

Histocompatibility Laboratories

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The Anthony Nolan Trust manages its own donor register and histocompatibility (tissue-typing) laboratories within the same facility in North London, such that the needs of the transplant physician can be better provided for. This also allows the registry and laboratory staff to work together to ensure optimum quality and resolution of testing is performed. Currently we have 48 scientific, technical and administrative staff working in our laboratories.

Since the 1990 s testing for genetic compatibility between donor and patient for transplantation (tissue-typing) has made use of DNA based molecular biology methods. The more traditional cellular based assays such as serological tissue-typing are still important in the laboratory and these are used to supplement results from DNA based assays during the final stages of matching donors with patients.

The advantages of DNA based assays are numerous: they allow work to be performed on small amounts of sample (usually blood); do not require viable cells; have easily renewable reagent sources; provide more accurate and detailed results and are more open to automation. We are constantly monitoring developments in technology and continuously introduce improvements in our tissue-typing strategies to enhance the quality and discriminative power of our work enabling us to achieve our targets in a cost effective way.

The most widely used technology in molecular biology is the polymerase chain reaction (PCR) invented by Kary B Mullis who obtained the Nobel Prize in Chemistry in 1993. This technique allows the amplification of specific gene fragments (e.g. tissue-typing genes) to produce millions of identical copies of the fragments that can then be studied further by a choice of different methodologies. The three methods for tissue-typing used in our laboratory all require PCR as the starting point:

PCR-sequence specific oligonucleotides (PCR-SSOP): the copies of the tissue-typing gene made by the PCR reaction are incubated with a panel of different oligonucleotide probes, with distinctive reactivities with different tissue-types. We are currently using Luminex xMAP technology where the oligonucleotide probes are individually attached to up to 100 distinctly fluorescent microspheres, allowing the measurement of 100 different reactions in a single tube. This methodology is very appropriate for bulk processing of samples and it is used as our initial tissue-typing technique for all donors and patients.

PCR-sequence specific primers (PCR-SSP): the PCR reaction is used to define whether the targeted tissue-typing gene is present or absent by using reagents in the PCR reaction specific for each of the variations seen in the tissue-typing genes. This method is used to achieve high resolution results for final stage testing of patients and donors. It is also used to achieve a speedy result as is the requirement for solid organ transplantation.

PCR-sequencing: The DNA sequence of the tissue-typing gene can be directly analysed by performing nucleotide sequence analysis of the PCR gene product. This method is used to achieve high resolution results for final stage testing of patients and donors and also to resolve any novel results.

The introduction of automated robotics into the laboratories has been a key feature over the last ten years, allowing more accurate performance of methodologies. Currently, DNA extraction procedures are semi-automated. Our screening for cytomegalovirus, (CMV); human immunodeficiency virus (HIV), hepatitis B and hepatitis C infections are fully automated, as are key stages in the PCR-SSOP processes. The use of automated reading systems also allows us to link results obtained at the bench directly to our main donor database.

The laboratories are fully accredited by Clinical Pathology Accreditation (UK) Ltd. and by the European Federation for Immunogenetics.

If you wish to learn more about the services we provide please download our user guide

[Laboratories and Operations Dept User Guide - now updated](#)

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