Diagnosis and monitoring of HIV (including resistance testing)

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Abstract

There are >100,000 people living with human immunodeficiency virus (HIV) infection in the UK, a high proportion of whom remain undiagnosed. Fourth-generation HIV tests are the gold standard for diagnosing HIV infection, with a window period of 4 weeks from the point of infection. The assessment of a newly diagnosed HIV-positive patient should include a thorough history and examination to identify symptoms that might be related to opportunistic infection. Further investigations are required for all newly diagnosed patients to stage the infection and recommend appropriate antiretroviral therapy. Once the individual has started antiretroviral therapy, regular follow-up is crucial to ensure adherence to treatment.

Keywords Antiretroviral therapy; fourth-generation test; HIV testing; MRCP; point-of-care test; resistance testing

Key points

- A number of HIV tests are available, fourth-generation serology testing being the gold standard
- A newly diagnosed HIV-positive patient requires psychological support and thorough medical history and examination
- HIV-positive patients require regular follow-up with their HIV team, usually more frequently in first few years and then every 6 months

Introduction

An estimated 36.7 million people globally (including 2.1 million children) are living with HIV, with a global prevalence of 0.8% among adults.[1] One million people died from acquired immunedeficiency syndrome (AIDS)-related illnesses worldwide in 2016.[1]

The UK by comparison has a small human immunodeficiency virus (HIV) epidemic, with an estimated 101,200 people living with HIV in 2015, and a prevalence of 1.6 per 1000 people aged 15 years and over.[2] There are, however, an estimated 13,500 people in the UK who are unaware of their HIV infection. In 2015, 6095 people were newly diagnosed with HIV, of whom 305 were diagnosed with an AIDS-defining illness.[2]

HIV testing over the years

Historically, HIV testing was treated differently from testing for other medical conditions largely because of stigma and the poor outlook for people living with HIV infection. The availability of antiretroviral therapy has changed this. Although it remains crucial to seek verbal consent before performing an HIV test, the outlook for patients living with the infection has improved. We believe HIV testing should be offered to everyone routinely both in the acute hospital setting and within the community via general practitioners.

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HIV testing[3]

The available tests for HIV infection can test for the antigen, the antibody or both (Figure 1). To understand the window period, it is important to understand what part of the HIV structure is being tested for. In routine practice, we use either a venous blood sample that is sent to a laboratory for analysis, or a rapid point-of-care test (POCT).

Venous blood sample

In the UK, fourth-generation tests are used as first line; these test simultaneously for HIV antibody and antigen. These allow the time between infection and testing positive to be shortened to 1 month. Laboratories perform fourth-generation testing using two different assays on each sample before providing a result. The first test is a screening test; a positive result should always be confirmed using a second blood sample.

Quantitative HIV RNA assays (HIV viral load-testing) are not recommended for screening. They have the potential to generate false-positive results and are more expensive than fourth-generation tests.

Point-of-care tests

These use either a fingerprick blood sample or a mouth swab and can provide results within minutes (usually <30 minutes). All reactive POCTs should be followed by a serological laboratory test for confirmation. This is because POCTs have a lower specificity in low-prevalence populations, which can result in false-positive results.

Monitoring of HIV infection

Initial assessment and investigation

The assessment of a newly diagnosed HIV-positive patient should include a thorough history and examination (Table 1), with additional psychological support as required. Partner notification and HIV testing of children should be discussed.

Further blood tests (Table 2) are required to complete the initial assessment and guide the HIV physician's recommendation for antiretroviral therapy.

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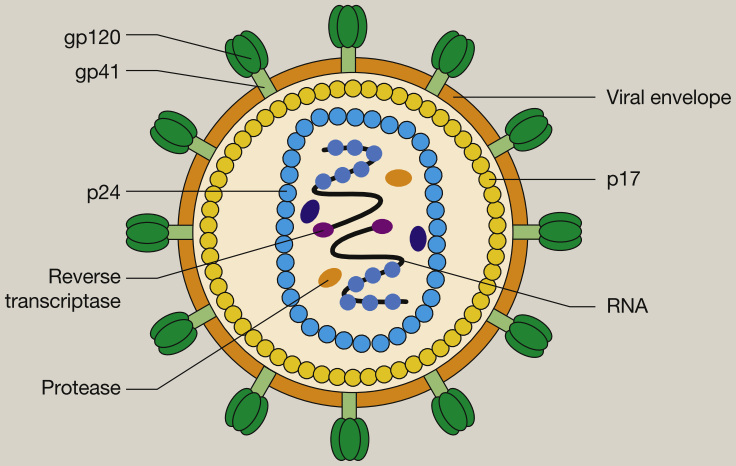
Human immunodeficiency virus – structure



- Antibodies to HIV typically appear 4–6 weeks after infection, but this may take as long as 3 months
- The p24 antigen can usually be detected in a blood sample from 2–4 weeks after infection
- The p24 antigen becomes rapidly undetectable once antibodies to HIV start to develop

Figure 1

Assessment of a newly diagnosed HIV-positive patient[4]

History	☐ General medical (including symptoms)
	☐ Psychosocial
	☐ Sexual and reproductive health
	☐ Past and current co-morbidities and allergies
	☐ Medications including over-the-counter, herbals and supplements
	☐ Lifestyle including smoking, alcohol and recreational drug use
	☐ HIV status of partners and children
	☐ Conception issues
	☐ Knowledge and belief about HIV infection, transmission and treatment
	☐ Partner notification
	☐ HIV testing of children
	☐ Current or previous intimate partner violence
	☐ Vaccination
	☐ Travel history
Examination	☐ General physical examination
	☐ Weight
	☐ Height
	☐ Body mass index
	☐ Blood pressure
	☐ Waist circumference

Investigations for a newly diagnosed HIV-positive patient[4]

Investigations	☐ Confirm HIV-1/2 status
	☐ HIV-1 plasma viral load
	☐ HIV-1 drug resistance test
	☐ CD4+ T cell count (absolute and percentage)
	☐ Hepatitis A virus immunoglobulin G
	☐ Hepatitis B serology
	☐ Hepatitis C virus antibody
	☐ Full sexually transmitted infection screen (including syphilis)
	☐ Measles/varicella antibodies (according to vaccination/infection history)
	☐ Full blood count
	☐ Renal/liver/bone profile
	☐ Dipstick urinalysis and urine protein: creatinine ratio (if protein positive on urine dipstick)
	☐ HLA-B*57:01 if abacavir therapy being considered
	☐ Viral tropism test if CCR5 inhibitor being considered
Investigations for specific groups	• Cardiovascular risk assessment (QRISK2) for patients >40 years old
	• Bone fracture risk assessment (FRAX) for patients >50 years old, postmenopausal women and other high-risk individuals

Table 1

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