Malawi Telepathology

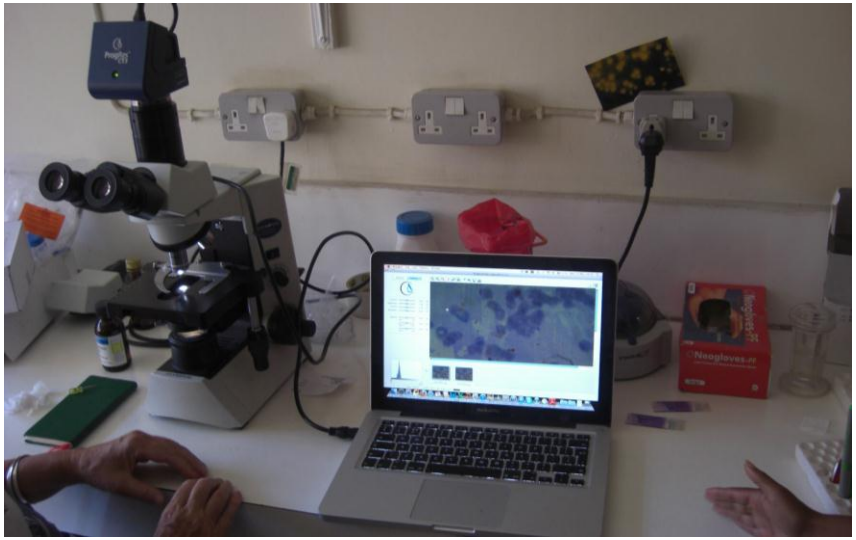
Helping children with cancer in Malawi by speedy diagnosis

Dr Peter Carey

Consultant Haematologist

Newcastle upon Tyne Hospitals

NHS Foundation Trust




AFRICA
Mediterranean Sea
Red Sea
Gulf of Aden
ATLANTIC OCEAN
INDIAN OCEAN
Algiers
Tunis
TUNISIA
Rabat
MOROCCO
Madeira Is. (PORTUGAL)
Canary Is. (SPAIN)
Laayoun
Western Sahara
Tripoli
Cairo
ALGERIA
LIBYA
EGYPT
MAURITANIA
Nouakchott
CAPE VERDE
Praia
Dakar
SENEGAL
GAMBIA
Banjul
Bissau
GUINEA-BISSAU
GUINEA
Conakry
Freetown
SIERRA LEONE
Monrovia
LIBERIA
Abidjan
Bamako
MALI
Niamey
NIGER
BURKINA FASO
Ouagadougou
CÔTE-D'IVOIRE
Yamoussoukro
GHANA
Accra
TOGO
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BENIN
Porto Novo
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NIGERIA
Lake Chad
N'Djamena
CHAD
Khartoum
SUDAN
ERITREA
Asmara
DJIBOUTI
Djibouti
Socotra (YEMEN)
ETHIOPIA
Addis Ababa
SOMALIA
Mogadishu
Malabo
EQUATORIAL GUINEA
Principe
SAO TOME AND PRINCIPE
Sao Tome
Sao Tome
Libreville
GABON
Annobón (EQUATORIAL GUINEA)
Yaoundé
CAMEROON
CENTRAL AFRICAN REPUBLIC
Bangui
SOUTH SUDAN
Juba
Lake Albert
Lake Turkana
UGANDA
Kampala
KENYA
Nairobi
CONGO
Brazzaville
Kinshasa
Cabinda (ANGOLA)
DEMOCRATIC REPUBLIC OF THE CONGO
RWANDA
Kigali
Bujumbura
BURUNDI
Lake Victoria
Lake Tanganyika
Dodoma
UNITED REPUBLIC OF TANZANIA
Pemba
Zanzibar
Amirante Is.
Victoria
SEYCHELLES
Aldabra Is.
Providence Is.
Farquhar Is.
Agalega Is.
Moroni
COMOROS
Mayotte Is. (under French admin.)
Lake Nyasa
Luanda
ANGOLA
ZAMBIA
Lusaka
Lilongwe
MALAWI
MOZAMBIQUE
Lake Kariba
Harare
ZIMBABWE
Antananarivo
MADAGASCAR
Tromelin (FRANCE)
Cargados Carajos
MAURITIUS
Port Louis
Réunion (FRANCE)
Ascension (UK)
St. Helena (UK)
NAMIBIA
Windhoek
BOTSWANA
Gaborone
Pretoria
Mbabane
SWAZILAND
Maputo
Bloemfontein
Maseru
LESOTHO
SOUTH AFRICA
Cape Town
0 500 1000 km
0 500 1000 mi
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Final boundary between the Republic of the Sudan and the Republic of South Sudan has not yet been determined.


Lake Tanganyika
32°
Songwe R.
36°
Kilombero R.
0 150 km
0 100 mi
Songwe R.
Lufubu R.
Lakungu R.
Chitipa
Karonga
Tanzania
N
Chambeshi R.
Lake Malawi
Rumphi
Mzuzu
Luangwa R.
Ruvuma R.
Nkhata Bay
Chisamula I. (Malawi)
Zambia
Mzimba
Luwawa
12°
Likoma I. (Malawi)
Malawi
Lugenda R.
Luwombwa R.
Messinge R.
Nkhota Kota
Kasungu
Mozambique
Luangwa R.
Messalo R.
Bua R.
Salima
Mchinji
Lilongwe
Monkey Bay
Dedza
Mangoche
Luia R.
Lake Malombe
Revúboé R.
Ncheu
Mozambique
Zomba
Lake Chilwa
Shire R.
Blantyre
Limbe
Cabora Bassa
Chikwawa
Mulanje
16°
Thyolo
Zambeze R.
Hunyani R.
LicungoR.
Mólocué R.
Mazoe R.
Nsanje
Zimbabwe
Cuácua R.
Cauresi R.
Harare
Lurnha R.
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Mozambique Channel

Malawi

- Population 13.6 million
- Resource challenged country
  - Healthcare workers/100,000: 57 (UK 1552)
  - Health budget/person/year £10 (UK £2000)

- Queen Elizabeth Central Hospital large government referral hospital – 28 000 children admitted per year
- 23 bedded paediatric oncology ward – 320 new patients per year
- Head of unit Professor Elizabeth Molyneux (Liz)


WELCOME TO
SOBO

The 10 most common childhood cancers in Malawi

- 320 new patients per year

Diagnosis	%
Burkitt lymphoma	46
Kaposi sarcoma	14
Retinoblastoma	9.9
Wilm's tumour	6.3
Hodgkin lymphoma	3.9
Leukaemia (A.L.L.)	2.8
Non Hodgkin lymphoma	2.5
Rhabomyosarcoma	2.5
Osteosarcoma	1.7
Other sarcoma	1.5

The Challenge

- First world medicine offers highly intensive treatment with relatively good survival and high morbidity
- This requires an expensive infrastructure for intensive supportive care both in the hospital and out.
- Some childhood tumours (eg Burkitt, ALL) are very chemosensitive. Effective results can be achieved with pragmatic gentler treatment protocols with acceptable toxicity, which are deliverable in a resource limited setting

- Accurate, fast diagnosis is critical to patient and treatment selection

Simon Bailey; Liz Molyneux

ALL Induction

Patient Name

Date of Birth

Hospital Number

Weight

Surface area

Full Blood count

Haemoglobin

White blood count

Neutrophils

Platelets

Treatment given

Bone marrow

Intrathecal methotrexate

1-2 years old - 8 mg
2-3 years old - 10 mg
3+ years old - 12 mg

Dose

Dose

Asparaginase

6000 IU/m^2 per dose (intramuscular)
Day 4 - 1st dose

Dose

Vincristine

1.5 mg/m^2 per dose

Dose

Prednisolone

40 mg/m^2/day in 2 divided doses then wean over 5 days

Dose

Day	1	8	15	22
Week	2	3	4	5
Date				

Malawi ALL 3
Sheet 2
Induction

Blantyre Burkitt Protocol

Cyclophosphamide	↓			↓			↓			↓	
Doxorubicin (Stage 3 and 4 only)				↓			↓				
Prednisolone	↓	↓	↓	↓	↓						
Vincristine		↓			↓			↓			↓
IT MTX/HC		↓			↓			↓			↓
DAYS		1			8			15			28

Doses. Cyclophosphamide 40 mg/kg (max 1.6g)
Doxorubicin 60 mg/m^2
Prednisolone 60 mg/m^2 per day in 2 divided doses
Vincristine 1.5 mg/m^2 (max 2 mg)
IT methotrexate 0-1 year 6mg, 1-2 years 8 mg, 2-3 years 10 mg, 3 + years 12mg
IT hydrocortisone 12mg/dose

New patient work up

- Clinical assessment (history, examination)
- Imaging (X ray, ultrasound, CT)
- Pathology tests
  - Blood count and film examination, biochemistry
  - Bone marrow aspirate
  - Fine needle aspirate
  - Biopsy

- Problem – local turnround time for pathology reporting


ProgRes
CT3
HIV
LAB

ID:

Pathology Report for

Queen Elizabeth Hospital Malawi.

Patients name. **Hospital No.**

Age (or Date of Birth). **Sex.**

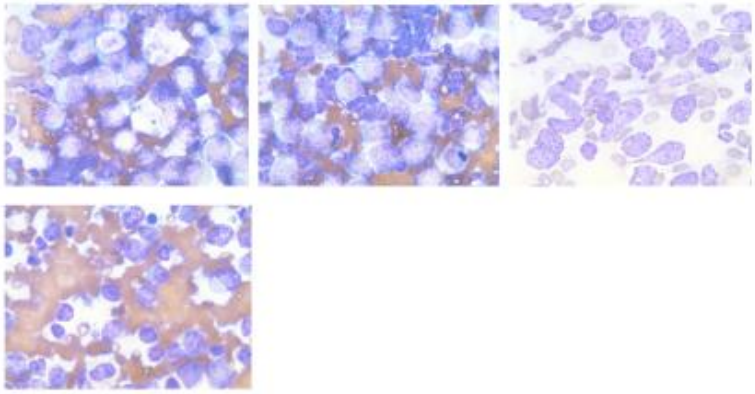
Date of Sample.

Type of Sample. FNA

Clinical History.

? Relapsed Burkitts -swollen left leg - FNA from leg

Slides.



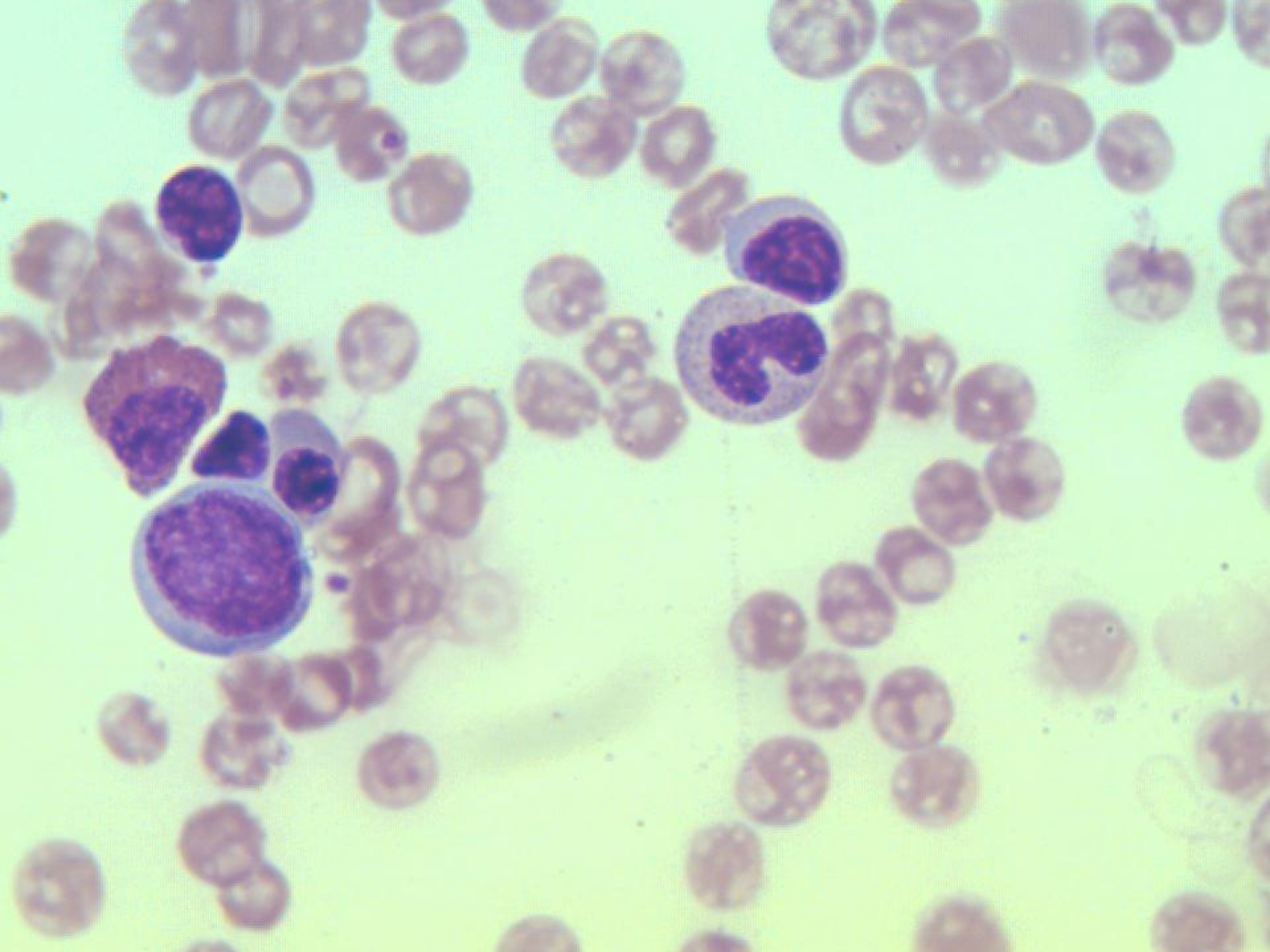
Report.

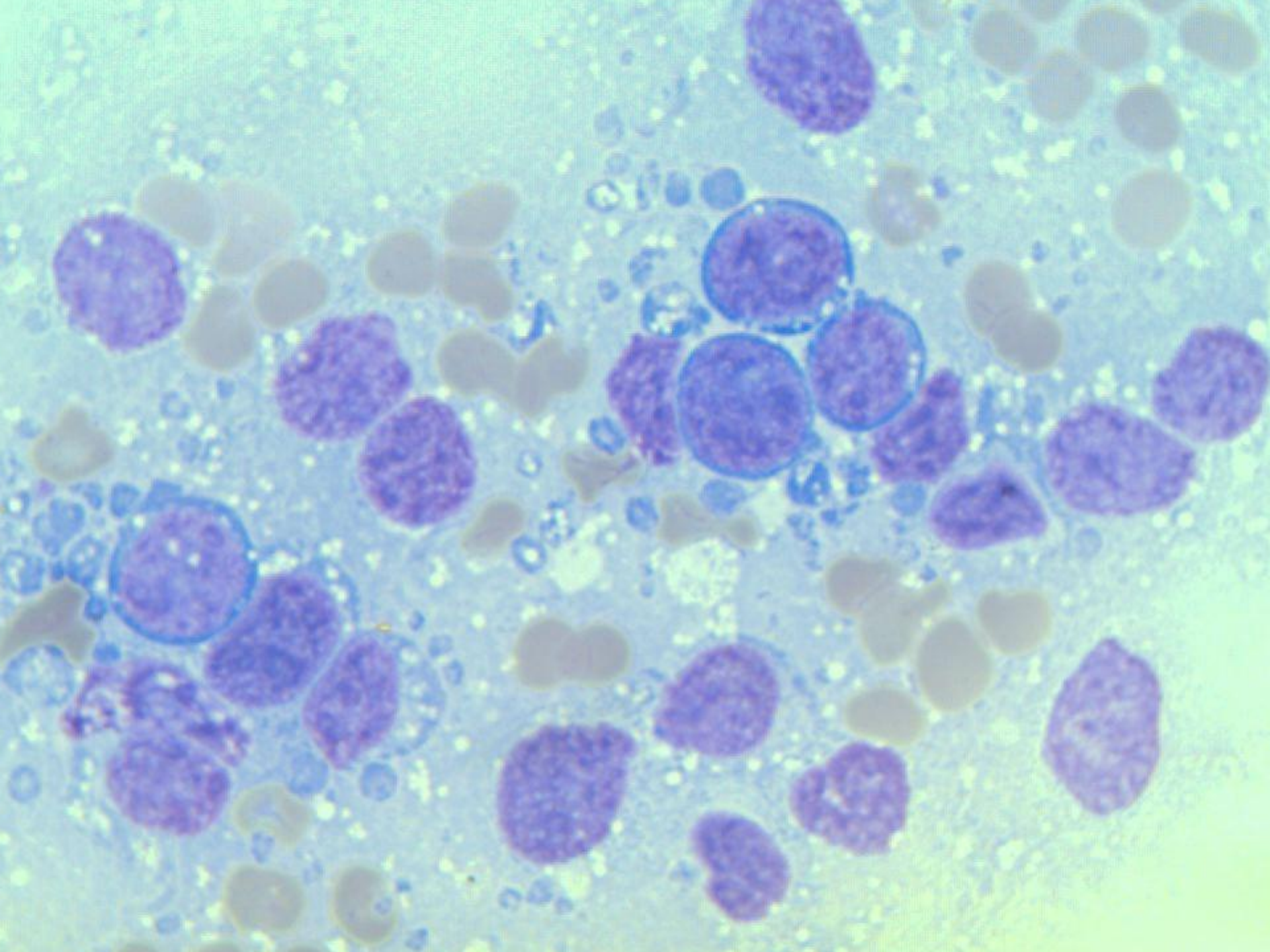
Cellular FNA preps. Heavy monotonous infiltrate of malignant cells with appearances typical for Burkitt Lymphoma. Consistent with the clinical diagnosis of relapsed Burkitt Lymphoma.

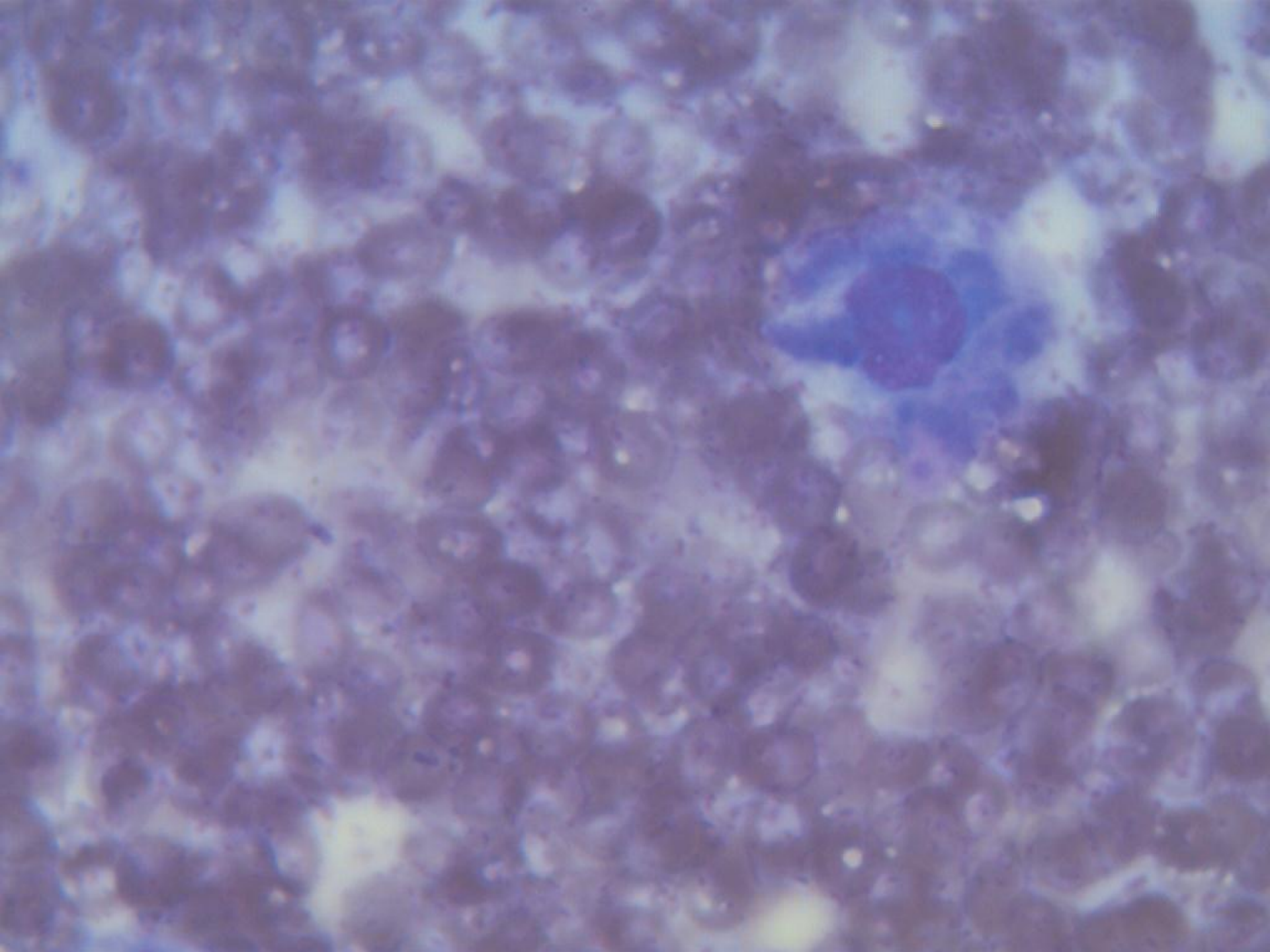
Recommendation.

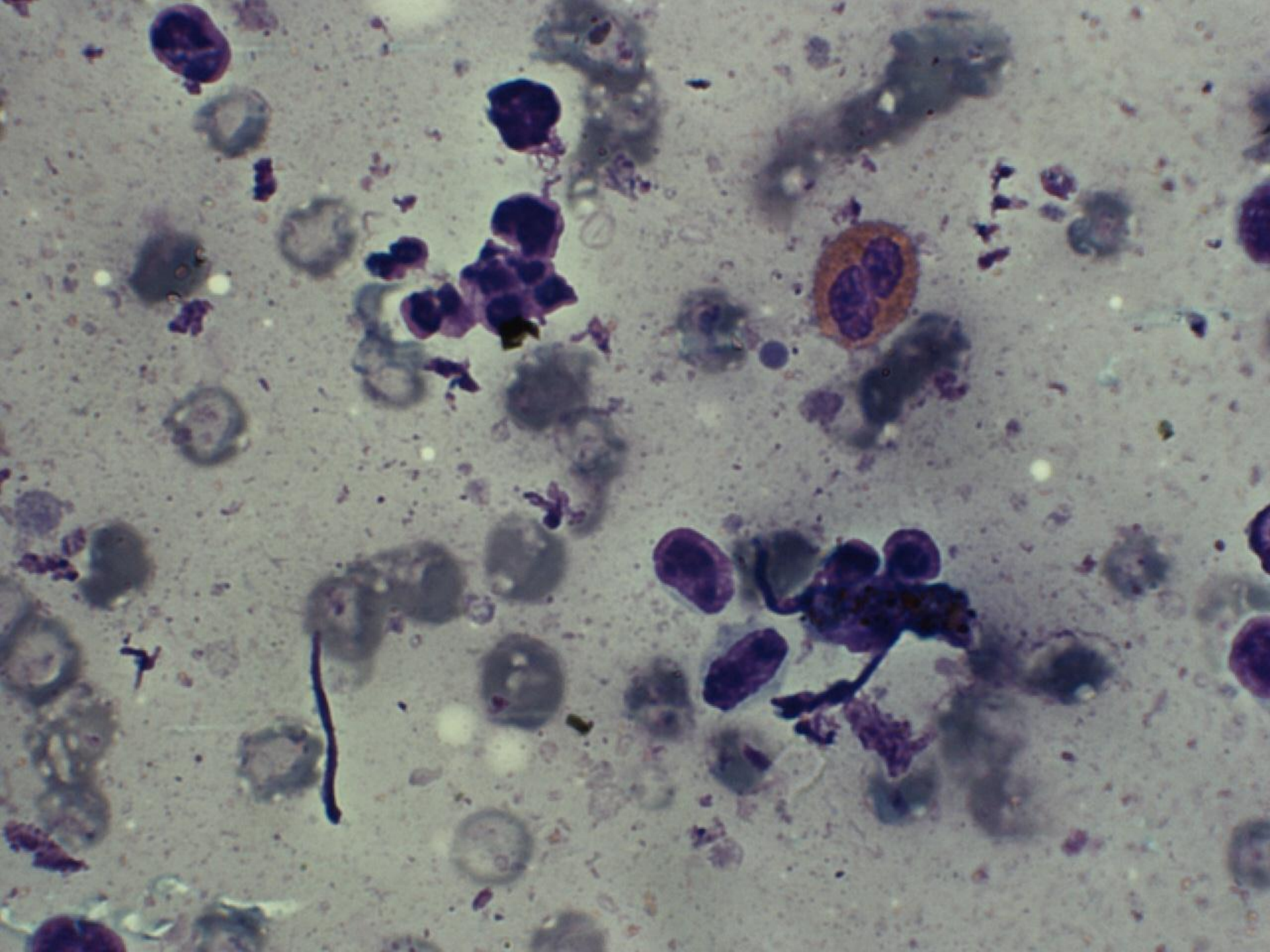
Suggested treatment with relapsed Burkitt lymphoma protocol

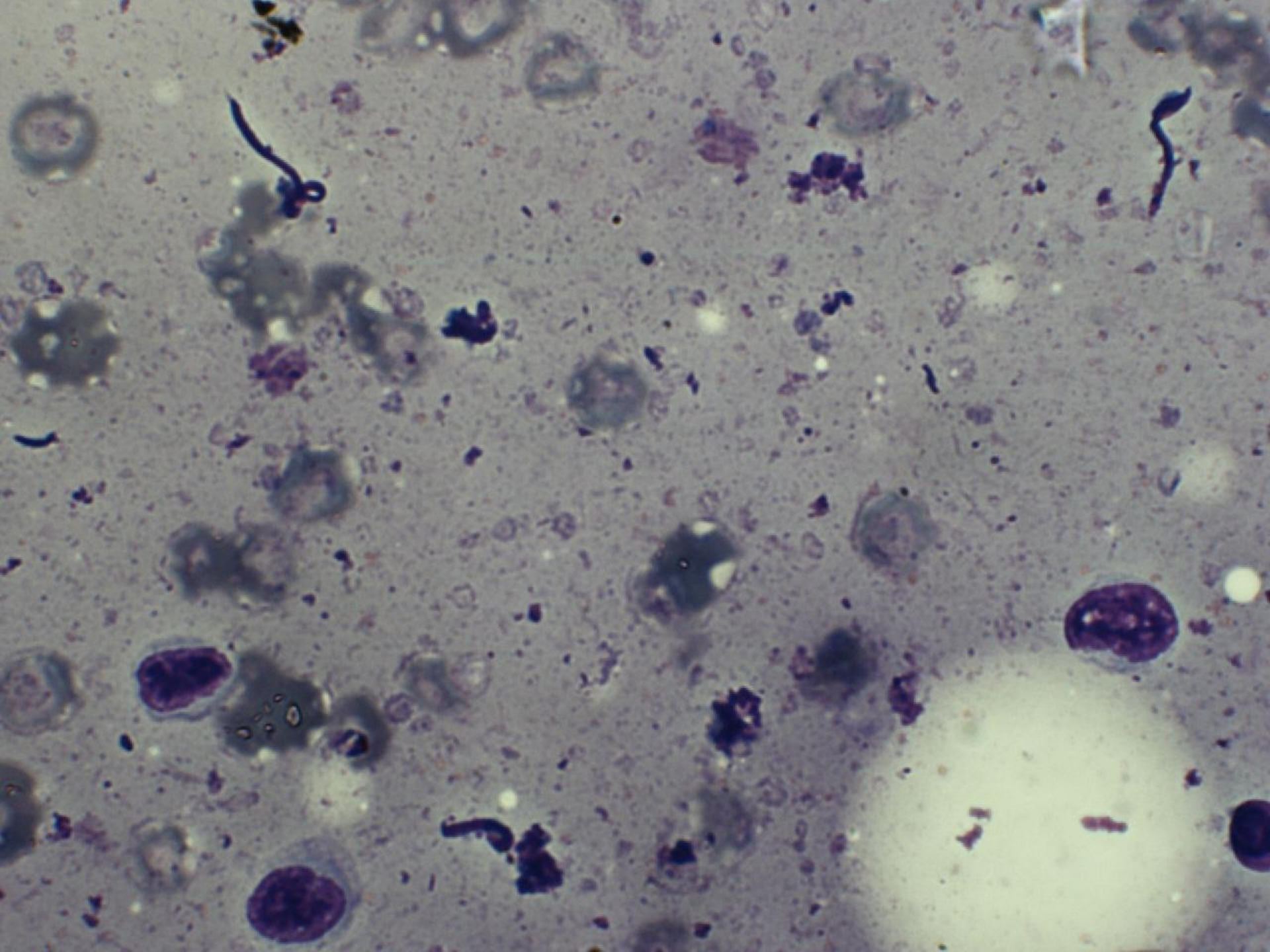
Reported by. **Date.**

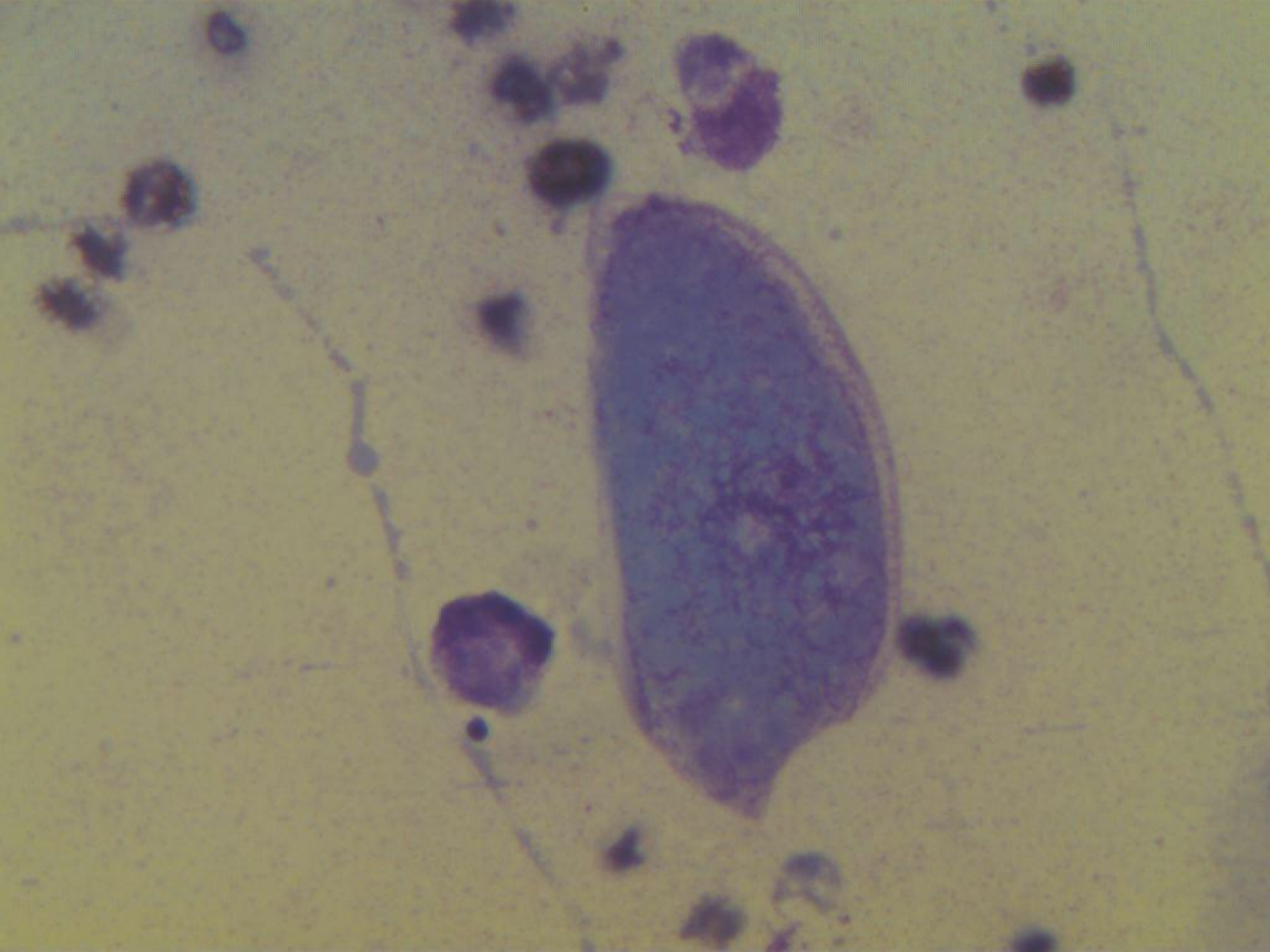












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Short report

Remote and rapid pathological diagnosis in a resource challenged unit

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ABSTRACT

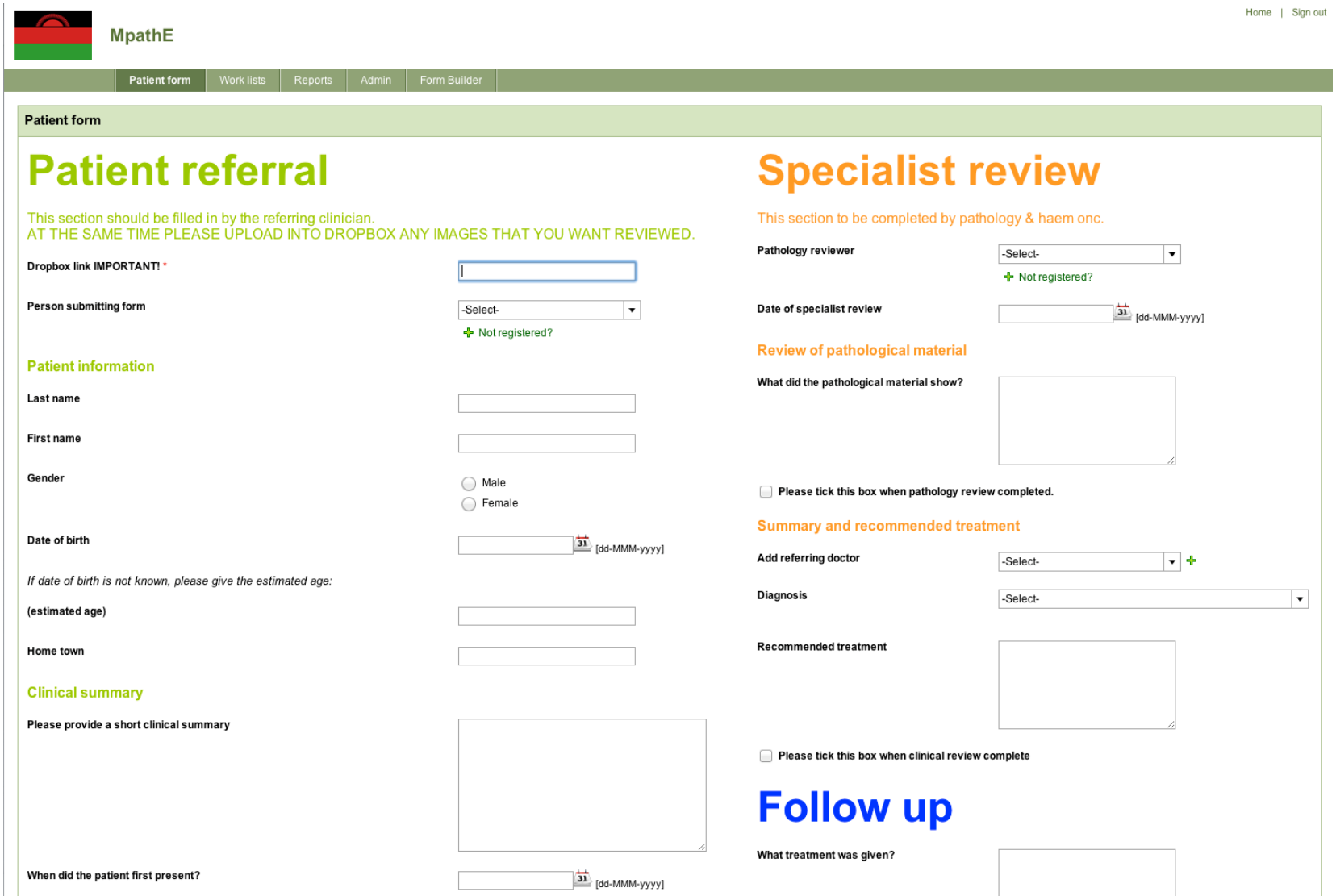
Malawi is one of the world's poorest countries, but despite this, has a dedicated paediatric oncology service. The service has been hampered by the inability to make a timely cytological diagnosis in the majority of patients. A telemedicine programme was commenced to help overcome this problem, and the results for the first 197 consecutive patients are described. The results are compared with the local reports where available. Most samples were fine needle aspirates (104/197–53%), but others included bone marrow aspirates, peripheral blood films and other fluid collections. A diagnosis was arrived at in 52% of the samples; there were 46 discordant results, 38 were when one or other of the local or distant teams were unable to make a diagnosis, and

Internet access, a fundamental requirement for telemedicine has grown rapidly in Africa, including Malawi, over the past few decades, and now all 54 African countries have direct internet access in the major cities.[3] There are many ways of using telepathology, ranging from complicated, remotely driven microscopes[4] to simple e-mails of photographic images. It is important that the provision of telepathology services is driven by the need of the local centre, that appropriate clinical information is provided and that the results are interpreted for clinical use by the local clinician who understands the limitation of the diagnosis that such a system imposes. Such a system needs to be robust and deliverable; and the system needs to be established

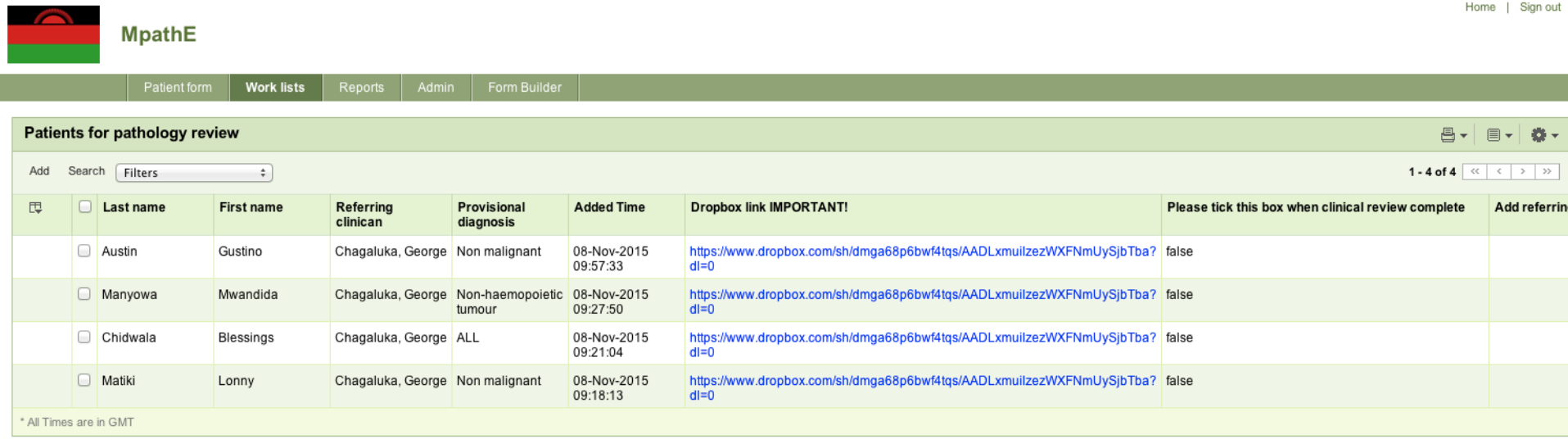
Steve O’Brien; Mpathe webmaster!

MpathE

MPathE website –referral homepage



MPathE website - worklist



MpathE

Home | Sign out

Patient form | **Work lists** | Reports | Admin | Form Builder

Patients for pathology review

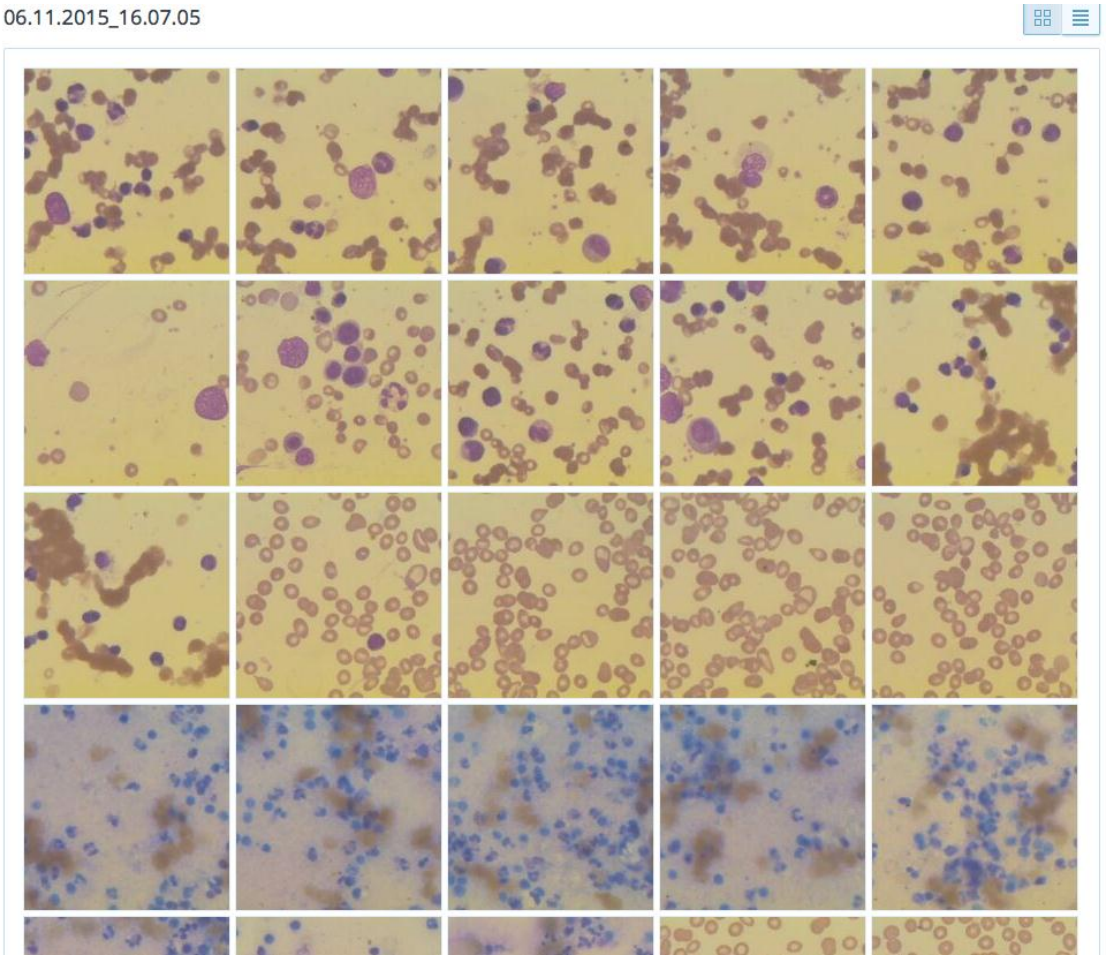
Add Search Filters

1 - 4 of 4

	Last name	First name	Referring clinican	Provisional diagnosis	Added Time	Dropbox link IMPORTANT!	Please tick this box when clinical review complete	Add referrin
	Austin	Gustino	Chagaluka, George	Non malignant	08-Nov-2015 09:57:33	https://www.dropbox.com/sh/dmga68p6bwf4tqs/AADLxmuilzezWXFNmUySjbTba?dl=0	false	
	Manyowa	Mwandida	Chagaluka, George	Non-haemopoietic tumour	08-Nov-2015 09:27:50	https://www.dropbox.com/sh/dmga68p6bwf4tqs/AADLxmuilzezWXFNmUySjbTba?dl=0	false	
	Chidwala	Blessings	Chagaluka, George	ALL	08-Nov-2015 09:21:04	https://www.dropbox.com/sh/dmga68p6bwf4tqs/AADLxmuilzezWXFNmUySjbTba?dl=0	false	
	Matiki	Lonny	Chagaluka, George	Non malignant	08-Nov-2015 09:18:13	https://www.dropbox.com/sh/dmga68p6bwf4tqs/AADLxmuilzezWXFNmUySjbTba?dl=0	false	

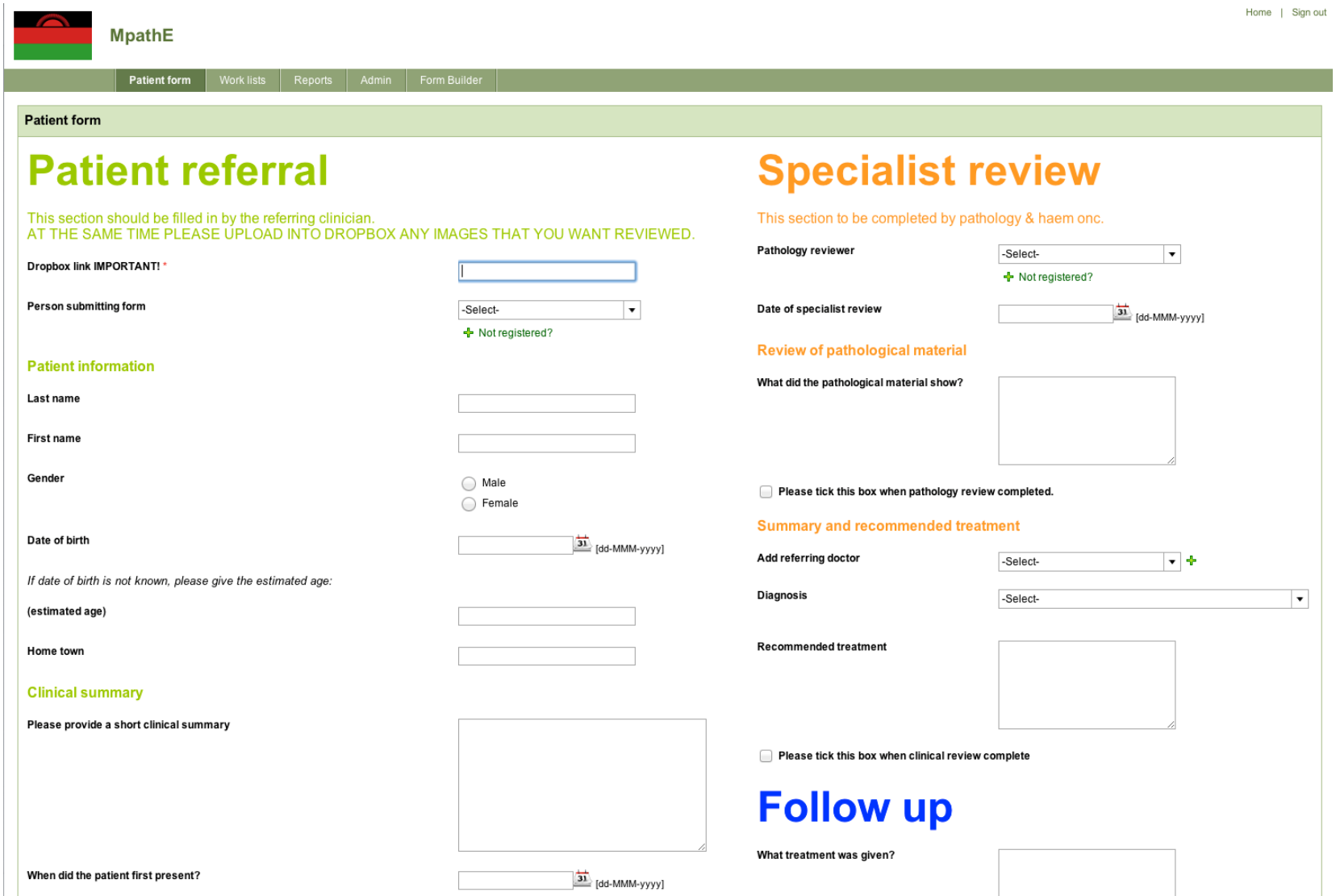
* All Times are in GMT

Dropbox link to pictures

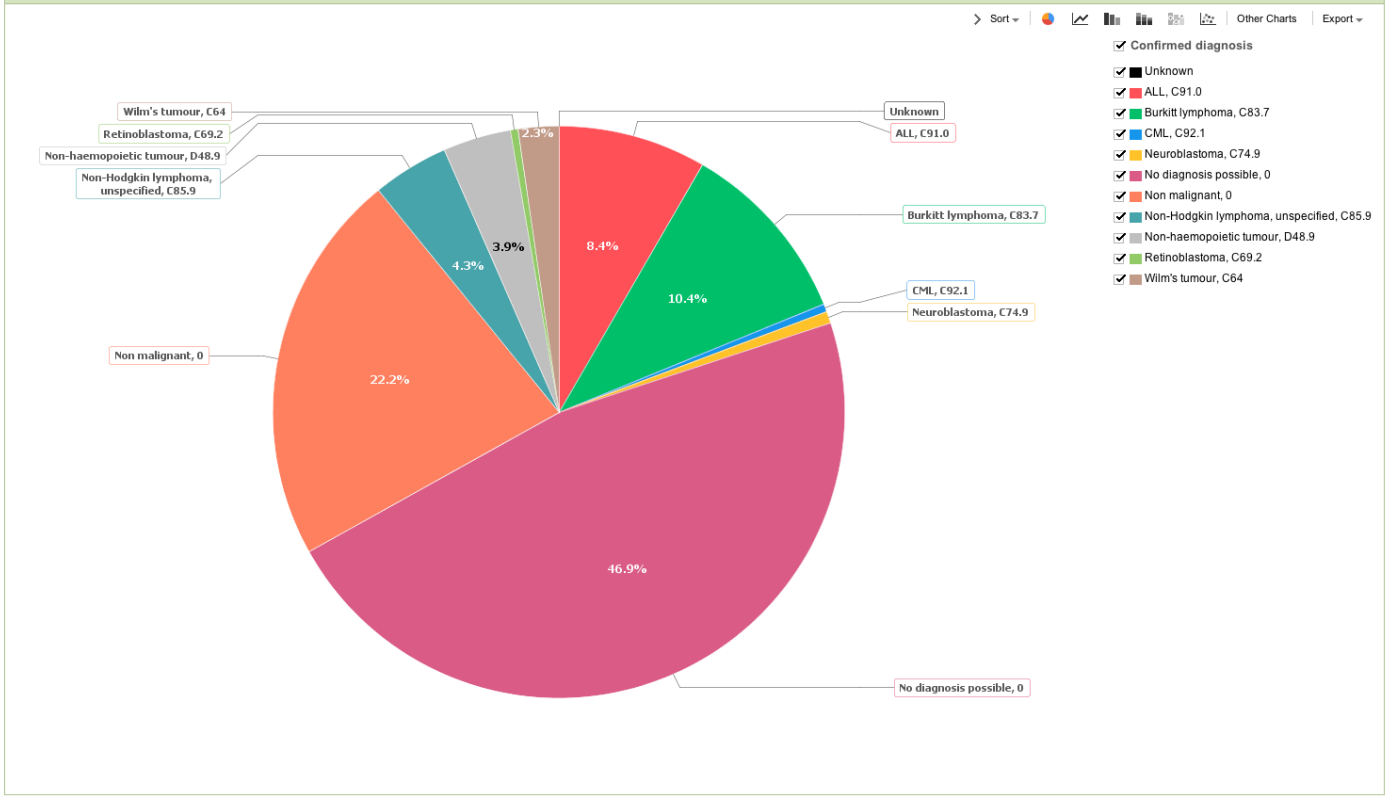


Working image screen

MPathE website – opinion entry



Confirmed diagnosis



Advantages/Limitations

- Advantages
  - Speed
  - Access to expertise
- Limitations
  - Only feasible to capture limited representative photographed ‘fields’
  - A ‘non-expert’ is choosing the captured fields
  - Single modality (morphology) diagnosis (no immunolophenotype/cytogenetic/molecular triangulation)
  - ‘no diagnosis possible’ accounts for a large proportion of coding categorisation

Governance/Accountability/Liability

- Quality control only possible in retrospect
  - Correlation with local pathology diagnosis
  - Cross check against transported slides (UK)
- Not a comprehensive integrated diagnostic pathology report
  - Rather a pragmatic morphology-only opinion triangulated just by clinical correlation
  - Enhanced by further expert clinical overview (SB)
- Clinical team aware of the pragmatic caveats/ limitations

Potential next steps

- New sites – expand/share website format, recruit more reporters
  - Governance issues as becomes more ‘formalised’
- Slide scanning
  - Scanner cost
  - Data file size

- DNA analysis
  - Easy to post
  - ?future substitute for immunophenotye/cytogenetics

Children with Cancer in Malawi

UK Registered charity no. 1111112

Contact: childrenscancermalawi@ncl.ac.uk
Donate: www.childrenscancermalawi.org *or* www.btplc.com/mydonate/

2013-2014 Newsletter

2013 in Malawi....

Happy Christmas to you all and a huge thank you once again for all the wonderful support that you have given to the children in Malawi in 2013. Professor Molyneux and her team remain very grateful for your support; it means they are able to continue to provide a good service for the children and their families as well as making strides forward. Once again a huge thank you to the parishioners at St. Andrews for your unstinting generosity.

This year, a number of exciting developments have taken place. As you may know from our previous newsletters, a new protocol to treat children with acute leukemia was developed two and a half years ago, using drugs provided by our charity. A new, more intensive, leukaemia protocol has now opened which will hopefully provide even greater chances of cure. This has required different chemotherapy drugs, which we have again provided.

The microscope camera that you bought last year has enabled 300 children's samples to be assessed in Newcastle within hours of being taken in Blantyre. It continues to enable Professor Molyneux and her team to treat the children more effectively. The country's first neurosurgeon has started operating on children using a microscope donated by the Royal Victoria Infirmary in Newcastle, and sent out by us (below), This will help enormously and is the start of being able to treat some children with brain tumours.

We have continued to supply an increasing range of chemotherapy drugs as well as some more effective drugs to help with nausea and vomiting. We continue to pay for the cartridges which allow vital blood tests to be done 24 hours a day.

Dr. George Chagaluka is now undergoing the final part of his training in Cape Town and he recently met Simon Bailey (CCM Trustee) during a visit there. He is very grateful for all the support the Malawi unit receives from CCM.

A package of toys, expertly chosen by CCM chairman Ian Sharkey (left) and his wife Joan, have once again been sent out to Blantyre for this Christmas. The childrens' faces when opening the box are wonderful to behold.

Once again, a very big thank you for all your generosity in ensuring that children with cancer in Malawi are able to be treated in an effective manner.

A Blessed Christmas to you all. Zikomo Nduthi.

The Children with Cancer in Malawi Trustees