



Banking AIDS-Related Malignancies in sub-Saharan Africa

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Worldwide Cancer Burden

- In 2010, Cancer is single greatest cause of mortality worldwide
(> **1 million cases** in sub-Saharan Africa)
- By 2020, 16 million new cancer cases
- By 2030, 27 million new cancer cases

Cancer incidence is increasing around the world

- Cancers are debilitating and lethal
- Treatment is resource intense
- Prevention requires energy, commitment and financial resources
- Both treatment and prevention require knowledge

Platform for knowledge

- Top-down guidelines, methods and modalities



- Bottom-up platforms



Platform for knowledge

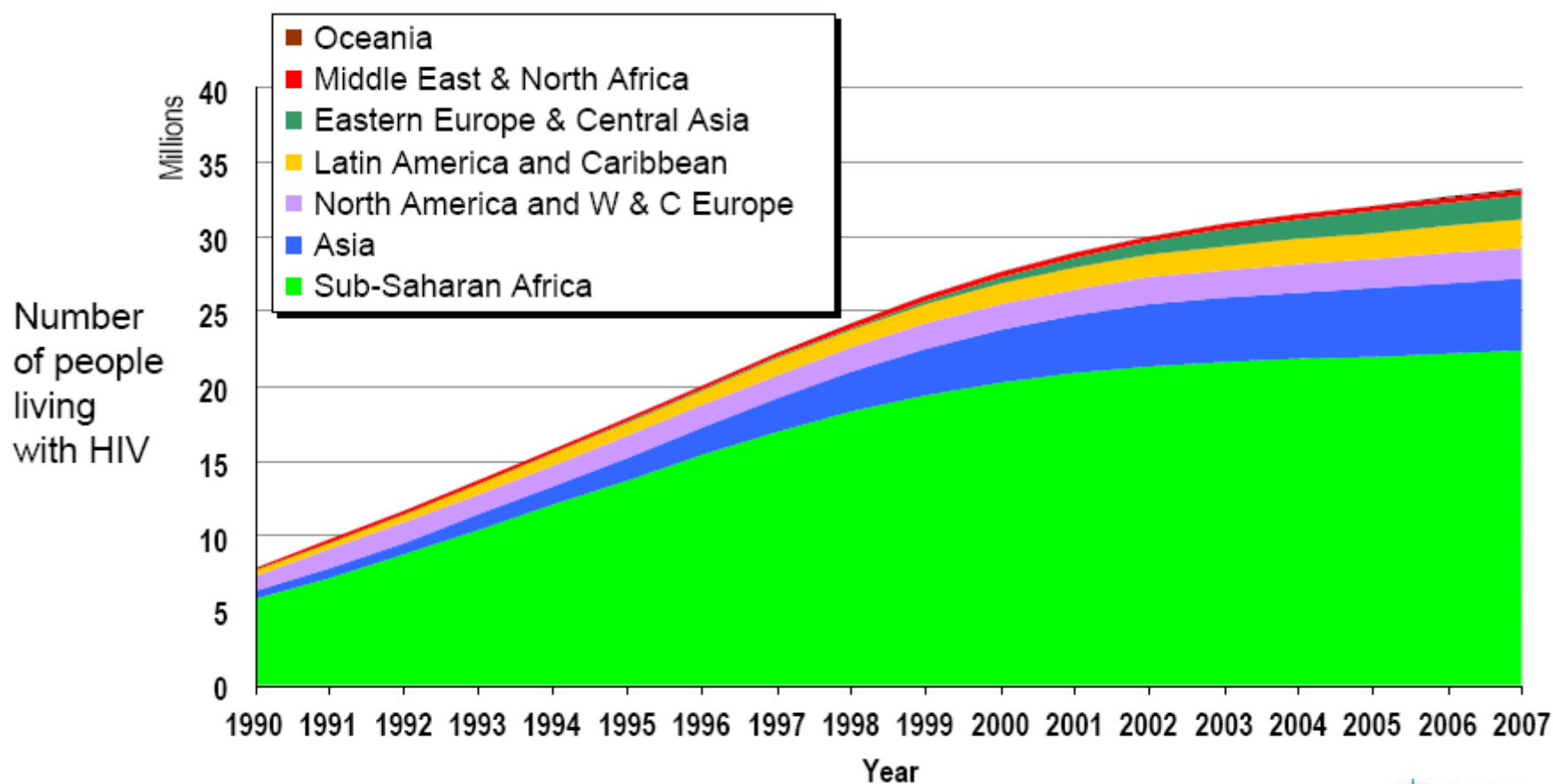
- Integrated



Basic Requirements for a **HIV/AIDS Cancer Biorepository Platform**

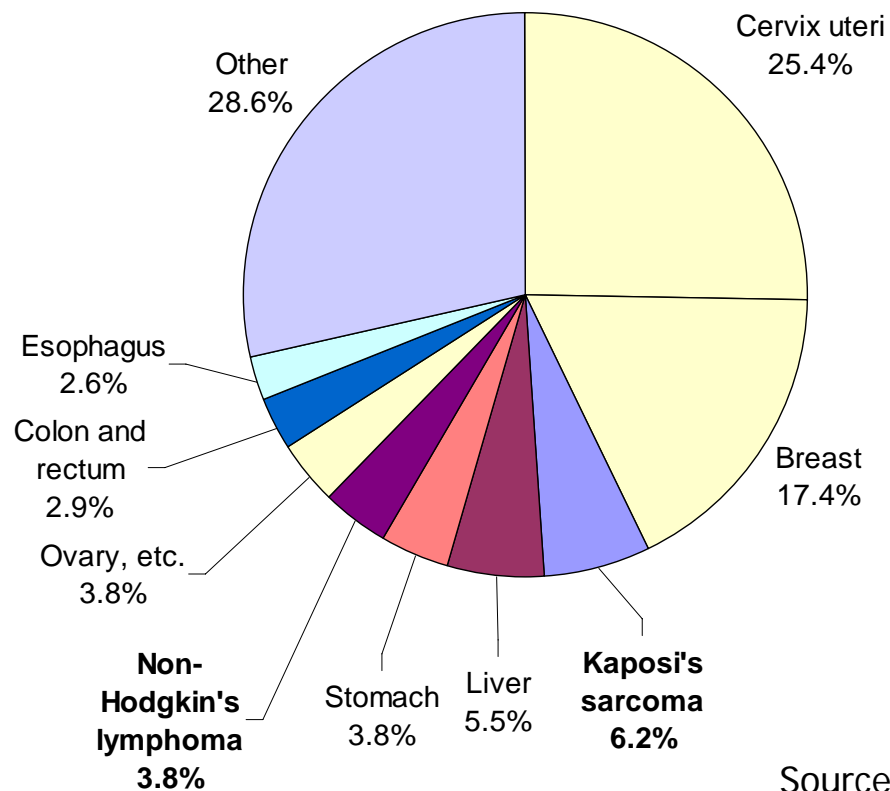
- HIV infected population
- Cancer prevalence
- Medical care conduits
- **Cancer diagnosis/tissue preservation (pathologist)**
- Established organization to support research (Universities/Institutes)
- Biorepository space

Adults and children living with HIV, by region, 1990–2007

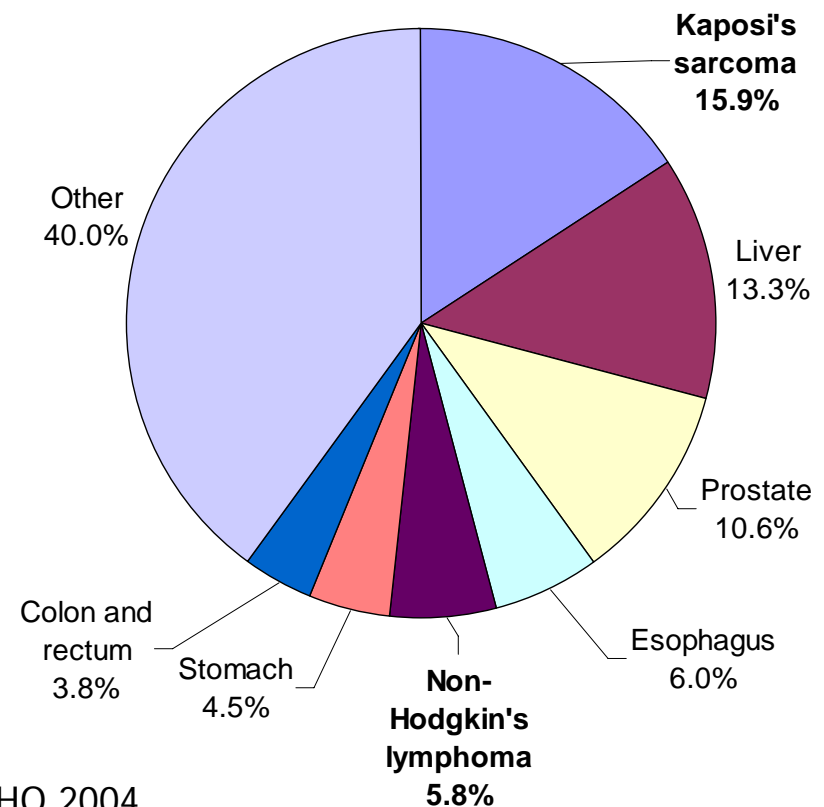


Malignancies in sub-Saharan Africa Gender and Site, 2002

Sub-Saharan Women



Sub-Saharan Men



Source: WHO 2004

Mulago Hospital Complex, Kampala, Uganda



Makerere University

Uganda Cancer Institute, Kampala, Uganda



Uganda Cancer Institute, Kampala, Uganda



Kenyatta National Hospital Nairobi, Kenya



University of Nairobi

Histology Laboratory



- Trained personnel
- Laboratory space
but
- Electrical outages
- Financial constraints

Preservation of Tissue

Pre-analytical barrier

Formaldehyde

34-40% gas by weight

10% formalin (4% formaldehyde)

40% formaldehyde	100ml
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Distilled tap water	900ml
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Formalin Fixation

- Neutral buffered formalin

40% formaldehyde	100ml
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Sodium Dihydrogen phosphate monohydrate	4g
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Disodium hydrogen phosphate anhydrous	6.5g
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Distilled water	900ml
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Tissue processors

pre-analytical barrier

- Aged, poorly functioning equipment can be replaced. Electricity is unreliable.



Technical Challenges

pre-analytical barrier

- Laboratory supply shortages



Pathology Archives, a tissue biorepository



10% Formaldehyde

Proteins and DNA, RNA, other

- **Pre-analytical variability**
 - Selected samples
 - Selected analytes
- **Analytical variability**
 - Partial preservation analytes
 - Absence of analyte
 - Preservation failure
 - Destruction

Immunohistochemistry (IHC) protein analytes

H&E

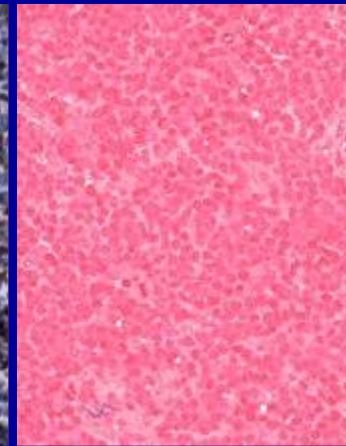
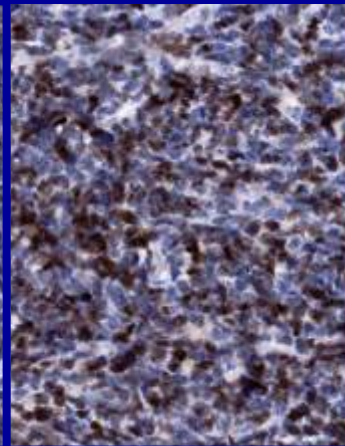
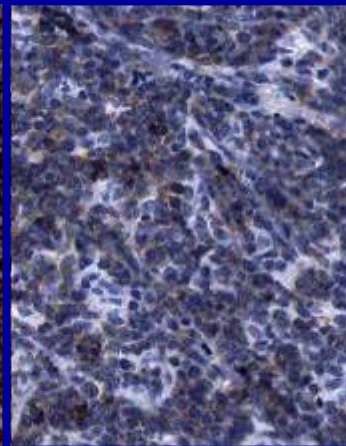
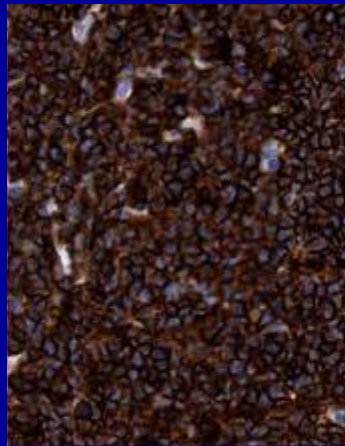
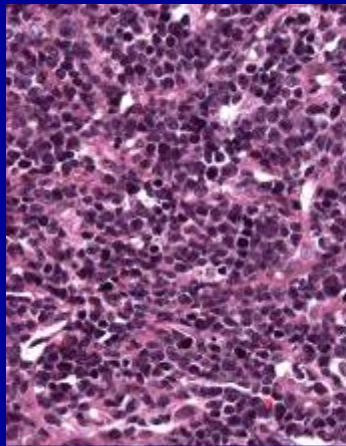
CD20
(IHC)

CD10
(IHC)

BCL6
(ISH)

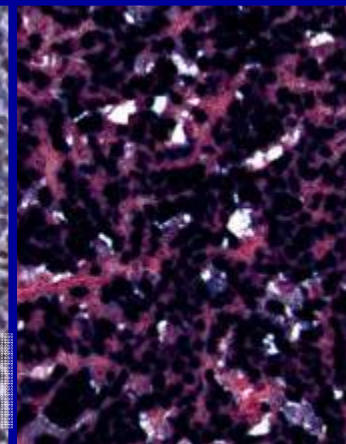
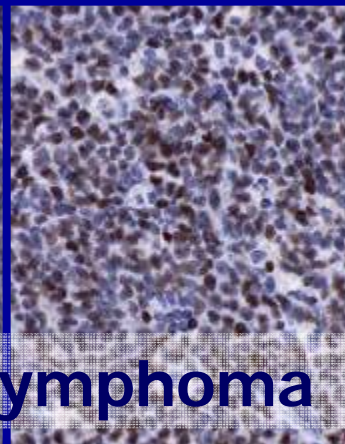
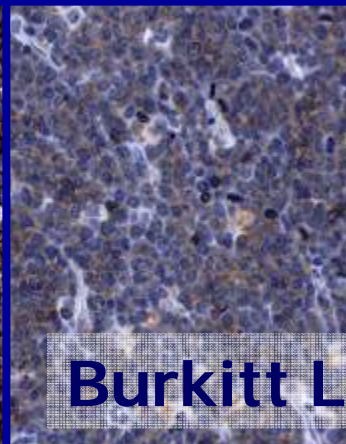
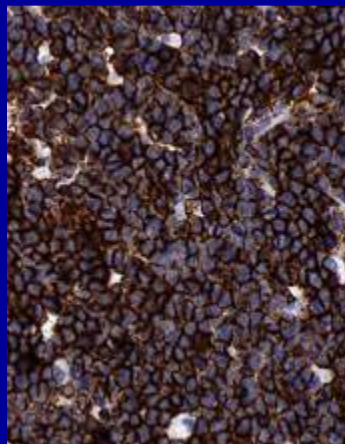
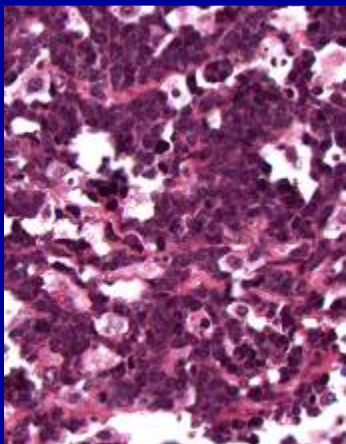
EBER
(ISH)

Case
A



20X

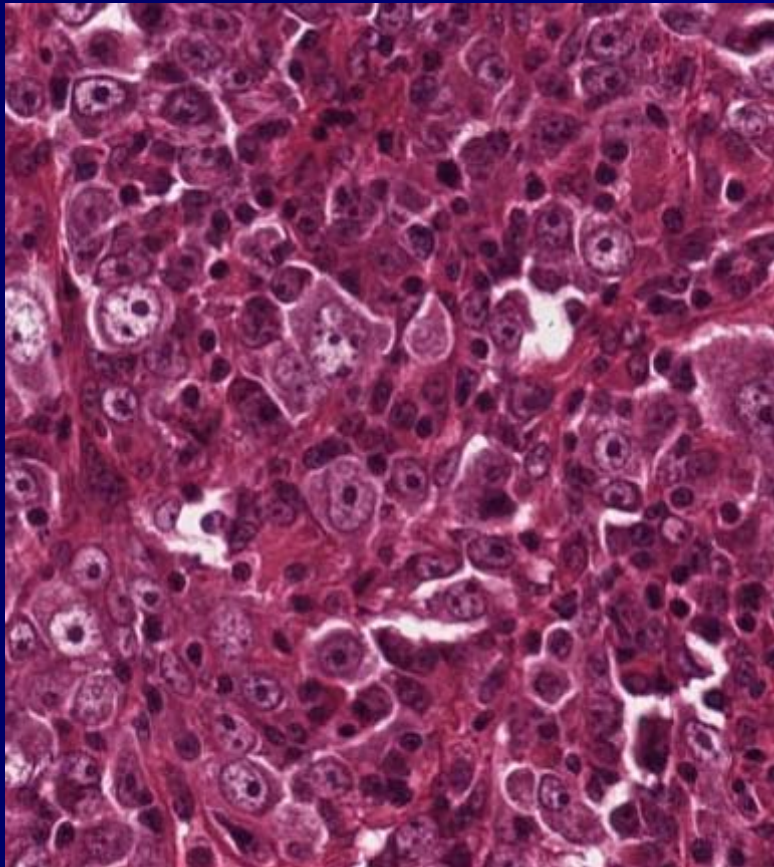
Case
B



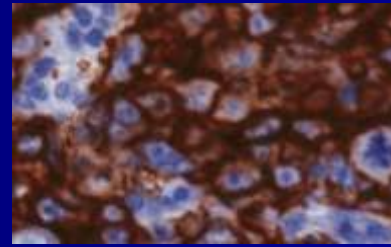
Burkitt Lymphoma

Plasmablastic Lymphoma

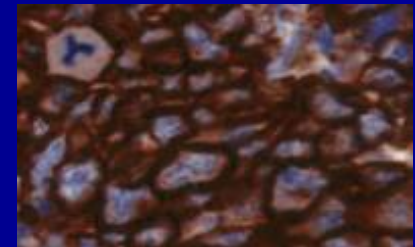
H&E



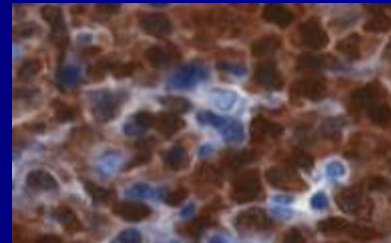
CD20



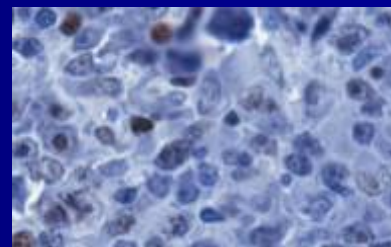
CD44



MUM1



Ki67



HHV8-

Plasmablastic Lymphoma

H&E

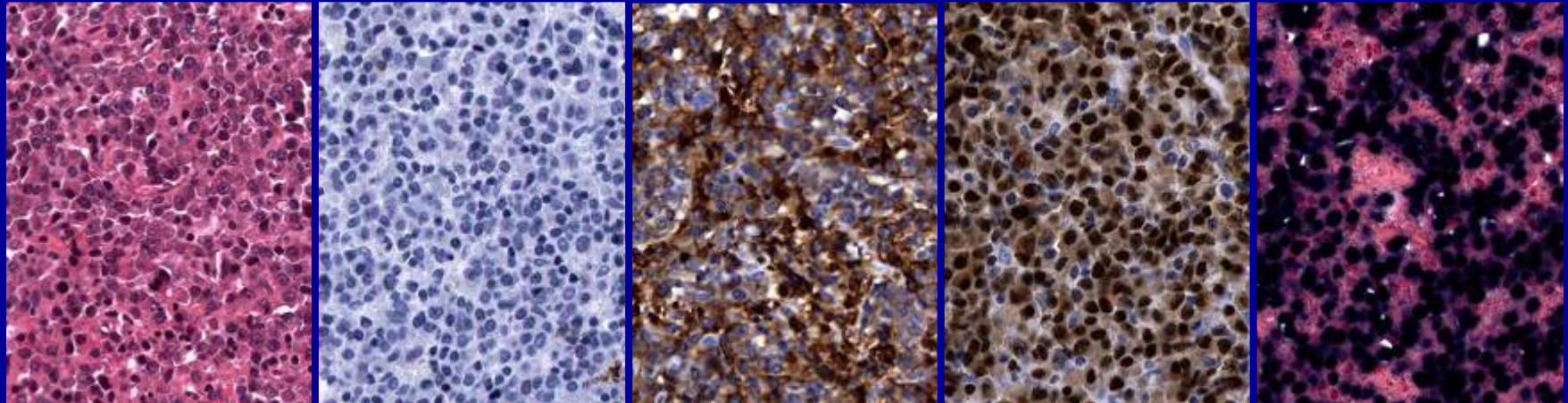
CD20
(IHC)

CD138
(IHC)

MUM1
(ISH)

EBER
(ISH)

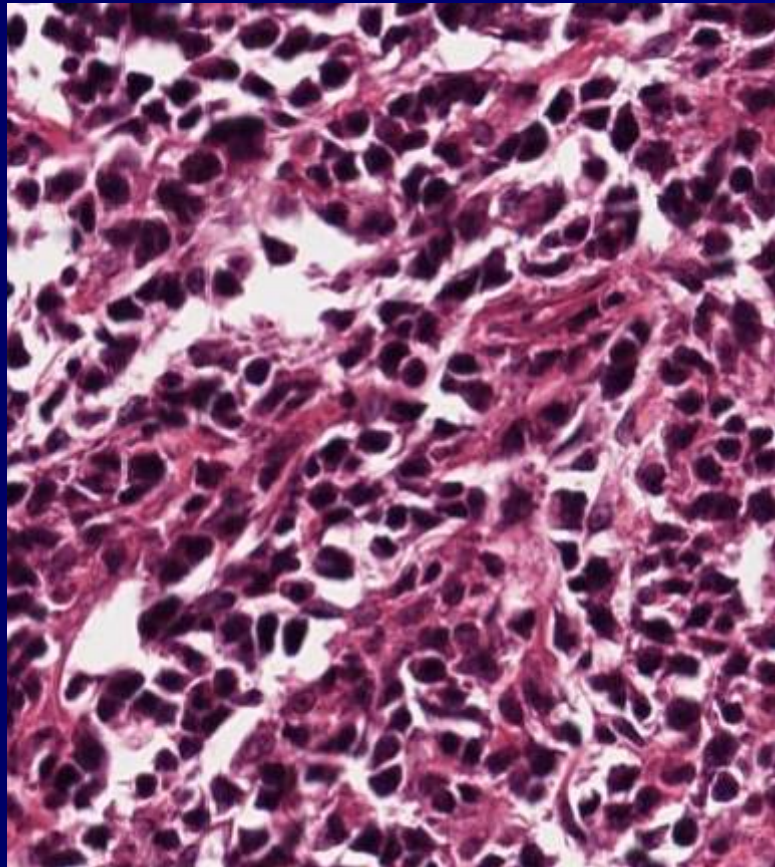
20X



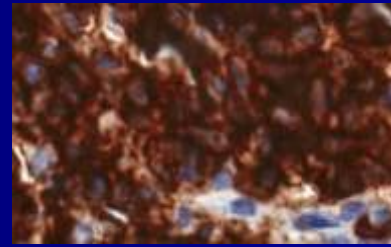
HHV8 (LANA-1) negative

Diffuse large B-cell lymphoma (DLBCL) Germinal centre B-cell-like (GCB)

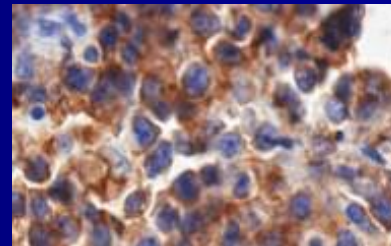
H&E



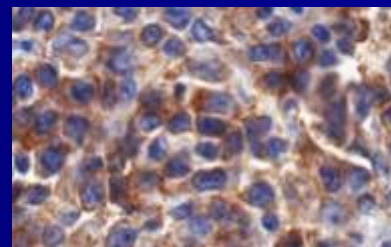
CD20



CD10

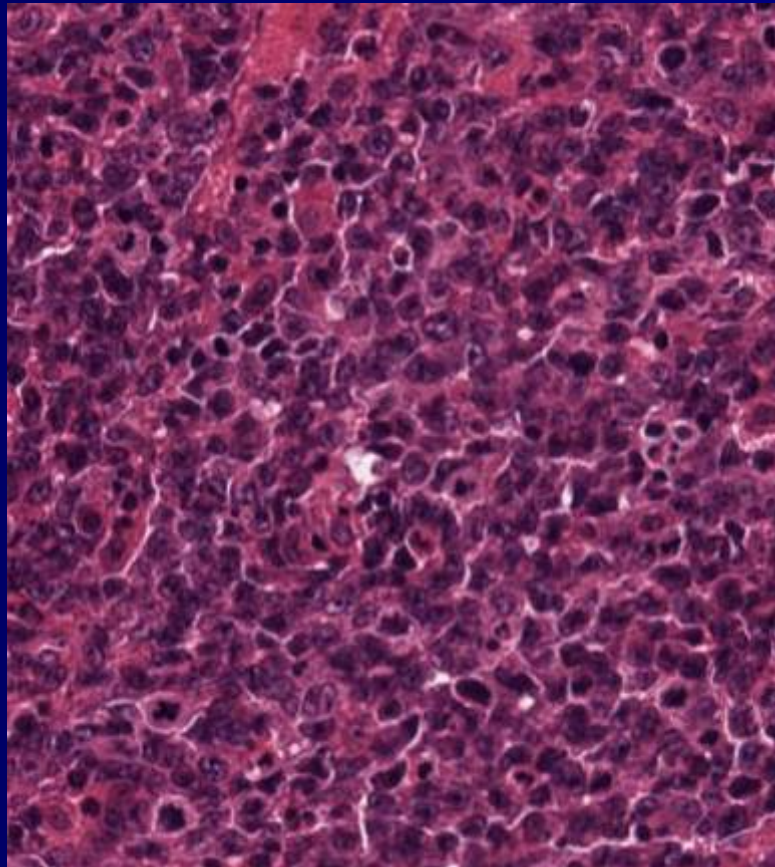


Ki67

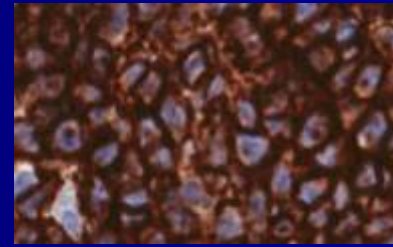


Diffuse large B-cell lymphoma (DLBCL) Activated B-cell phenotype

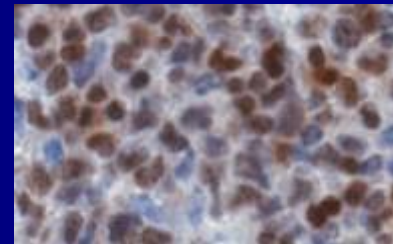
H&E



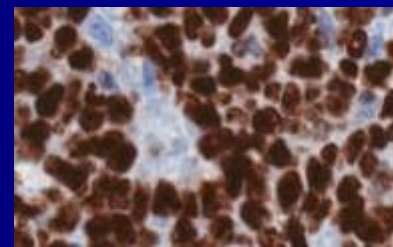
CD20



MUM1

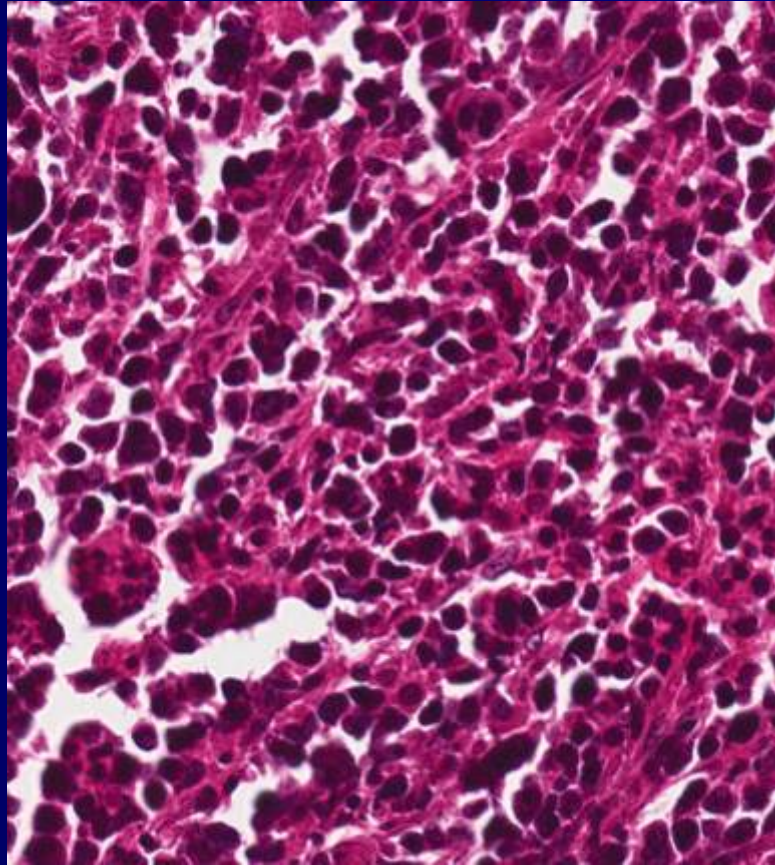


Ki67

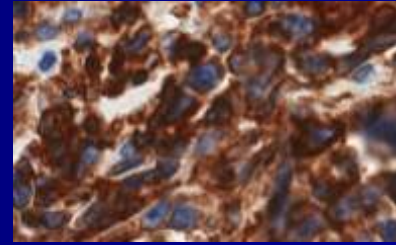


Anaplastic Lymphoma

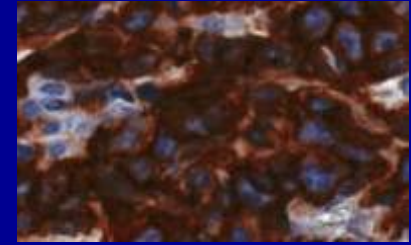
H&E



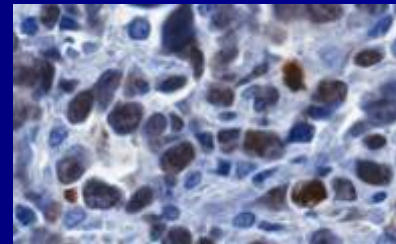
CD45RO



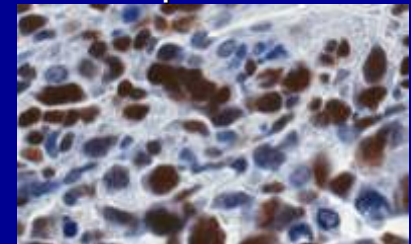
CD30



Ki67



p53



B cell markers negative NK

Conclusions

- Tissue biorepository offers a **bottom up** opportunity to implement pre-analytical controls.
- Frozen or specially preserved tissues (ex. RNA later) support isolation of DNA, RNA, proteins and other analytes but:
 - Fresh tissues are difficult to obtain outside of a research protocol.
 - Frozen or refrigerated tissues are expensive to maintain. (electricity unreliable)

Conclusions

- Fixed tissues are collected as part of patient care (<50% CA) and autopsy evaluations.
 - Optimally fixed tissues are a valuable resource.
 - Without pre-analytical controls, FFPE tissues have marginal value.
 - Current tissues can reveal scope of cancers not previously clearly documented.

Conclusions (continued)

- Non-toxic fixation methods needed
 - Support expanding molecular techniques
- Deploy with expanded quality assurance
- **Bottom-up** platforms required for cancer research

Collaborators



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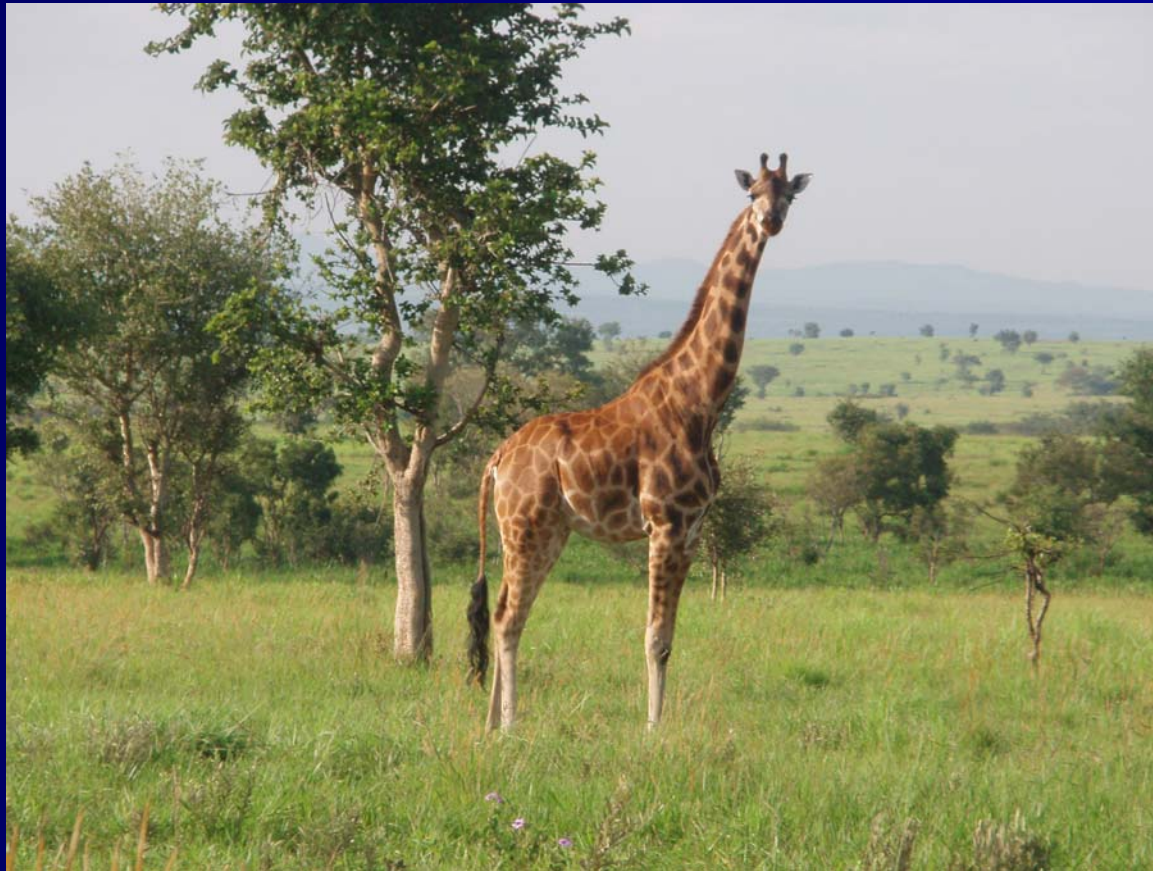


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Thank you



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