WHO Emerging Viral infections and diseases: Focus on monkeypox

Central African Republic Perspective

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One health – monkeypox - CAR

**ZOOLOGY**
Animal reservoir and intermediate hosts identification – proliferation - contacts

**ECOLOGY**
Environnement, ecotopes, ecological changes

**ANTHROPOLOGY**
Illness, changing ecologies, wildlife

**VIROLOGY**
Molecular field diagnostic test
Sequencing & phylogeny
Serological test

**EPIDEMIOLOGY**
Surveillance, outbreak investigation, modeling, transmission, natural history

**CLINICAL RESEARCH**
with University of Oxford:
clinical trial of tecovirimat
AFRIPOX: EPIDEMIOLOGY

Besombes et al, in preparation

60 outbreaks, size range: 1 to 13 (1 to 25)

107 confirmed cases, (204 with suspected cases)

Case-fatality rate: 12/160 (7.5%)

(Besombes et al, in preparation)
VIROLOGY – diagnostic tools

Molecular field diagnostics
- Monoplex (RT-LAMP) and multiplex (RT-LAMP QUASR) rapid tests

Integrated test cartridges (Withings) (MPX lineage, VZV)

-Detection by isothermal amplification / RPA strip technology

Serological diagnostic tests
- Multiplex test based on a library of more than 7891 viral peptides representative of the proteome of human pathogenic OPXV (MPXV, VACV, CPXV, VARV) (PhiP-Seq)

-Multiplex assay based on a combination of a selection of 10 MPXV proteins and peptides (MMIA)
VIROLOGY - sequencing

- Use of capture probes for long DNA fragments

- Microfluidic technology and droplet generation for targeted enrichment of droplets containing viral genome fragments

- Direct Illumina sequencing, or direct and real-time MinION sequencing on samples

(Berthet et al, Scientific Reports, 2021)
African squirrels as a potential reservoir of Monkeypox virus

1. MMPXV isolated from two African squirrels
   → Funsiciurus anerythrus (Khodakevich et al., 1986)
   → Funsiciurus bayonii (Mariën et al., in review)

2. MPXV DNA in African squirrel museum specimens (Tiee et al., 2018)
   → Five species of Funsiciurus including two new species

3. Anti-OPXV antibodies in African squirrels (Khodakevich et al., 1988)
   → Funsiciurus
   → Heliosciurus

   → African squirrels are good candidates for the reservoir of Monkeypox virus
   → Focus on African squirrels

Curaudeau et al., in prep
Ecological Niche Modelling with MaxEnt in R
ZOOLOGY – Field work

Animal samples: 376

2019 Toma outbreak
2021 Moloukou outbreak
2021 Grima outbreak

Rodents, duikers, squirrels, bats, pangolins

PCR
Serological assay
ECOLOGY

Environmental atlas
Climate profile
Human activities

Deforestation
ANTHROPOLOGY

- **Anthropological investigation** of monkeypox illness, diagnosis & treatment pathways, care: formal health care workers, traditional healers, former patients

- **Participatory investigation of « local epidemiologies »** (local understandings of origins, emergence, transmission)

- **Ethnohistorical** study of local ecological (forest, wildlife) & social changes implied in monkeypox emergence in the CAR since 1970

- **Ethnoecology**: local conceptions and observations of wildlife; current practices with wildlife
OUTLOOK FOR CAR

• Validation of the response plan against the MPX endemic
• Establishment of an endemic response team
• Review and validation of the new investigation form
• Distribution of contact tracing tools
• Distribution of guidelines on MPX (case definition, how to avoid the disease etc)
• Adaptation of the WHO management protocol to the CAR context
OUTLOOK FOR CAR

• Follow-up mission of the WHO regional office

• Training on management at the national level and in the Mbomou

• Adaptation of the therapeutic trial and vaccination protocol

• Development of awareness and community engagement tools
• Continued compassionate use of Tecovirimat®.
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