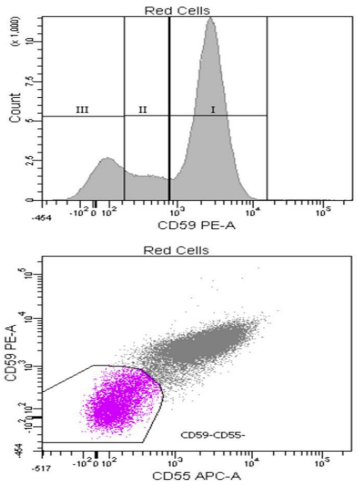
Accreditation and Quality Assurance

The laboratories are accredited by the Clinical Pathology Accreditation Ltd (CPA). It participates in the UK National External Quality Assurance Scheme (UKNEQAS), and subscribes to all their available schemes (Leucocyte Immunophenotyping, PNH, CD34, FMH, Factor V Leiden, Prothrombin gene mutation, HFE gene analysis, JAK2, Leukaemia-associated chromosome abnormalities and BCR-ABL)

The laboratory is associated with the Multicolour Immunophenotyping Group (MIG UK) and the European Leukaemia Network's working group for flow cytometry analysis in myelodysplasia. It also has close links with the UK network for MRD analysis in childhood and is a member of the UK BCR-ABL



UHBristol
Haemato-Oncology Diagnostic Service
(UHB HODS)
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Diagnostic Team

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Clinical Haematology Team

Bone Marrow Transplantation	Professor D Marks Dr S Robinson Dr R Protheroe
Avon Haematology Unit	Dr R Evely Dr J Bird Dr P Mehta Dr G Standen Dr C Price (medical oncologist) Dr M Beasley (clinical oncologist) Dr P Robson
Paediatric haematology	Dr J Moppett Dr M Cummins Dr O Tunstall
Haemostasis	Dr A Mumford Dr A Clark
Transfusion	Dr T Latham

University Hospitals Bristol NHS
NHS Foundation Trust

UHBristol Haemato Oncology Diagnostic Service

Respecting everyone
Embracing change
Recognising success
Working together
Our hospitals.

Background

UHB Haemato-Oncology Diagnostic Service (UHB-HODS) was developed 3 years ago in response to the recommendations from the National Institute for Clinical Excellence (NICE) Improving outcomes in Haematological Cancers (IOG) 2003 and the Carter Report which identified the increasing complexity of haematological diagnosis and need to centralise and integrate the diagnostic and reporting pathway for such patients.

UHB-HODS serves the population in the catchment areas for UHBristol and Weston and provides the diagnostic support for the Avon Haematology Unit at the Bristol Haematology and Oncology Centre (BHOC) and Bone Marrow Transplant units at Bristol Childrens Hospital (BCH).

Aims of the Service

- Provide an efficient comprehensive diagnostic service for haematological malignancies
- Provide effective communication with clinical haematologists and multidisciplinary meetings (MDTs) to support an accurate diagnosis and aid patients in their management pathway
- Provide teaching and training of medical and laboratory staff
- Provide support for accurate data for the Somerset Cancer Registry
- Provide and implement state of the art technologies as appropriate
- Foster research links with Universities

The basic techniques used in diagnosing haematological malignancies include:

- Morphology
- Histology/Immunohistology
- Flow cytometry
- Molecular diagnostics
- Cytogenetics

Morphology

This is the examination of a bone marrow aspirate under a microscope and is the first stage of evaluating a patient suspected of a haematological malignancy. This result is evaluable within minutes of a sample being taken allowing rapid evaluation for patients requiring urgent clinical intervention eg: acute leukaemia. Occasionally, the diagnosis can be made easily without the need for further investigation of the bone marrow, usually however further investigation of the bone marrow is required.

All bone marrow samples undergo a systematic initial evaluation involving clinical, morphological and flow assessments. Samples for molecular and cytogenetic analysis are stored at this stage

Results from the initial screen allow a decision algorithm to be followed and samples are processed if required for molecular diagnostics and if necessary sent for cytogenetics at either Southmead Hospital, Bristol or Salisbury depending on the investigations required.

Results are reviewed and integrated in a weekly diagnostic MDT meeting attended by three consultant haematologists and a training grade, with expertise in molecular diagnostics, flow cytometry, and histopathology. This allows tracking of samples in the diagnostic pathway and culminates in a final electronic report integrating all of the diagnostic information .

These results are fed into two weekly clinical MDTs for patients with Lymphoma and Myeloma/Leukaemia where the clinical management plan for the patient is decided

Histology

Histology is the examination of tissue that has been fixed, finely sectioned and stained. This process is can be applied to any tissue but typically this is performed on bone marrow trephines and lymph nodes.

Immunohistochemistry is a technique for the demonstration of antigens in histological tissue sections and has the advantage of providing immunophenotypic information with preserved spatial organisation of labelled and unlabelled cells. This is critically important for example in the diagnosis of lymphomas.
The fixation and immunostaining processes result in histological results being available after 2-3 days

Flow Cytometry

Flow cytometry allows rapid identification (within 1hour) and quantification of subpopulations of cells in suspension through assessment of light scatter properties and antigen expression. Samples are labeled with fluorescently-tagged antibodies specific for select cell antigens. The antibodies used are tailored to specimen type, clinical history and suspected diagnosis.

Our cytometers are capable of simultaneously examining up to 8 different antigens. This offers a very high level of sensitivity and allows for the identification of abnormal populations at diagnosis as well as minimal residual disease testing post therapy.

With the clinical information, results from morphology and flow cytometry rapid decisions can be taken on which further diagnostic investigations are required avoiding unnecessary tests and ensuring an efficient management pathway for the patient.

Applications:

- Distinguishing reactive form clonal states
- Rapid diagnosis of acute leukaemias
- Determining prognostic markers
- Minimal Residual Disease (MRD) detection
- CD34 counting for stem cell collections
- Diagnosis of PNH

Molecular Diagnostics

Molecular diagnostic techniques such as PCR and RT-PCR have an increasing role in haematological diagnoses. These highly sensitive assays can detect abnormalities associated with specific diseases and allow in many settings the detection and monitoring of Minimal Residual Disease.
Urgent results are available within 48-72hours

Applications:

- Jak 2, Mpl, Kit mutation detection in Myeloproliferative Neoplasms
- Prognostic markers in Acute Leukaemia eg FLT-3 and NPM-1 mutations
- Qualitative detection of important chromosomal abnormalities in AML eg inv 16, t(8;21), t(15;17)and t(9;22)
- Quantitative BCR-ABL monitoring in CML and ALL
- Quantitative NPM1 monitoring in AML
- Detection of t(11;14) and t(14;18) mutations seen respectively in Mantle Cell Lymphoma and Follicular Lymphoma
- T cell and B cell clonality
- IgVH mutational analysis in CLL
- Non-malignant uses eg FVL, Prothrombin mutations, and Haemochromatosis diagnosis

Cytogenetics

Cytogenetics is an important investigation in certain settings and where appropriate samples are sent to the regional laboratories either at Southmead Hoapital , Bristol or Salisbury. These investigations take approximately 1 week for FISH and 3 weeks for standard cytogenetic analysis