850: Ebola Epidemic: Laboratory Lessons Learned in Uganda - Are you ready?

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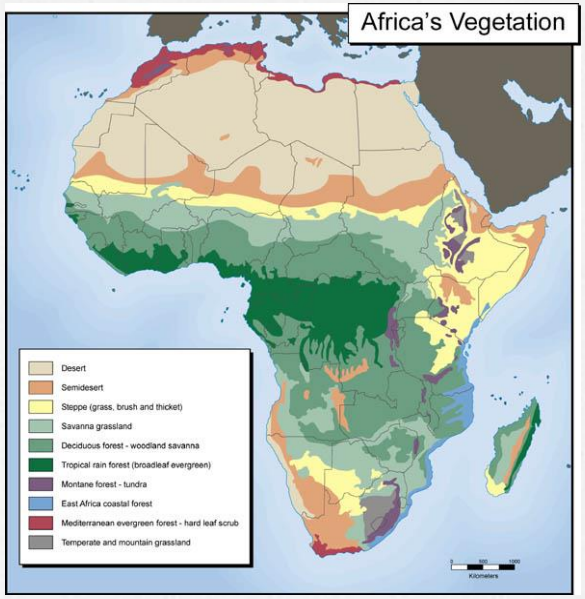
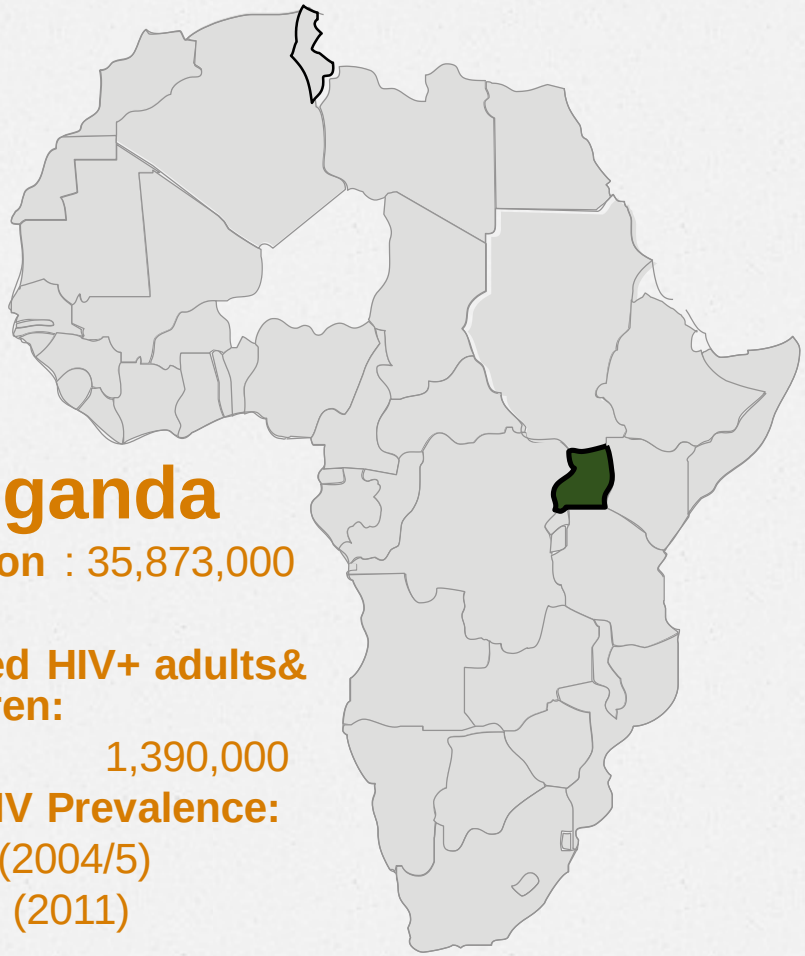
Disclosure

- None
- In the past 12 months, I have not had a significant financial interest or other relationship with the manufacturer(s) of the product(s) or provider(s) of the service(s) that will be discussed in my presentation.
- This presentation will (not) include discussion of pharmaceuticals or devices that have not been approved by the FDA or unapproved or "off-label" uses of pharmaceuticals or devices.

We are we located…

- Sub-Saharan Africa is, geographically, the area of the continent of Africa that lies south of the Sahara. Politically, it consists of all African countries that are fully or partially located south of the Sahara (excluding Sudan)





Uganda

Population : 35,873,000

Estimated HIV+ adults& children:

1,390,000

Adult HIV Prevalence:

6.4% (2004/5)

7.3% (2011)

Infections Diseases – Uganda

- Uganda lies in a region where many viral diseases, leading to a lot of debilitation and deaths, have emerged in the recent past. Lying at the equator and being at the confluence of the Equatorial Forest zone of West Africa and the Tropical Savannah zone

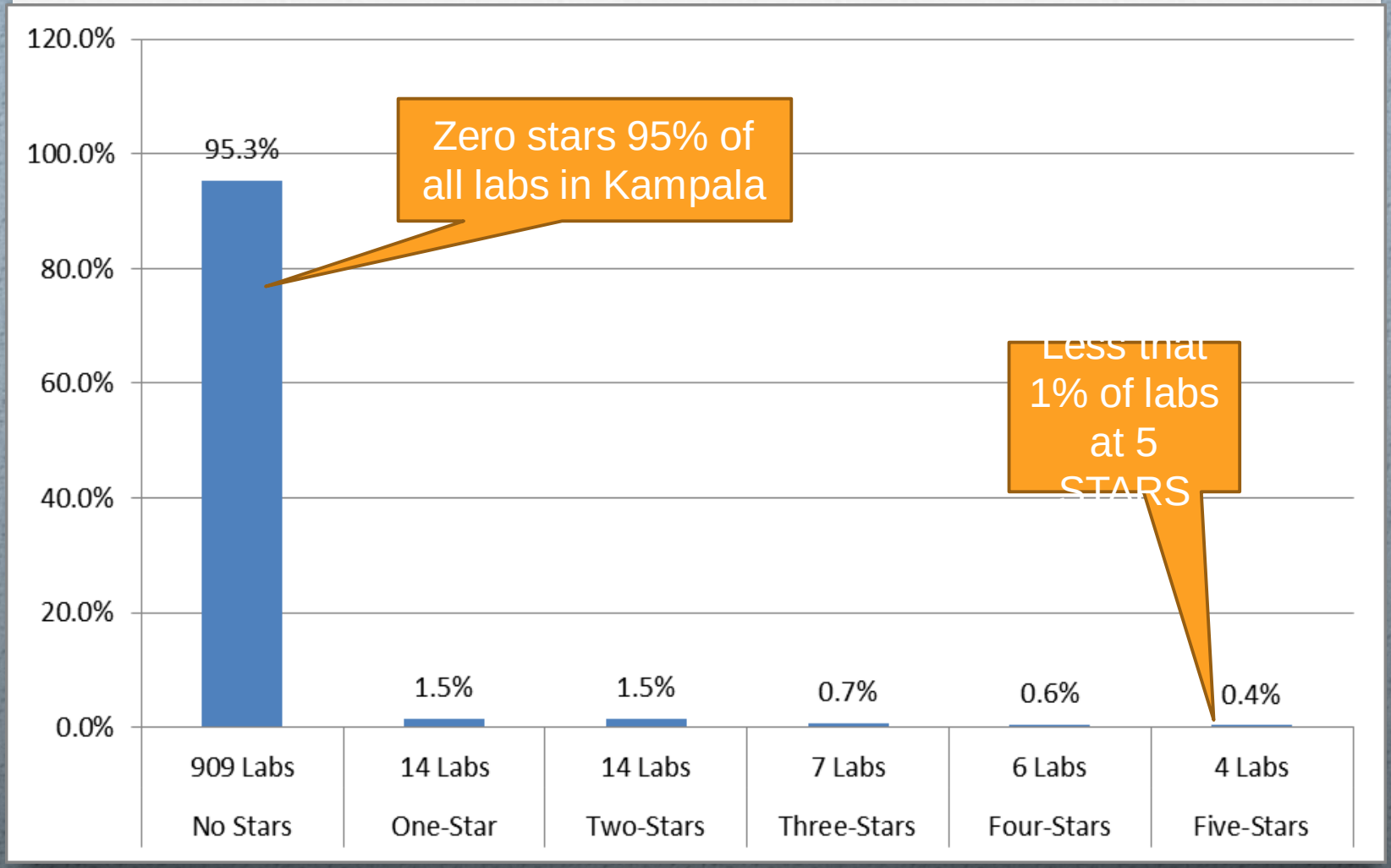
- **Reported EBOLA Epidemics in Uganda:**

- 1998-1999 Rift Valley fever in Eastern Uganda in (confirmed retrospectively).
- 2000 - Ebola (425 cases / 224 deaths).
- 2007 Marburg fever (Two outbreaks, 4 infections, 1 death)
- 2008- A Dutch tourist infected and died in the Netherlands, an American tourist infected and treated in Michigan, USA ,
- 2009 outbreaks of Influenza H1N1pdm (Swine flu)
- 2007-2008 Ebola (New Ebola strain),
- 2010 Yellow Fever in Northern Uganda,
- 2011 Ebola in Luwero, (Single case of Ebola Sudan)
- **2012 Ebola Kibaale (17 deaths, 43 cases)**

Pathology and Lab Medicine in SSA

- Medical laboratory services in Sub-Saharan Africa is in dire status.
- Among the many areas of concern are clinical misdiagnosis, and inadequate healthcare infrastructure, laboratory capacity, and diagnostic accuracy.
- These concerns led to wasted resources due to inappropriate treatment, as a result of misdiagnoses and improper utilization of medications

Quality Assessment of Kampala City Laboratories

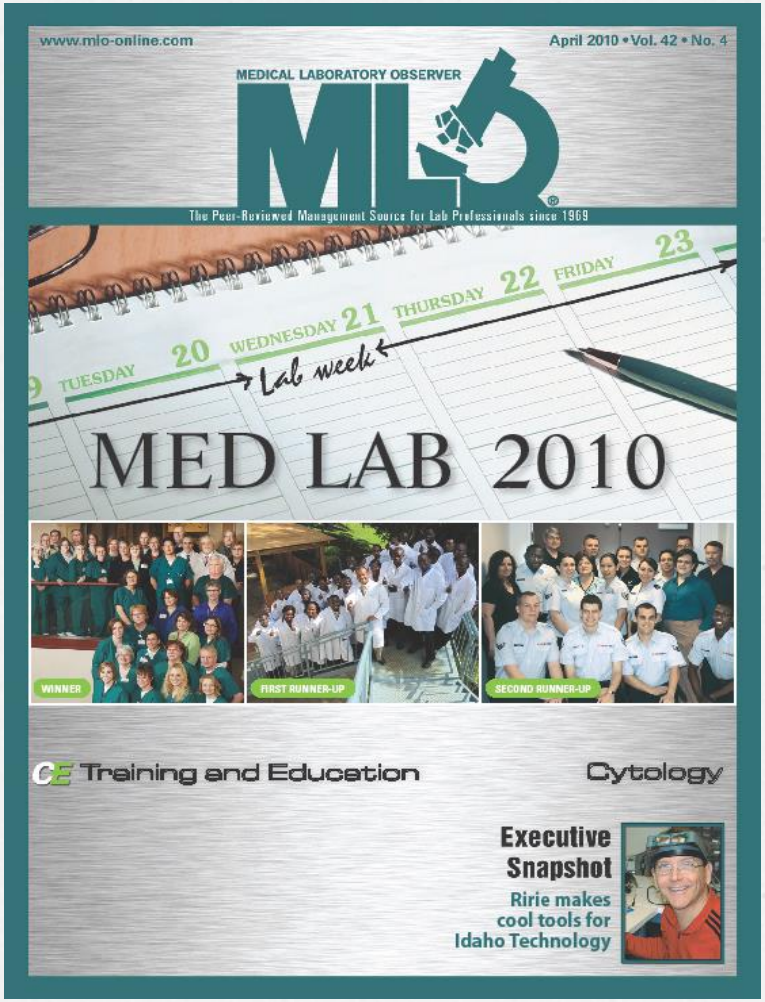



AXSYM

MU-JHU/IDI Core laboratory

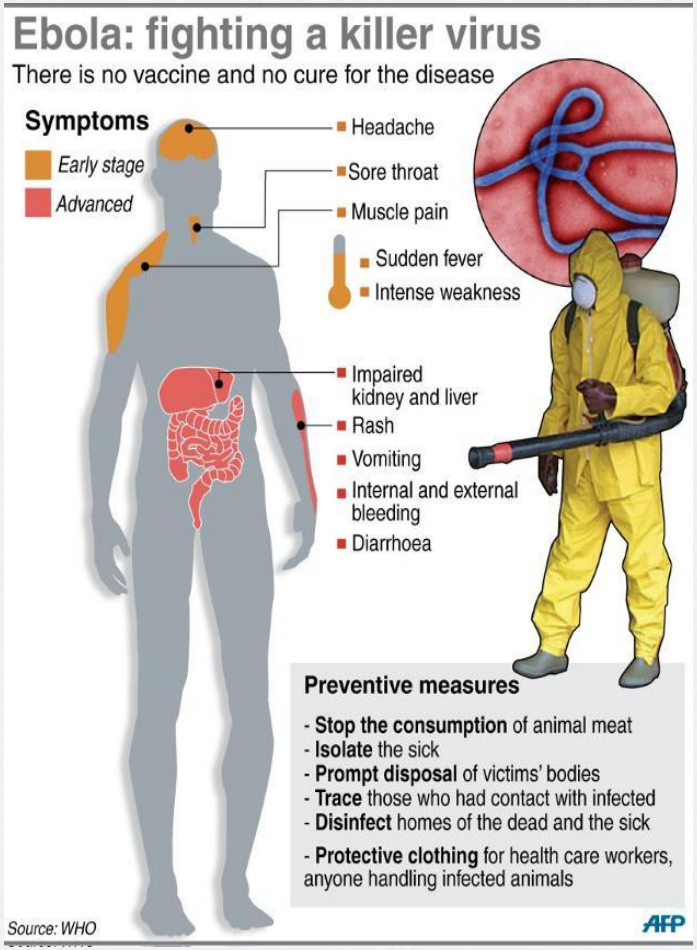
- MU-JHU Core Laboratory was established in 1989 in Kampala – Uganda
- In 2003 was the 2nd ever CAP accredited laboratory on the African continent.
- MU-JHU Core Lab is an official site for many of the U.S. clinical research networks of National Institute of Health (NIH)/ Division of AIDS (DAIDS) clinical trial units
- The lab currently have about 80 clinical clients and research studies

MU-JHU Lab Quality Accomplishments



Eboal – A killer Virus

- Ebola virus is a member of Filoviridae family virus. They cause viral hemorrhagic fever in certain primates; and they infect primates, pigs or bats in nature.
- First virus detected in Ebola river in 1976. Central and West Africa, near tropical rainforests.

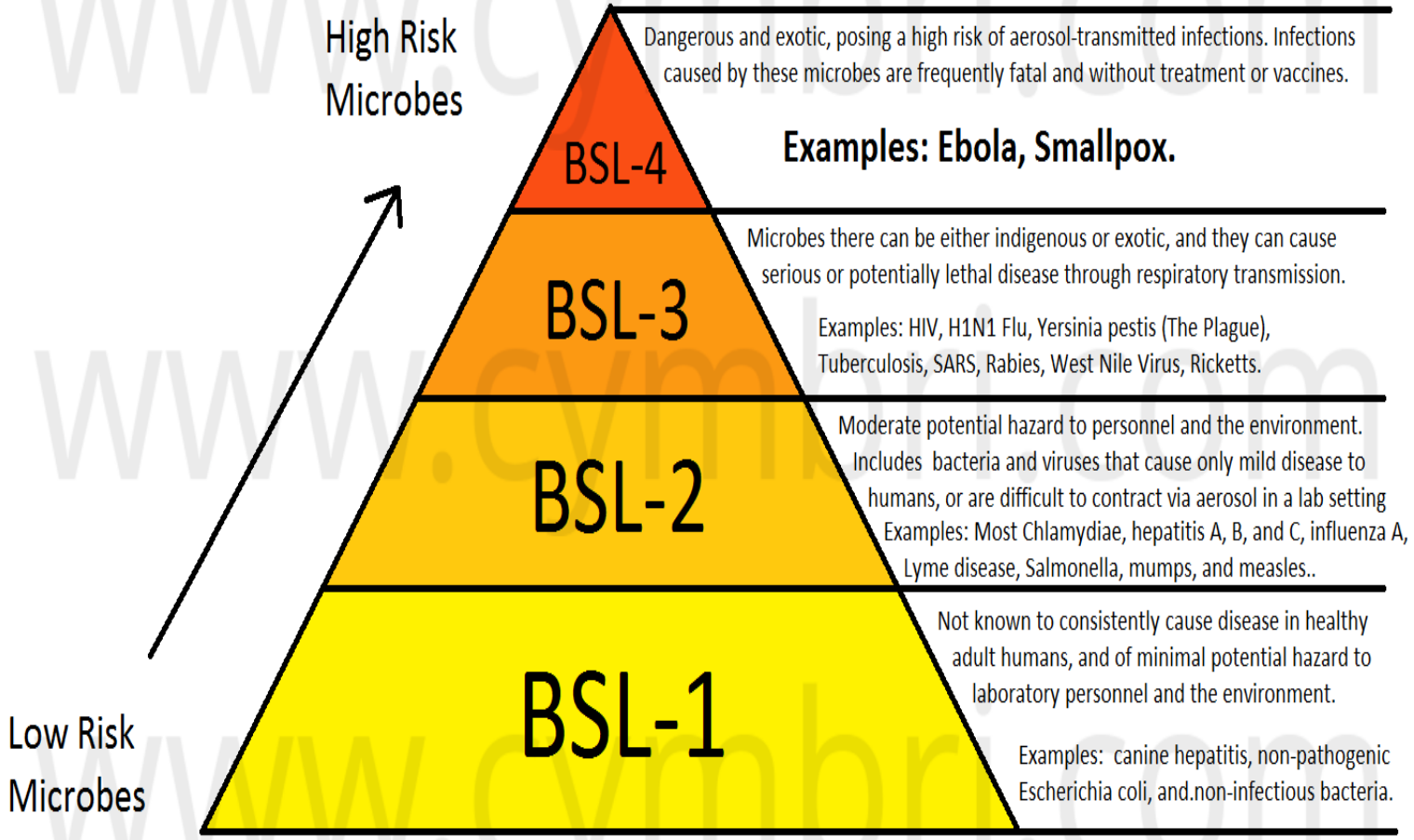


Ebola Lab Diagnosis

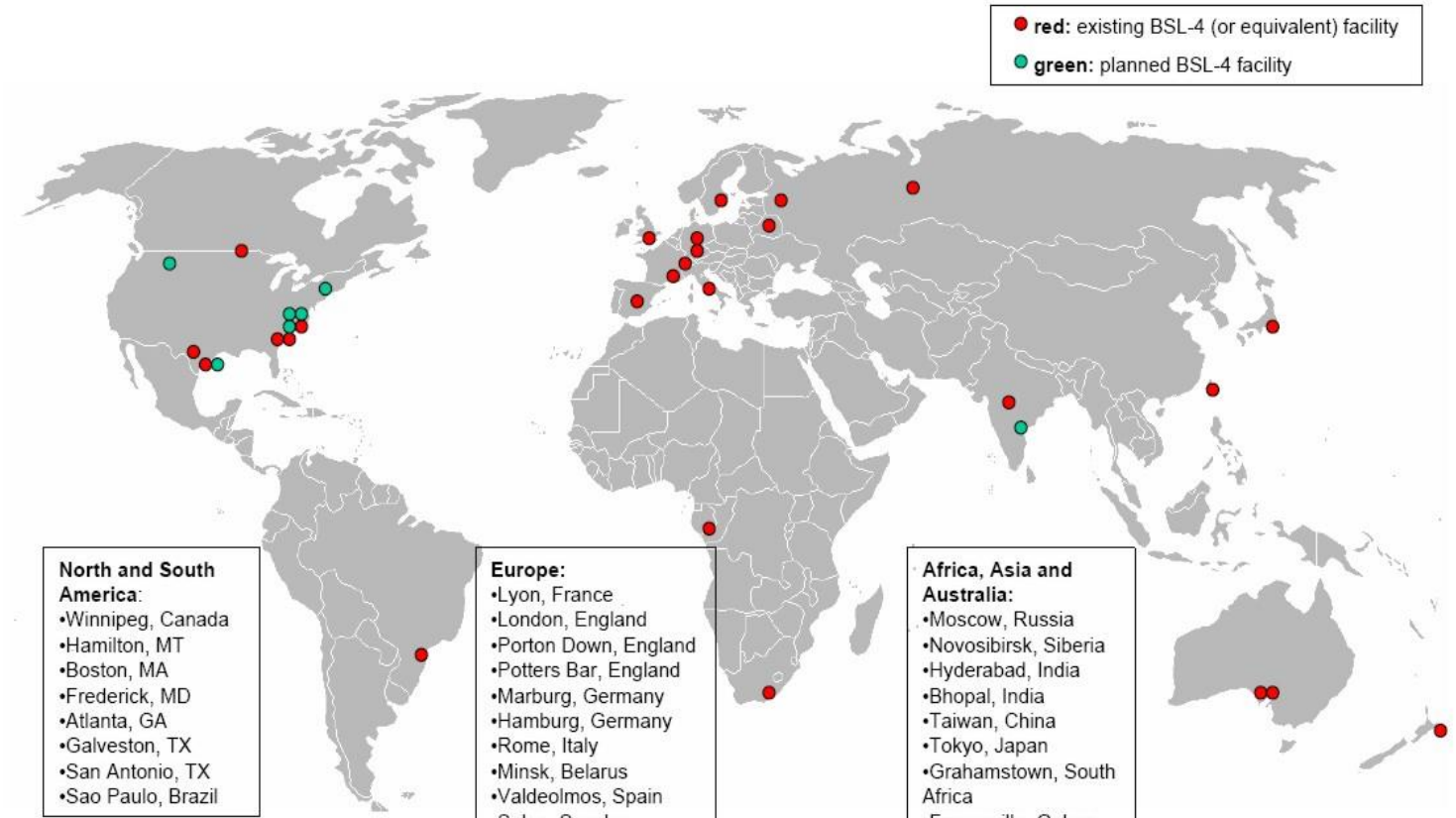
- **Within a few days after symptoms begin**
  - Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing
  - IgM ELISA
  - Polymerase chain reaction (PCR)
  - Virus isolation
- **Later in disease course or after recovery**
  - IgM and IgG antibodies

Laboratories can use biosafety level 2 (BSL-2) methods, but most are taking the additional precautions associated with BSL-3 facilities

CDC Biosafety Levels



BSL-4 Facilities Worldwide

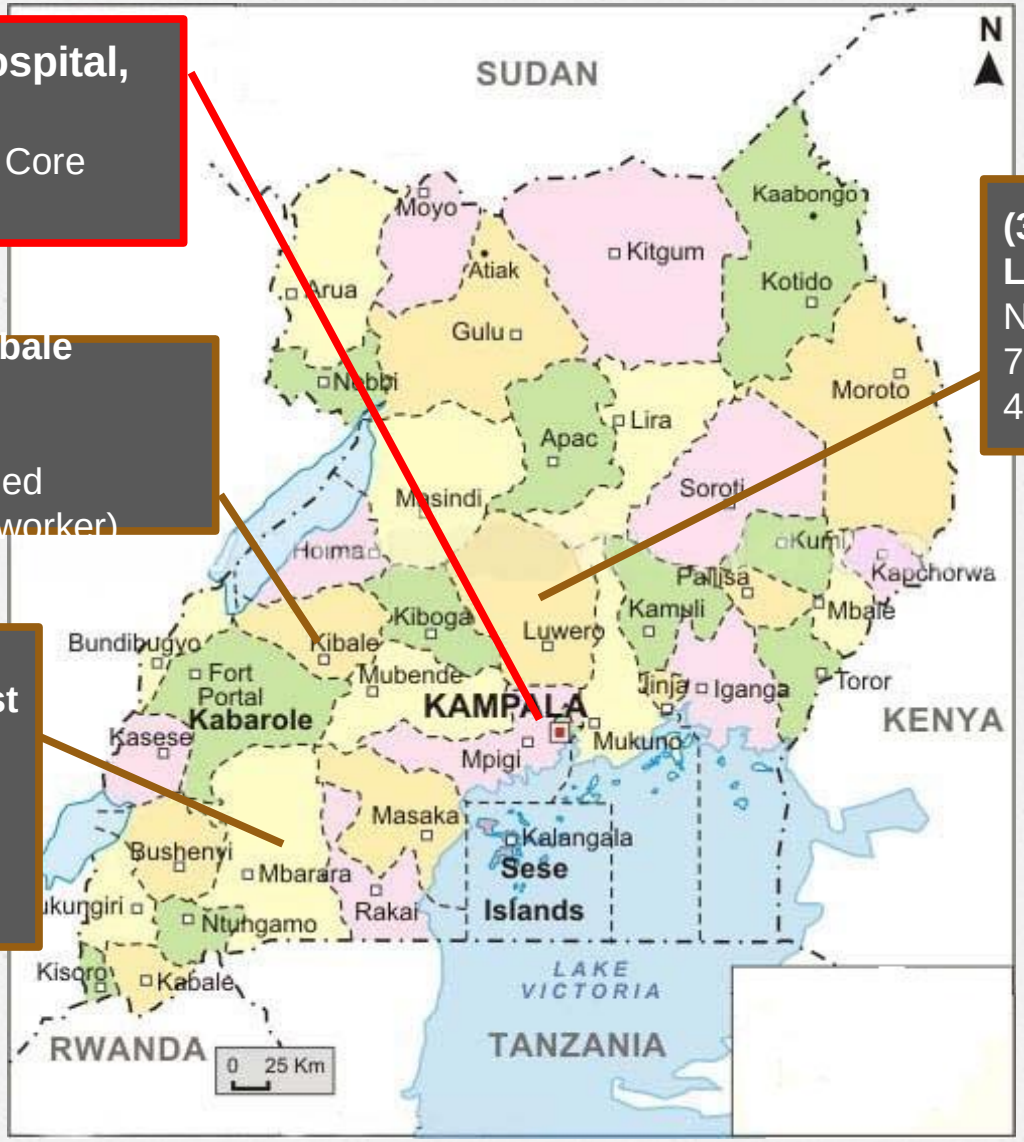


Mulago National Hospital, Kampala
(Site of MU-JHU /IDI Core Laboratory)

(1) Ebola Outbreak – Kibale District
July –October 2012
24 Cases - 11 lab confirmed
17 Deaths (1 health care worker)

(2) Marburg Outbreak – 5 Districts in South-West
October-November 2012
18 Cases – 9 lab confirmed
9 Deaths (1 health care worker)

(3) Ebola Outbreak – Luweero District
November 2012
7 cases - 6 lab confirmed
4 deaths

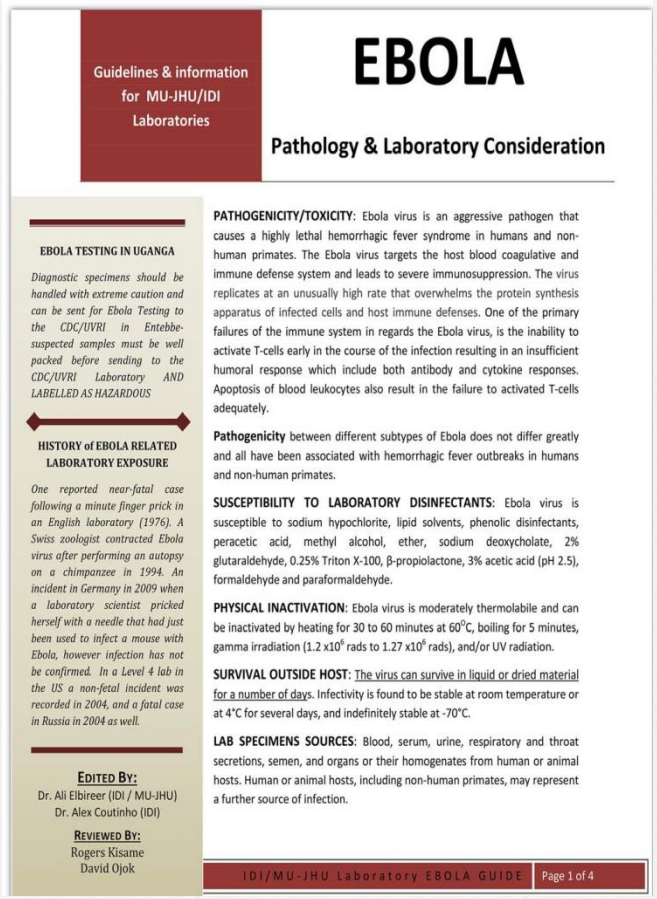


What to do? Action Plan

1. Acted immediately
2. Sensitized the healthcare staff on issue and current situation - demystify
3. Identified project leaders
4. Ensure infection control /PPE measures in place
5. Created contact with MOH/refreal center staff

Action Plan – Cont.

6. Evaluated all unnecessary outreach activities of staff
7. Contacted CDC Uganda to seek advice and offer our support
8. Created surveillance tools at the healthcare facility
9. Identified and assigned nurses team at entrances to encourage hand washing and look for sentinel signs (checklist)
10. Doctors to diligently completed the screening tools and investigations for all urgent care patients to screen for suspected VHF cases.



Guidelines & information for MU-JHU/IDI Laboratories

EBOLA

Pathology & Laboratory Consideration

EBOLA TESTING IN UGANGA

Diagnostic specimens should be handled with extreme caution and can be sent for Ebola Testing to the CDC/UVRI in Entebbe-suspected samples must be well packed before sending to the CDC/UVRI Laboratory AND LABELLED AS HAZARDOUS

HISTORY of EBOLA RELATED LABORATORY EXPOSURE

One reported near-fatal case following a minute finger prick in an English laboratory (1976). A Swiss zoologist contracted Ebola virus after performing an autopsy on a chimpanzee in 1994. An incident in Germany in 2009 when a laboratory scientist pricked herself with a needle that had just been used to infect a mouse with Ebola, however infection has not be confirmed. In a Level 4 lab in the US a non-fetal incident was recorded in 2004, and a fatal case in Russia in 2004 as well.

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PATHOGENICITY/TOXICITY: Ebola virus is an aggressive pathogen that causes a highly lethal hemorrhagic fever syndrome in humans and non-human primates. The Ebola virus targets the host blood coagulative and immune defense system and leads to severe immunosuppression. The virus replicates at an unusually high rate that overwhelms the protein synthesis apparatus of infected cells and host immune defenses. One of the primary failures of the immune system in regards the Ebola virus, is the inability to activate T-cells early in the course of the infection resulting in an insufficient humoral response which include both antibody and cytokine responses. Apoptosis of blood leukocytes also result in the failure to activated T-cells adequately.

Pathogenicity between different subtypes of Ebola does not differ greatly and all have been associated with hemorrhagic fever outbreaks in humans and non-human primates.

SUSCEPTIBILITY TO LABORATORY DISINFECTANTS: Ebola virus is susceptible to sodium hypochlorite, lipid solvents, phenolic disinfectants, peracetic acid, methyl alcohol, ether, sodium deoxycholate, 2% glutaraldehyde, 0.25% Triton X-100, β-propiolactone, 3% acetic acid (pH 2.5), formaldehyde and paraformaldehyde.

PHYSICAL INACTIVATION: Ebola virus is moderately thermolabile and can be inactivated by heating for 30 to 60 minutes at 60°C, boiling for 5 minutes, gamma irradiation (1.2 x10^6 rads to 1.27 x10^6 rads), and/or UV radiation.

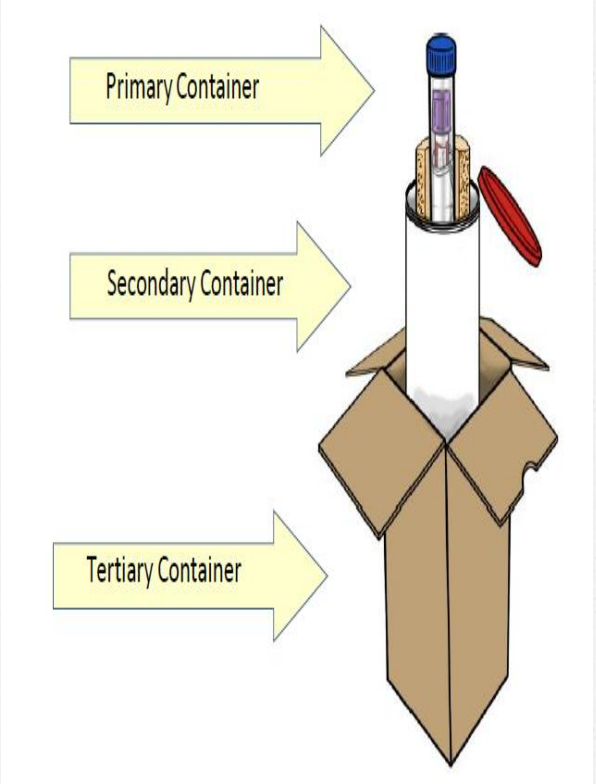
SURVIVAL OUTSIDE HOST: The virus can survive in liquid or dried material for a number of days. Infectivity is found to be stable at room temperature or at 4°C for several days, and indefinitely stable at -70°C.

LAB SPECIMENS SOURCES: Blood, serum, urine, respiratory and throat secretions, semen, and organs or their homogenates from human or animal hosts. Human or animal hosts, including non-human primates, may represent a further source of infection.

IDI/MU-JHU Laboratory EBOLA GUIDE | Page 1 of 4

Other Laboratory Considerations

- **Hem:** Low white blood cell and platelet counts,
- **Chem:** elevated liver enzymes
- **Coag:** Disseminated intravascular coagulation
- **PCR** - confirmation
- Multiorgan failure



Lab Checklist - Are you ready?

1. System to Identify & Notify lab in advance
2. Acute care testing.
3. PPE
4. Specimen Transport
5. Close Centrifugation
6. Removal/disposal strategy for PPE
7. Procedure for cleaning/disinfecting
8. Address exposure from manual processes (Micro/BB)
9. A simple plan & practice

Conclusion

1. Fighting Ebola or any ID is a collective responsibility, that include government, community, healthcare facilitates

2. Understand the culture and apply a public health strategy shift to eradicate the ID.

3. Every healthcare professional should focus on changing what they can control and then strive influence others


Behind every sample we process,
there is a human face
Making the people
we serve smile