



Irish Blood Transfusion Service

Seirbhís Fuilaidriúcháin na hÉireann

Document Detail

Type: HLA IBTS POL
Document No.: IBTS/HLA/POL/0006[3]
Title: **NATIONAL HISTOCOMPATIBILITY AND IMMUNOGENETICS
REFERENCE LABORATORY (NHIRL) CUSTOMER
HANDBOOK**
Owner: 3049 DEBBIE MAC RORY
Status: CURRENT
Effective Date: 08-Sep-2010
Expiration Date: 08-Sep-2011

Review

Review: IBTS DOC REVIEW AND APPROVAL

<u>Level</u>	<u>Owner Role</u>	<u>Actor</u>	<u>Sign-off By</u>
1	HLA WRITER	GENEVIEVE ROONEY	GENEVIEVE ROONEY
2	HLA HEAD OF DEPT	RICHARD HAGAN	RICHARD HAGAN
2	QUALITY ASSURANCE REVIEWER NBC	PAULINE COAKLEY	PAULINE COAKLEY
2	HLA REVIEWER	JOHN CROWLEY	SMARTCOMM
2	HLA REVIEWER	RICHARD HAGAN	RICHARD HAGAN
3	HLA DIRECTOR	EMER LAWLOR	EMER LAWLOR

Change Orders

Changes as described on Change Order: Change Order No.

Change Orders - Incorporated#

Changes as described on Change Order: Change Order No.
IBTS/CO/0210/10

**TITLE: NATIONAL HISTOCOMPATIBILITY AND
IMMUNOGENETICS REFERENCE LABORATORY (NHIRL)
CUSTOMER HANDBOOK**

Accredited by the European Federation for Immunogenetics (EFI) since 2001

Change Description:

- [IBTS/CO/0210/10](#)
- Introduction of Luminex Fluoroanalyser.
- **Reason for Change:**
- Improved sensitivity and specificity in HLA antibody detection and identification.

Verify when in Use. Status CURRENT Effective 08/09/2010 00:00:00

A GUIDE TO THE SERVICES

PROVIDED BY THE

**NATIONAL HISTOCOMPATIBILITY AND IMMUNOGENETICS
REFERENCE LABORATORY (NHRL)**

IRISH BLOOD TRANSFUSION SERVICE (IBTS)

Verify when in Use. Status: CURRENT/Effective 08/09/2010 00:00:00

IBTS/HLA/POL/0006	Ver 3	Page 4 of 22
--------------------------	--------------	---------------------

No part of this handbook may be reproduced or transmitted in any form by any means without the prior consent of the NHIRL. Information contained in this handbook is accurate at the time of going to press, but may change without notice and does not represent a commitment on the part of the NHIRL.

We welcome your comments on the services and on the contents and scope of the information provided in these notes. Please telephone the NHIRL if you would like to see any additional information added to this booklet, or to seek clarification, or to arrange a visit to the laboratory.

This document is reviewed annually and is available on the IBTS website at: www.giveblood.ie : NHIRL Customer handbook (under Clinical Services).

**Dr Emer Lawlor FRC Path/FRCPI.
Consultant Haematologist
Laboratory Director**

**Dr Ciaran Dunne DMedSc, FIBMS
Chief Medical Scientist NHIRL
Laboratory Co Director**

CONTENTS

HOW TO CONTACT THE NHIRL

INTRODUCTION

THE HLA SYSTEM / TISSUE TYPING SERVICE

SERVICES AVAILABLE AT THE NHIRL

SPECIMEN LABELLING REQUIREMENTS

LABORATORY TESTS PERFORMED AT THE NHIRL

REQUESTING A TEST

TEST REQUIREMENTS

HLA TYPING

RELATED AND UNRELATED WORKUPS FOR HSCT

IRISH UNRELATED BONE MARROW AND PLATELET REGISTRY

PLATELET REFRACTORINESS

SCREENING FOR HLA ANTIBODIES

SCREENING FOR PLATELET ANTIBODIES

PLATELET GENOTYPING

REPORTING TEST RESULTS

DATA PROTECTION ACT AND FREEDOM OF INFORMATION ACT

QUALITY STANDARDS

PRICE LIST

How to contact the NHIRL

Opening Hours:**8.00 to 18.00 hrs.
Monday to Friday****TELEPHONE NO.:****+ 353 1 432 2975/2974****FAX NO.:****+ 353 1 432 2701**

Dr Emer Lawlor
Laboratory Director

Tel: 432 2887
e mail: emer.lawlor @ ibts.ie

Dr Joan Fitzgerald
Consultant Haematologist

Tel: 432 2877
e mail: joan.fitzgerald @ ibts.ie

Dr Ciaran Dunne
Chief Medical Scientist

Tel: 432 2963
e mail: ciaran.dunne @ ibts.ie

Dr Richard Hagan
Acting Chief Medical Scientist

Tel: 432 2963
e mail: richard.hagan @ ibts.ie

Ms Genevieve Rooney
Senior Medical Scientist

Tel: 432 2974
e mail: genevieve.rooney @ ibts.ie

Mr John Crowley
Senior Medical Scientist

Tel: 432 2964
e mail: john.crowley @ ibts.ie

Mr James Kelleher
Senior Medical Scientist

Tel: 432 2964
e mail: james.kelleher@ibts.ie

Introduction

The IBTS was requested by the Department of Health to set up a National Tissue Typing Reference Laboratory (NTTRL) in 1977. The service was initiated in 1978. The laboratory received approval from the DOHC in January 2005 to change the title of the laboratory to the National Histocompatibility and Immunogenetics Reference Laboratory (NHIRL). This title more accurately reflects the diversity of immunogenetic markers tested and the fact that the department employs molecular methods for both low and high resolution typing.

The work performed within the department is wide and varied and provides a comprehensive range of assays and services designed to complement and co-ordinate the allogeneic Haematopoietic Stem Cell Transplantation (HSCT) programmes currently available in the Republic of Ireland. The demand for these assays and services is growing rapidly and is in response to requests from Medical Consultants and Haematologists nationwide involved in transplantation procedures. The department also provides a H + I DNA testing service for disease association studies, the Irish Unrelated Bone Marrow and Platelet Registry and the investigation of alloimmune thrombocytopenia. In addition, a platelet immunology service for the serological investigation of alloimmune thrombocytopenia and adverse transfusion reactions is also provided.

The department has a formal policy for internal quality control and participates in recognised external quality assessment programmes. The laboratory maintains an active developmental programme for evaluation and initiation of new typing and immunologic assays relevant to the care of transplant patients. The laboratory is also actively involved in research programmes and has liaised with several national hospitals to publish papers on the work performed within the department. The laboratory conducts statistical analysis and produces population statistics.

IBTS/HLA/POL/0006	Ver 3	Page 8 of 22
--------------------------	--------------	---------------------

HLA System / Typing Service

The genes of the Major Histocompatibility Complex (MHC) which is localised on the short arm of chromosome 6 are one of the most important factors in determining allograft outcome. In humans these genes are termed HLA or Human Leukocyte Antigen genes. Human Leukocyte Antigens are glycoproteins expressed on the cell surface which play an integral part in many immunologic responses. HLA antigens are divided into Class I (A, B, C) and Class II (DR, DQ, DP) molecules based on their structure and function. Class I molecules are expressed on virtually all nucleated cells and platelets, whereas Class II molecules have restricted cell surface expression.

HLA typing refers to the techniques for identifying the tissue type of an individual. HLA typing tests are performed primarily for the purposes of matching organs or tissues for transplantation/transfusion. In the past tissue typing involved the identification and determination of HLA antigens present on the surface of most nucleated cells. Lymphocytes were used for tissue typing as these cells could be separated from anticoagulated whole blood.

The development of the polymerase chain reaction (PCR) has allowed the evolution of improved molecular HLA typing techniques. We now use exclusively molecular methods such as PCR-SSO and PCR-SSP to define the genes encoding the HLA class I and II molecules. This new improved technology gives a high level of resolution and improved HLA allele definition. Each new technique is being driven by the clinical need for higher resolution as well as the need for robust and high throughput methods of genotyping.

We HLA type all patients and donors prior to transplantation to aid selection of the most closely matched donor. Since HLA antigens are carried in high concentrations by leucocytes, platelets and human tissues/organs (trace amounts on erythrocytes) each transfusion, graft or pregnancy carries a risk of immunising the patient. We therefore provide an antibody screening programme to detect antibodies to HLA and platelet specific antigens.

SERVICES AVAILABLE AT THE NHIRL

HLA typing for related allogeneic haematopoietic stem cell transplantation (HSCT)

HLA typing for unrelated HSCT

HLA typing for the Irish Unrelated Bone Marrow and Platelet Panel (IUBMR)

HLA typing for disease association studies

Platelet Refractoriness Investigation

HLA and platelet specific alloantibody screening

HLA and platelet specific alloantibody identification

Platelet phenotyping

Platelet genotyping

Verify when in Use. Status CURRENT Effective 08/09/2010 00:00:00

Laboratory Tests performed at the NHIRL

1. Serum screening for HLA specific antibodies by Luminex

Bead based immunoassays to detect/identify IgG antibodies to HLA Class I and II antigens.

2. Serum screening for HLA Class I antibodies: using selected cell panel

CDC assay to determine the presence of specific HLA-A, -B and -C antibodies using an HLA-typed reference panel representing known specificities and incorporating uncommon allelic associations.

3. Serum screening for HLA specific antibodies by ELISA

For samples not suitable for Luminex testing a solid phase Enzyme Linked Immunosorbent Assay may be used to detect and/or identify antibodies to HLA antigens. The assay can determine HLA Class I and/or Class II specific antibodies depending on the nature and specificity of the immobilised antigen(s).

4. DTT serum screening for HLA Antibodies

CDC assay to determine IgG or IgM class of antibody using DTT treated recipient sera and random or selected cell panel.

5. HLA Class I DNA typing: low resolution

Determination of HLA-A, -B, -C allelic specificity by DNA analysis with a range of DNA probes (PCR-SSOP) or PCR primers (PCR-SSP) giving definition comparable to serological typing, for the purpose of HLA typing in allogeneic haematopoietic stem cell transplantation (HSCT), disease association and platelet transfusion.

6. HLA Class II DNA typing: low resolution

Determination of HLA-DR, -DQ and DP allelic specificity as in (4).

7. HLA Class I and II DNA typing: high resolution

Determination of HLA-A, -B, -C, -DR, -DQ and DP allelic specificity by a combination of methods including PCR-SSP and PCR-SSO and giving high resolution definition for the purpose as in (4).

8. Serum screening for platelet specific alloantibodies by ELISA

A solid phase Enzyme Linked Immunosorbent Assay to detect and/or identify alloantibodies to platelet specific antigens expressed on the platelet membrane.

9. Human Platelet Antigen (HPA) genotyping

Determination of HPA-1a/1b, 2a/2b, 3a/3b, 4a/4b, 5a/5b platelet alloantigen specificity by PCR-SSP.

10. HPA-1a phenotyping by ELISA

A solid phase Enzyme Linked Immunosorbent Assay to phenotype platelets for the HPA-1a polymorphism on the GP IIb/IIIa glycoprotein.

DNA TESTS

PCR – SSOP Sequence – specific oligonucleotide probe typing using the reverse line blot format.

PCR – SSP Sequence – specific primers.

Verify when in Use. Status: CURRENT Effective 02/09/2010 09:00:00

Specimen Labelling Requirements

The minimum information required on the sample label for testing by the NHIRL is:

1. The patient's/donor's full surname correctly spelt
2. The patient's/donor's forename(s) (initials are not sufficient)
3. The patient's/donor's unique hospital number and/or date of birth (year of birth or age is not sufficient).
4. When a patient/donor cannot be identified, an accident and emergency unique number or code may be used.
5. The sample should be date labelled and either the sample or request form must be date labelled.
6. Barcodes on a sample must not replace full sample labelling.
7. Addressograph labels are not acceptable for confirmatory typing of transplant patients.
8. Specimen labelling details must be legible.

When multiple blood tubes are collected, each tube must be individually labelled.

Requesting a Test

NHIRL request forms (BT 255) can be ordered from the laboratory or secretary (Tel: 432 2881 / 432 2882). Clinical staff requesting tests are required to fill in details on the Request Form of:

Patient/donor identity – i.e. full name (surname and forename), date of birth, referring centre i.e. hospital or clinic, hospital number and laboratory number and/or order number

Date of specimen collection (and time when pertinent to testing)

For immediate and extended family members i.e. potential donors for haematopoietic stem cell transplantation (HSCT), the donor relationship to the patient, the patient's name and date of birth must also be provided.

The tests/investigations required clearly indicated

Nature of specimen

Name and address of the person who ordered the test

Address to where report is to be sent (if different from above)

Details of where to send invoice (if different from above)

Risk of infection, if recognised. Category 3 specimens must be clearly labelled and indicated as hazardous. High risk specimen box must be ticked.

Relevant clinical history and diagnosis including previous transfusion and obstetric history are important in:

- deciding which investigations to perform
- interpretation of the test results
- provision of clinically useful reports and advice
-

N.B: Clinical interpretation of results and advice on follow up investigations cannot be provided in the absence of clinical details.

Signature of requesting clinician.

NHIRL TEST REQUIREMENTS

DNA typing (HLA, HPA etc.)	5 ml EDTA blood
DNA typing of HSCT patients	10–20 ml EDTA blood
DNA typing of potential donors	5–10 ml EDTA blood
Antibody screening/identification	5–10ml clotted blood
Neonatal alloimmune thrombocytopenia (NAITP) investigations	10-20 mls clotted (mother) 5 mls EDTA (mother) 1 ml EDTA (neonate) 5 mls EDTA (father)

Blood Specimens for HLA and/or HPA typing should be taken into EDTA. Samples for HLA typing may also be taken into tri-sodium citrate, CPD-A and ACD-A. Heparin must **not** be used as it interferes with DNA tests. It is important that blood specimens for non-urgent testing be despatched to the NHIRL after collection (*to arrive within 48 hrs of specimen collection*).

The source (i.e. serum) of separated samples for antibody screening must be indicated on the specimen or request form. HLA antibody screening/identification cannot be performed on plasma/anticoagulated samples.

For HLA antibody screening/identification blood should be referred to the NHIRL while still fresh to minimise the chance of obtaining false-positive or false-negative reactions due to improper storage or contamination of the specimen. Serum that cannot be tested within 24 hours should be stored at 2 to 8°C for no longer than 48 hours, or frozen at -50 to -80°C.

Packaging. Samples must be packaged to conform to Post Office regulations so that any leakage is contained and persons handling the package are not at risk. As a precautionary measure specimens must be transported in protective blood containers and enclosed in a plastic biohazard bag with the request form. The package should be clearly addressed to the testing laboratory: NHIRL, IBTS, National Blood Centre, James's Street, Dublin 8.

Caution: DNA typing is performed at the NHIRL from Monday to Friday only.

N.B: Failure to meet test and/or specimen labelling requirements may result in sample rejection.

We recommend that referring centres who do not have a traceable specimen delivery system confirm that samples have been received at the NHIRL by phoning the laboratory during normal working hours.

Requests for investigation of suspected cases of post transfusion purpura (PTP) and transfusion related acute lung injury (TRALI) must be discussed in advance with IBTS Medical Consultant.

Urgent Samples

For urgent samples please telephone the laboratory and discuss the arrangements for sending the samples. Urgent samples should be transported directly from the hospital blood bank to the National Blood Centre.

For samples from infants, please contact the laboratory to discuss minimum accepted volume.

HLA Class I (A, B, C) and HLA Class II (DR, DQ, DP) Typing

There are many reasons for HLA typing: matching for haematopoietic stem cell and solid organ transplantation, as an important aid to allow alloantibody definition, anthropological studies, disease association studies, drug reactions, forensic studies and facilitation of investigations into T cell mediated immunity. The HLA typing method most suited to each application is a balance of resolution, sample numbers, time, money, sample material and the expertise of the individuals performing the typing.

New PCR based HLA typing techniques now allow histocompatibility scientists the choice of whether to use low, medium or high resolution methods. Low resolution methods generally only identify broad specificities or groups of specificities. The term “medium resolution” can be used to describe a typing system that discriminates between all serological specificities but may also give some allele specific results, whereas high resolution typing is a term generally used to describe a typing system that discriminates between greater than 90% of the alleles in the loci analysed. Thus in solid organ transplantation medium resolution typing is generally the method of choice whereas in unrelated haematopoietic stem cell transplantation (HSCT) low or medium resolution typing is followed up with high resolution typing.

Low resolution typing (2 digit level) e.g. A*02

Medium resolution typing e.g. A*0201/A*0202/A*0203

High resolution typing (4 digit level) e.g. A* 0201.

Up until January 2001 the HLA Class I antigens were serologically defined by the standard NIH (National Institute of Health) microlymphocytotoxicity typing system utilising a complement dependent assay and trays of selected allo and monoclonal antisera. However molecular typing techniques, in particular PCR-SSP and PCR-SSO, are now used for the detection of polymorphisms of the HLA Class I (A, B, C) loci.

HLA Class II (DR, DQ and DP) typing is also performed exclusively by molecular (DNA) techniques. Reverse line blot PCR-SSO assays provide intermediate to high resolution typing. High resolution DRB1 and DQB1 typing, to identify the specific allele carried by an individual is achieved by PCR-SSP.

(1) Haematopoietic Stem Cell Transplantation (HSCT)

HLA matching of bone marrow donor and recipient is crucial to the success of the graft. Incompatibility may not only lead to rejection but also to the greater problem of graft versus host disease (GVHD) in which the immunologically compromised recipient is “attacked” by donor lymphocytes.

We provide high resolution HLA typing for matching unrelated haematopoietic stem cell donors and recipients. Since screening and typing of donors for the Bone Marrow Registry requires a high throughput intermediate level resolution typing is provided.

(2) HLA and Disease Susceptibility Studies

Numerous reports have been published highlighting the role of the human MHC in the control of immune responsiveness and disease susceptibility.

The NHIRL provides HLA typing (low to high resolution as requested) to aid in the diagnosis of various diseases such as narcolepsy and ankylosing spondylitis and has also participated in several studies to assess the role of the human MHC in disease susceptibility including insulin dependent diabetes mellitus, coeliac disease, Non Hodgkin’s Lymphoma, acute posterior uveitis, Reiter’s disease, psoriasis, systemic lupus erythaematosi, idiopathic dilated cardiomyopathy, sarcoidosis, adrenal hyperplasia, Behcet’s disease, rheumatoid arthritis, birdshot chorioretinitis, schizophrenia, pseudo-exfoliation of the lens capsule, dermatitis herpetiformis, primary biliary cirrhosis, multiple sclerosis, Hepatitis C, Opticneuritis and Pharmacogenetics eg. Abacavir treatment of HIV positive individuals.

With the introduction of DNA methods all HLA-B27 requests are now typed for HLA-B. For other disease association studies the number of loci and level of resolution provided is as requested.

Related (Immediate and Extended) Workups for HSCT Patients

Most haematopoietic stem cell transplants involve HLA – identical siblings where the HLA identity can be confirmed by molecular typing techniques. For related HSCT workups we require testing of all siblings and parents. Such related workups enable us to identify phenotypically matched sibling donor(s)/parents and to identify whether any recombination events have occurred. Failing a HLA identical sibling being available extended family workups to identify matched intrafamilial donor(s) may be considered.

It is the responsibility of the transplant centre to forward samples from the patient and matched related donor(s) for confirmatory testing prior to conditioning. This is to ensure that there has been no sample mix up at any stage in the past.

The Irish Unrelated Bone Marrow and Platelet Registry (IUBMR)

To date over 20,000 volunteer donors have been HLA A, B and DR typed and placed on the Bone Marrow Register. The development of this Register of HLA typed volunteers who are prepared to donate bone marrow arose because approximately 60% to 70% of potential candidates do not have a suitable HLA matched family member. There are now a number of such registries established and by international collaboration a further 30% to 40% of candidates now stand a reasonable chance of finding a HLA matched donor. We receive requests from both national and international registries/hospitals for searches to identify HLA matched unrelated bone marrow donors. We provide high resolution typing of matched unrelated donors (MUD's) and confirmatory typing of selected MUD/patient pairs prior to transplantation. We confirm the original HLA type of IUBMR donor's requested by foreign registries. This register is fully integrated into the Bone Marrow Donor Worldwide (BMDW) registry (over 12 million donors) and provides access to this registry for Irish patients.

The IUBMR was accredited by the World Marrow Donor Association (WMDA) in 2007. HLA A, B typed volunteer donors are also included on the Platelet register. We regularly receive requests from national hospitals requesting searches for patients who have become refractory to random donor platelets and require HLA matched platelet transfusions.

Maintenance of the files for the Bone Marrow register is carried out by staff within the IUBMR office and this involves adding new HLA typed donors, upgrading HLA types of existing donors, removal of unsuitable donors, deferral of donors, inclusion of the Irish registry on the BMDW programme and performing searches for Irish and foreign patients requiring unrelated bone marrow donors and HLA matched platelet transfusions.

Irish Unrelated Bone Marrow Registry Office		
Tel:	432 2897/2898	Fax: 432 2933
Dr. Emer Lawlor (Director)	e mail:	emer.lawlor@ibts.ie
Gillian Pitt (Bone Marrow Nurse)	e mail:	gillian.pitt@ibts.ie
Sinead Horgan (Coordinator)	e mail:	sinead.horgan@ibts.ie
Mary O'Neill	e mail:	mary.o'neill@ibts.ie
Rose Buckley	e mail:	rose.buckley@ibts.ie
Kathleen Duffy	e mail:	kathleen.duffy@ibts.ie

Platelet Refractoriness

Platelet refractoriness is empirically defined as a lack of response in post transfusion platelet increments after 2 or more consecutive transfusions of an adequate dose of allogeneic platelets. Refractoriness to platelet transfusion can be of non-immune or immune cause:

Non – Immune
DIC
use of amphotericin
splenomegaly
sepsis, fever
active bleeding

Immune
anti-HLA Class I
anti-HPA
potent anti-A or anti-B
platelet autoantibodies

Platelet refractoriness caused by antibodies

The HLA class I antigens encoded by the A and B loci are densely expressed on platelets. Around 20 – 60 percent of patients on long term platelet support (>14 days) will form platelet alloantibodies and in the vast majority these will be against HLA-A and B antigens. Around 10 percent of patients with HLA antibodies also have HPA antibodies. HPA antibodies in the absence of HLA antibodies are less frequent. Platelets express the ABO blood group antigens, and it is well documented that potent anti-A and / or anti-B antibodies can diminish the survival of antigen positive platelets. In the case of HLA class I alloimmunisation the availability of ABO compatible HLA class I matched platelets may be restricted and ABO group incompatible platelets may be provided.

Although leucodepletion is believed to reduce primary immunisation to HLA antigens, many patients will have been alloimmunised by previous transfusions, pregnancy, transplantation, immunisation etc.

Overall, in 10-15 percent of patients on long term platelet transfusion support, survival of random donor platelets will be impaired because of antibody mediated destruction. For this group of patients platelets have to be provided from donors selected on the basis of their HLA class I and sometimes HPA status. However, in the majority of patients there are non-immune factors causing refractoriness, or a combination of immune and non-immune.

Matching for HLA-A and B antigens requires a large pool of HLA class I typed donors from whom platelets are collected by apheresis techniques. For the provision of HLA matched platelets the following criteria should be met:

exclusion of non-immune causes of refractoriness

•

positive screen for HLA class I antibodies

•

refractoriness to ABO group compatible,
platelet concentrate on two occasions

Transfusion of HLA class I matched platelets in alloimmunised patients results in a significantly improved recovery in 60-70% of patients. Transfusion failure with HLA class I matched platelets may be due to co-existing non-immune causes of refractoriness, HPA alloantibodies, platelet autoantibodies or potent anti-A or anti-B. If increments with HLA class I matched platelets are poor, the case should be discussed with a medical consultant.

In lieu of difficulties procuring suitably matched platelets we recommend that patients who are likely to require extensive platelet support during treatment eg. autograft / allograft patients are HLA-A and B typed as part of their initial workup.

To order HLA matched platelets contact medical personnel at the IBTS. When an order is placed for the first time for a patient the following data set is needed:

Patient name, date of birth or hospital number and hospital name

•

ABO/RhD group, HLA-A,B type

•

Period of expected thrombocytopenia

•

Contact person at hospital blood bank

•

Consultant or registrar responsible

•

Clinical diagnosis

•

Current treatment e.g. antibiotics, ALG, etc

•

Current platelet support / transfusion history

We recommend screening refractory patients at regular monthly intervals to monitor their antibody status.

Screening for HLA Antibodies

Luminex bead-based immunoassays are used routinely for the detection of IgG HLA antibodies. HLA antibodies can be formed in an individual in response to immunisation by HLA antigens which can occur following blood transfusions, transplantation, immunisation or pregnancy. Screening tests aim to detect and identify HLA antibodies which may react with and reject a donor organ, tissue or blood component expressing the corresponding antigens. Patients registered for the investigation of platelet refractoriness are screened for HLA antibodies by Luminex assays. Samples giving HLA Class I positive results are then screened by CDC and further Luminex Class I identification assays.

Cytotoxic screening is performed using selected cell panels of frozen lymphocytes with known HLA phenotype covering as many as possible of the recognised serologically defined HLA specificities. We use a panel of T cells for the detection and characterisation of HLA Class I antibodies. If appropriate, dithiothreitol treatment of serum samples allows IgG and IgM antibodies to be differentiated (DTT is used to inactivate IgM antibodies). Cytotoxic screening using selected panels is used for antibody analysis to enable complement binding HLA antibodies to be identified with greater precision. Identification of HLA antibody specificity may improve donor selection by avoiding those donors with unacceptable antigens.

The solid phase ELISA assays may be used for the detection of IgG HLA antibodies where samples are found to be unsuitable for testing by Luminex assays. Screening for HLA IgM antibodies is also available using the ELISA assay.

The results of CDC and Luminex Class I ID/ELISA assays are recorded as % PRA (Panel Reactive Antibodies) by calculating the number of samples within the panel with which serum reacts and recording these as a percentage. The percentage PRA is very subjective and can vary considerably between transplant centre laboratories, depending on the technique used and cell panel composition. It is therefore not suitable for use in treatment regimes when making direct comparisons between centres, although it does indicate the degree of difficulty in finding a well matched negative donor when taken together with the antibody specificity.

Screening for anti-platelet antibodies

These assays are of use in the detection of alloimmune causes of thrombocytopenia such as NAITP, PTP and platelet refractoriness.

The ELISA antibody screening assays are used routinely to detect the presence of IgG alloantibodies to platelet glycoproteins and HLA Class I antigens. Other platelet antibody ELISA assays are designed to detect antibodies specific to epitopes on selected platelet glycoproteins.

On the 1st of November 2005, the NHIRL discontinued investigating samples from cases with suspected ITP. The indirect platelet antibody assay which is performed is not appropriate for investigation of this disorder. The problem, as indicated in the British Committee for Standards in Haematology Guidelines (*British Journal of Haematology* 2003;120, 574–596) is the low sensitivity and specificity associated with indirect platelet antibody testing.

Platelet Genotyping

Alloimmunisation against human platelet antigens (HPA) occurs in neonatal alloimmune thrombocytopenia (NAITP), post transfusion purpura (PTP) and very occasionally in patients who are refractory to platelet transfusion therapy. In these situations we can provide platelet genotyping of the five platelet specific alloantigen systems using PCR SSP.

HPA 1a/1b, 2a/2b, 3a/3b, 4a/4b, 5a/5b

In suspected cases of NAITP we recommend collecting samples in EDTA from both parents and the baby for HPA genotyping and a maternal clotted sample for platelet antibody investigation.

All urgent investigations should be telephoned in advance to the IBTS Registrar/Consultant. Form (NBC/HLA/F230) should be completed with the clinical details of the case by the requesting clinician and forwarded with the sample.

Reporting Test Results

A typed report of test results is reported to the requesting doctor unless directed otherwise. Urgent investigations (HLA antibody screening, HLA class I typing for refractory patients) are reported within 48 hours. Other samples for HLA typing have a turn around time of 5-10 working days. More complex investigations (e.g. related HSCT workups, high resolution molecular typing and matching of unrelated donor and cord blood donors) require more time and progress on these is generally discussed with the person requesting the test.

Failure to obtain a HLA type or failure to comply with our labelling/test requirements will be reported by telephone on the day that the unsatisfactory results are obtained.

Additional copies of reports can be sent on request and urgent reports can be faxed to a secure location in accordance with IBTS policy. HSCT and platelet immunology reports are authorised by blood service medical personnel before being issued and relevant clinical comments made.

Data Protection Act and Freedom of Information Act

The laboratory keeps patient and donor data on their computer system and on a back up paper filing system.

The data held can include some or all of the following:

- Name
- Hospital number
- Date of birth
- Gender
- Address
- Ethnic origin
- Relationship to patient
- Laboratory/order number
- Organ/tissue required
- Referring centre
- Clinician
- Transfusion history
- Transplantation history
- Obstetric history
- Relevant clinical details
- Tests required
- Test Results including molecular typing information.
- Related donor information
- Dates specimens collected, received, tested and reported
- Result interpretations
- Clinical comments
- Test methods used.

The NHIRL follows the guidelines below for the retention and storage of pathological records and archives

- (i). Blood/DNA samples for HSCT, platelet transfusion, investigation of NAITP and TRALI are archived and stored indefinitely. DNA samples for disease association investigations are stored for 3 months and then discarded.
- (ii). Serum samples for investigation of platelet refractoriness or platelet autoantibodies are stored for 2 weeks and then discarded. Serum samples for investigation of NAITP and TRALI are archived and stored indefinitely.
- (iii). Hard copies of reports and request forms are stored indefinitely.

Quality Standards

The staff at the NHIRL are committed to providing a high quality service. The laboratory participates fully in all the relevant Quality Assessment Schemes provided by UK NEQAS for H+I, Eurotransplant and by UK National Institute for Biological Standards and Control (NIBSC) for platelet serology.

The NHIRL is registered for the following schemes, the results and performance levels of which are available on request:

- HLA antibody detection and identification
- High resolution HLA typing
- Platelet antibody detection and identification
- HPA genotyping

The NHIRL has a comprehensive Quality Assurance programme in place which includes internal QC exercises, batch analysis and validation procedures, equipment maintenance and staff internal proficiency testing schemes.

The NHIRL was first accredited by the European Federation for Immunogenetics (EFI) in 2001.

Price List

The NHIRL price list is available on request from the Accounts Department.