

Mpox Molecular Diagnostic Tests(RT-PCR)

**RECOMMENDATIONS AS
PER 4 NOVEMBER 2024**

On 13 August 2024, Africa Centres for Disease Control and Prevention (Africa CDC) declared the ongoing mpox outbreak a Public Health Emergency of Continental Security (PHECS). The World Health Organization (WHO) followed this the next day, which extended the alert internationally as a Public Health Emergency of International Concern (PHEIC). After these declarations, many countries have made efforts to mobilize resources to introduce or expand laboratory testing, surveillance, and response activities. As the number of mpox cases increase and significant number of countries continue reporting new cases, there is an urgent need to expand testing capacity to strengthen the joint mpox continental preparedness and response for Africa. However, access to appropriate quality assured diagnostics is a challenge. There is limited information on important characteristics, such as available test kits' performance and ability to detect relevant clades.

To address the challenge of mpox diagnostics access in the continent, the Africa CDC Diagnostic Advisory Committee (DAC) is continuously reviewing all available evidence on molecular tests for mpox and to shortlist tests that will be useful for mpox testing in countries. The shortlist aims to provide guidance to Africa CDC, countries and partners on appropriate high-quality molecular tests to procure and use for the mpox response. Africa CDC has published two editions of the shortlisted tests.

This third edition, an update to the second edition, has included one locally manufactured PCR detection kit (UM6P-MAScIR MPOX qPCR 1.0), manufactured by Moldiag, Morocco. This test kit was evaluated in Democratic Republic of Congo (DRC) and demonstrated very good performance characteristics and the test kit has fulfilled almost all of the criteria used by DAC for shortlisting of recommended tests. By issuing regular updates on mpox diagnostics tests including locally manufactured diagnostics, Africa CDC seeks to provide a more inclusive and representative selection of available mpox diagnostics.

To shortlist the appropriate molecular tests for mpox, the DAC review is based on current available literature, expert feedback in the field and the Target Product Profile (TPP) published by the World Health Organization (WHO) for mpox tests as guidance. Shortlisted tests for mpox must meet the following key minimum criteria:

- **Clade identification:** The test should specifically identify mpox clades I and II, even if precise differentiation between the two clades is not possible.
- **Limit of Detection (LoD):** The LoD should not exceed 1000 copies/ml.
- **Cross-reactivity:** There should be no cross-reactivity with non-Ortho poxviruses with similar signs and symptoms. At least one mpox specific target should not cross-react with known human Orthopox viruses.
- **Sample type:** The test should be compatible with sample types specified in the TPP. The manufacturer should indicate the sample type(s) for which the assay is designed.
- **Regulatory status:** The test should have regulatory approval or emergency use listing (for either in vitro diagnostic or research use) from at least one of the agencies recognized as a stringent regulatory agency, such as United States Food and Drug Authority(FDA), European Union CE, Japan Pharmaceutical and Medical Devices Agency(PMDA) or Australian Therapeutic Goods Administration(TGA), or others. The availability of performance evaluation data, especially from an African country, was considered an additional advantage. The Africa CDC's DAC will also consider approval by a National Regulatory Agency (NRA) or the African Continental process for regulation of in-vitro diagnostics (IVDs) supported by quality-assured performance evaluation data in future. Research Use Only (RUO) tests that have been independently evaluated or are widely used in laboratories across African countries and in the process of regulatory approval were also considered.

Using the above criteria and working with test information available from manufacturers and other sources, the DAC has identified the recommended list of molecular tests for mpox, shown in Table 1. The list of manufacturers is in alphabetical order. This list was produced based on available evidence and will be updated regularly as additional information on existing or, new or modified tests becomes available. The DAC will review this evidence and update the list with tests that meet the minimum requirements.

Molecular Point-of-Care (POC) Tests for mpox

Given the critical role of POC tests in decentralizing and scaling up testing in various countries, the DAC has reviewed available molecular POC tests for mpox. Currently, the modular designed Xpert®Mpox (Cepheid) test is one of the few currently available options for decentralized molecular testing for mpox, and hence may provide a test for settings with limited laboratory diagnostic options after the

considerations below are taken into account. The SD Biosensor molecular POC test is also another option as it detects and differentiates between clade I and II. However, this test is currently for research use only (RUO) and the required equipment is not widely available across Africa.

After a careful review of the Xpert®Mpox assay, the DAC recommends that countries using this test consider clinical features, diagnostic algorithms and

the local epidemiological context when interpreting results from Xpert®Mpox. The current Xpert®Mpox test identifies mpox clade II and Orthopox viruses.

Lastly, the DAC recommends that Cepheid takes steps to address the ability of the Xpert®Mpox test to detect and differentiate between different mpox clades, to ensure better diagnostic accuracy in affected regions.

Table 1: Availble Recommended Real-Time PCR (RT-PCR) Tests for Mpox

| Manufacturer, country | Name of test | Sample type | Clades | Limit of detection | Regulatory Status | Comments |
|----------------------------------|--|---|---|--------------------|--|--|
| Abbott, United States of America | ALINITY M MPXV | Lesion swab specimens | Detects clade I and II. Does not distinguish between clades. | 200 copies/ml | EUA by US FDA | Limited opportunity for cross-reactivity in silico analysis |
| Bioperfectus Biotech, China | Bioperfectus MonkeyPox Virus Genotyping RT-PCR kit | Tonsillar swab, Nasopharyngeal swab, lesion exudate, lesion crust, serum, whole blood | Detects and distinguishes between clades I and II. | 250 copies/ml | CE-IVDD | |
| Certest Biotec SL, Spain | Viasure Monkeypox Virus Real Time PCR Detection Kit | skin lesion swab: vesicular fluid, pustular fluid, papules | Detects clades I and II. Does not distinguish between clades. | 8 copies/ml | CE-IVDD. EUA by FDA revoked. | |
| Daan Gene, China | Detection Kit for Monkeypox Virus DNA (PCR-Fluorescence Probing) | Rashes, scabs, blister fluid, pustular fluid, or whole blood specimens | Detects clades I and II. Does not distinguish between clades. | 200 copies/ml | CE, China NMPA | |
| Diacarta Inc, United States | QuantiVirus MPXV Test Kit | Swabs of acute pustular or vesicular rash | Detects clades I and II. Does not distinguish between clades. | 25-80 copies/ml | CE-IVDD and EUA by US FDA | Reagents for extraction not included in the kit. |
| KH Medical Co.Ltd, South Korea | RADI FAST Mpox detection kit | Skin lesion, crust and swab | Detects clade I, IIb and II. | 1000 copies/ml | CE-IVDD | Independently evaluated in DRC. Has local regulatory approval in DRC. |
| Moldiag, Morocco | UM6P-MAScIR MPOX qPCR 1.0 | Cutaneous (vesicle and crust), oropharyngeal, and blood | Clade I and II doesn't distinguish | 150 copies/ml | Local authorization for use by MoH Morocco | Evaluated at INRB, DRC. This is the first locally manufactured mpox kit in Africa. |
| Roche, United Stated of America | Cobas MPVX | Lesion swab samples | Detect clade I and II. Does not distinguish between clades. | 36.5 copies/ml | EUA by US FDA | Limited opportunity for cross-reactivity in silico analysis. |
| Sansure Biotech. China | Monkey Pox Nucleic Acid Diagnostic Kit | Serum, whole blood, vesicles and pustules, nasopharyngeal swab, ororopharyngeal swab | Detects clades I and II. Does not distinguish Clades | 200 copies/ml | CE-IVDD | |
| TIBMolBiol, Germany | LightMix Modular Monkeypox Virus | Swabs from skin lesions. | Detects clades I and II. Does not distinguish clades | 500 copies/ml | *** | Used in some African countries already. |

***The TIBMolBiol test is currently used for surveillance purposes only as it is RUO.*

To submit information on tests to the DAC, please contact **Dr Noah Fongwen** via **FongwenN@africacdc.org**

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