMBITION-cm
HIVAN	Trial showing early ART benefit? — START, TEMPRANO
PrEP with cabotegravir and lenacapavir	Trial proving U=U in couples? — HPTN 052, PARTNER



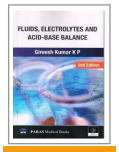
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REFERENCE 4

Abbreviations

Drugs, tests and programme terms used in this book

- **3TC** lamivudine
- **ABC** abacavir
- **AHD** advanced HIV disease
- **AIDS** acquired immunodeficiency syndrome
- **AmB-d / L-AmB** amphotericin B deoxycholate / liposomal
- **ART** antiretroviral therapy
- **ATT** antituberculosis treatment
- **ATV/r** atazanavir/ritonavir
- **AZT/ZDV** zidovudine
- **BIC** bictegravir
- **CAB-LA** long-acting cabotegravir
- **CBNAAT** cartridge-based nucleic acid amplification test
- **CD4** CD4 T-lymphocyte count
- **CMV** cytomegalovirus
- **CoE** Centre of Excellence
- **COBI** cobicistat
- **CPT** co-trimoxazole preventive therapy
- **CrAg** cryptococcal antigen
- **CrCl** creatinine clearance
- **CTX** co-trimoxazole
- **DBS** dried blood spot
- **DDI** drug–drug interaction
- **DHHS** US Department of Health and Human Services
- **DOR** doravirine
- **DRV/r** darunavir/ritonavir
- **DSD** differentiated service delivery
- **DTG** dolutegravir
- **EAC** enhanced adherence counselling
- **EBV** Epstein–Barr virus
- **EFV** efavirenz
- **EID** early infant diagnosis
- **FTC** emtricitabine
- **HAART** highly active antiretroviral therapy
- **HAND** HIV-associated neurocognitive disorder
- **HHV-8** human herpesvirus 8
- **HIVAN** HIV-associated nephropathy
- **ICTC** Integrated Counselling and Testing Centre
- **INSTI** integrase strand transfer inhibitor
- **IRIS** immune reconstitution inflammatory syndrome
- **KS** Kaposi sarcoma
- **LF-LAM** lateral-flow lipoarabinomannan
- **LPV/r** lopinavir/ritonavir
- **MAC** Mycobacterium avium complex
- **MMD** multi-month dispensing
- **NACO** National AIDS Control Organisation
- **NACP** National AIDS and STD Control Programme
- **NAT** nucleic acid test
- **NNRTI** non-nucleoside RT inhibitor
- **NRTI** nucleoside/nucleotide RT inhibitor
- **NTEP** National TB Elimination Programme
- **NVP** nevirapine
- **OHL** oral hairy leukoplakia
- **OI** opportunistic infection
- **PCNSL** primary CNS lymphoma
- **PCP/PJP** Pneumocystis pneumonia
- **PEP / PrEP** post- / pre-exposure prophylaxis
- **PGL** persistent generalised lymphadenopathy
- **PI** protease inhibitor
- **PLHIV** people living with HIV
- **PML** progressive multifocal leukoencephalopathy
- **PPTCT** prevention of parent-to-child transmission
- **RAL** raltegravir
- **RPV** rilpivirine
- **RT** reverse transcriptase
- **SACEP** State AIDS Clinical Expert Panel
- **TAF / TDF** tenofovir alafenamide / disoproxil fumarate
- **TI** targeted intervention
- **TLD / TLE** TDF + 3TC + DTG / EFV
- **TPT** TB preventive therapy
- **U=U** undetectable = untransmittable
- **VL** viral load



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REFERENCE 5

Guidelines, Image Atlases and Further Reading

All links are free — tap to open, or scan the QR code

Source	What it covers	Link
DHHS Adult & Adolescent ARV Guidelines (Sept 2026 update)	What to start, switching, failure, resistance, special populations	clinicalinfo.hiv.gov
DHHS Adult & Adolescent OI Guidelines	Prevention and treatment of every OI	clinicalinfo.hiv.gov
DHHS Perinatal and Pediatric Guidelines	Pregnancy, infant prophylaxis, children	clinicalinfo.hiv.gov/en/guidelines
NACO National Guidelines for HIV Care and Treatment 2021	Indian national protocols — ART, OIs, PPTCT, PEP	aidsdatahub.org
NACO	Programme, India HIV estimates, circulars	naco.gov.in
NTEP — Central TB Division	TB/HIV, TPT, DR-TB guidelines	tbcindia.mohfw.gov.in
WHO HIV guidelines	Consolidated guidelines, AHD, cryptococcal disease	who.int
Liverpool HIV Drug Interactions	Interaction checker (recommended by DHHS 2026)	hiv-druginteractions.org
Stanford HIV Drug Resistance Database	Genotype interpretation	hivdb.stanford.edu

Image atlases used in this book

Neurotoxoplasmosis — Radiopaedia
CT/MRI of cerebral toxoplasmosis.
► Tap to open the image gallery (radiopaedia.org)

Pneumocystis jirovecii pneumonia — Radiopaedia
Chest X-ray and HRCT of PCP.
► Tap to open the image gallery (radiopaedia.org)

CMV retinitis — EyeRounds atlas (University of Iowa)
Fundus photographs of CMV retinitis and HIV retinopathy.
► Tap to open the image gallery (webeye.ophth.uiowa.edu)

Kaposi sarcoma — Frontiers in Medicine (2025)
Case report and review: KS at a high CD4 count.
► Tap to open the image gallery (www.frontiersin.org)

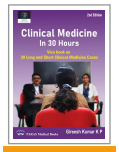
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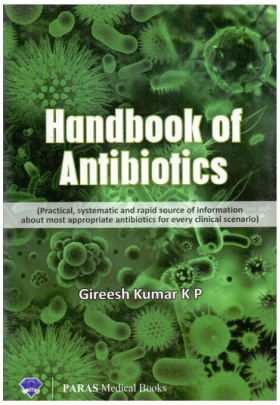
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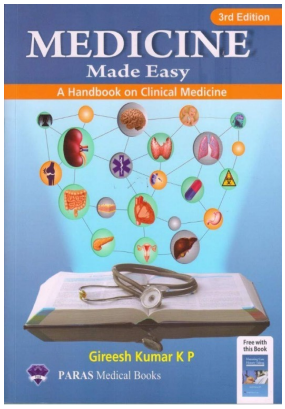
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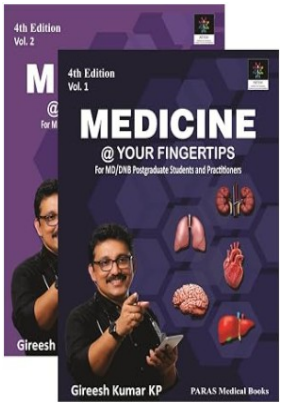
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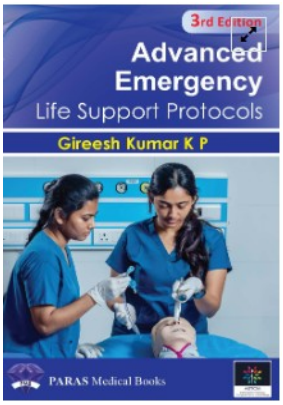
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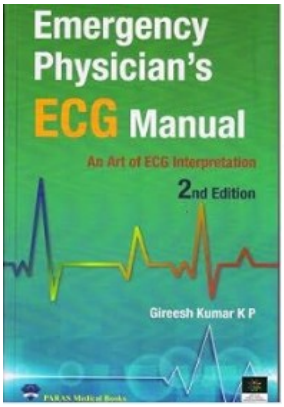
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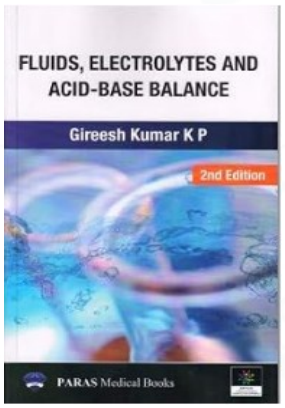
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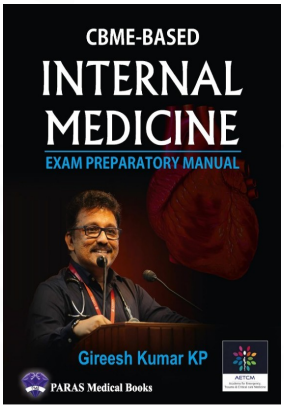
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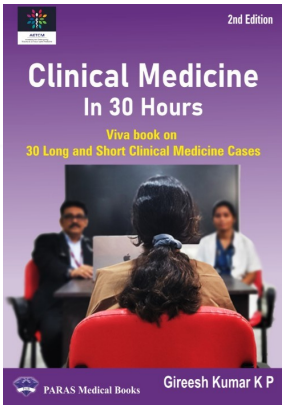
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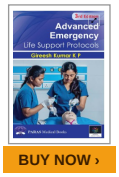
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