Diagnosis and Treatment of endemic Burkitt Lymphoma in the Pediatric Population in Western Kenya

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Background

Burkitt Lymphoma

- Burkitt Lymphoma (BL) is a highly aggressive B-cell non-Hodgkin lymphoma
- 3 subtypes: ***1) endemic, 2) sporadic, 3) immunodeficiency/HIV-associated***
- In all subtypes:
  - male to female ratio of 2:1
  - t(8,14) translocation of c-myc proto-oncogene

Table 1 | **Characteristics of Burkitt's lymphoma (BL) subtypes**

Characteristics	Endemic	Sporadic	HIV-associated
Geographical distribution	Equatorial Africa*, Papua New Guinea	United States, Europe	Worldwide
EBV-association	>90%	<20%	~30% in Europe and the United States
Incidence rate	1–20/100,000	0.01/100,000	Variable
Age range	2–14 years	All ages	All ages
Tumour site	Extranodal	Lymph nodes	Lymph nodes
c-myc translocation	Yes	Yes	Yes
Cofactors	Malaria, EBV	Unknown	HIV infection

*There is some evidence that in Africa all three subtypes can be present. There is not enough known about South American BL to determine whether it is a new subtype of BL.

Endemic Burkitt's lymphoma: a polymicrobial disease? Rosemary Rochford, Martin J. Cannon & Ann M. Moormann, Nature Reviews Microbiology 3, 182-187|February 2005

Focusing on Endemic Burkitt Lymphoma (eBL)

- More common compared to other subtypes
- Higher incidence rate in equatorial Africa primarily near the holoendemic malaria belt
- Highly associated with Epstein-Barr-virus (EBV) infection
- Mainly presents in mandible or facial bones; less common in the abdominal region compared to the other subtypes

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Objectives

1) To improve the outcomes of children diagnosed with eBL through novel clinical and research approaches between medical institutions in Western Kenya
2) To address the issue of abandonment of treatment in eBL cases

The study is a collaborative effort between the Academic Model Providing Access To Healthcare (AMPATH) which includes Indiana University and the Moi Teaching and Referral hospital (MTRH) in Eldoret, Kenya and the Kenyan Medical Research Institute (KEMRI), which includes Jaramogi Oginga Odinga Teaching and Referral hospital (JOOTRH) in Kisumu Kenya and the University of Massachusetts Medical School (Laboratory of Dr. Moormann).

Methods

Diagnosing eBL

Previous Method

1. Biopsy patient via fine-needle aspiration of tumor
   1. In addition, collect a sample peripheral blood for control
2. Smear tumor sample on microscope slide
3. Prepare sample via hematoxylin & eosin-staining method for visualization

Problems with this method

- Average of two weeks for final diagnosis
- Immunohistochemical staining while beneficial is not affordable for all families

Current New Method

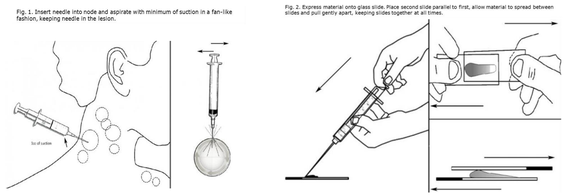
1. Biopsy patient via fine needle aspiration of tumor
   1. In addition, collect a sample peripheral blood for control
2. Smear tumor sample on microscope slide
3. Use flow cytometry and fluorescence in situ hybridization (FISH) to analyze tumor sample

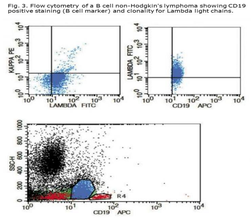
Benefits with this method

- Less than one week turn-around for diagnosis therefore treatment efforts start sooner
- Improvement in staging via evaluations of spinal fluid, bone marrow, and imaging

Methods Cont.

FNA & Flow Cytometry Diagnostic Example





Figures & figures legends by: Wright, Colleen Anne. Fine-needle aspiration biopsy of lymph nodes. Continuing Medical Education, [S.l.], v. 30, n. 2, p. 56-60, feb. 2012. ISSN 2078-5143. Available at: <http://cmej.org.za/index.php/cmej/article/view/2333/2189>. Date accessed: 01 Aug. 2017.

Barriers to Healthcare

Abandonment of treatment in eBL cases

- **Limited resources**: lack of chemotherapy drugs
- **Financial burdens**: transportation issues for patients and their families, inability to afford certain treatments
- **Training/Support**: training of staff in cancer treatment protocols & diagnostics, educating parents on eBL diagnosis
- **Medical personnel strikes**: patients cannot receive treatment; patients sent home from hospitals and clinics

Addressing abandonment of treatment

- Financial interventions: transportation cost to medical facilities for patients & families
- Monthly team meetings between MTRH and JTRH ensures standardized treatment regimen
- Open communication between clinicians and patient families

Future Directions

My Role in Project/Study

- Focusing on the abandonment of care
- Review medical records of patients during the treatment phase of care to assess clinical information and if there are correlations with clinical outcome
  - Hypothesis: In regards to complete blood count (CBC), are there key similarities or differences in patients' CBC at MTRH and JOOTRH during the course of treatment that would indicate clinical outcome?
  - Results from this question may encourage more resources and support for transfusions for eBL patients

Images from: http://www.jaramogireferral.go.ke/ http://www.jaramogireferral.go.ke/obama-childrens-hospital/

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