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AMPATHCHAT

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Tissue typing: HLA typing and screening

Ampath Immunology is proud to announce the introduction of HLA tissue typing and antibody screening using Luminex PCR-based multiplex technology. This platform will provide clinicians with reliable, standardised and accurate HLA typing and screening results much sooner.

Introduction to HLA molecules

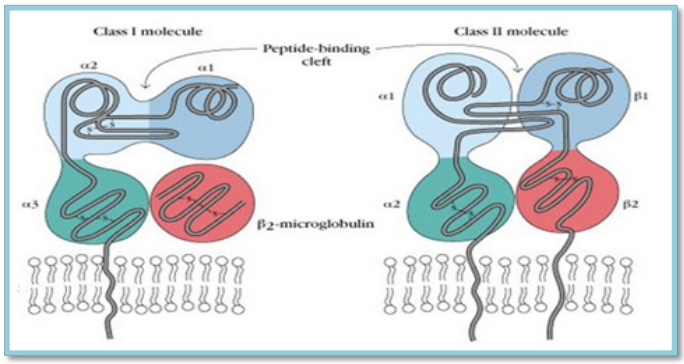
The major histocompatibility complex (MHC) genes are located on the short arm of chromosome 6 and codes for cell surface markers that play a vital role in the immune system. The human MHC is synonymous with the human leukocyte antigen (HLA) complex.

The two major classes are MHC Class I and Class II. MHC Class I is found on the surface of all nucleated cells and platelets, whereas MHC Class II is constitutively expressed on antigen-presenting cells of the immune system – dendritic cells, B-lymphocytes and macrophages. The function of these molecules is to present proteins, whether from "self' or non-"self" to T-lymphocytes.

HLA genes are inherited (one allele from each parent) and are highly polymorphic, creating diversity within a population's gene pool.

Class I consists of HLA-A, HLA-B and HLA-C.

Class II consists of HLA-DR, HLA-DQ and HLA-DP. The Class II molecules contain an alpha and a beta chain and both are polymorphic, but because the alpha chain contributes to almost no diversity, only the beta chain is typed.



Please contact your local Ampath pathologist for more information.

HLA typing

Indications

HLA typing is mainly used in transplant medicine to determine whether a donor and a recipient match on a tissue level, thus preventing solid organ rejection or graft versus host disease in stem cell transplants. HLA typing can also be used in other clinical scenarios, for example, certain disease associations, pharmacogenomics, immunotherapy and vaccine development.

HLA typing

Molecular typing has surpassed serological typing, where serum specimens are used containing known antibodies to certain HLA molecules. Serological typing is not easily reproducible and a lack of appropriate anti-sera can miss diverse or rare antigens, especially in our culturally rich country.

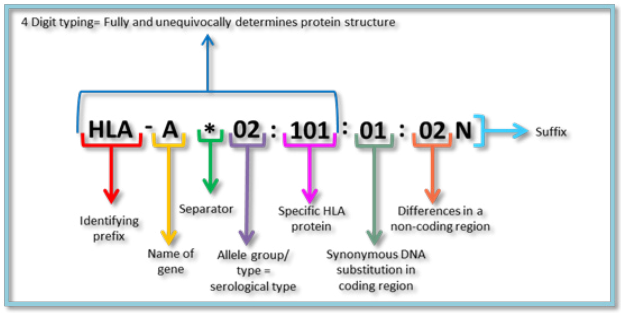
Molecular typing consists of either PCR-based technology or DNA sequencing. These methods are robust, specific and reproducible, which in turn allows for accurate and higher resolution typing between the donor and the recipient.

HLA nomenclature

There are currently more than 21 000 known HLA alleles, with more discovered every day. The naming of new HLA genes, allele sequences and their quality control is the responsibility of the World Health Organisation's Nomenclature Committee for Factors of the HLA System. More information can be found at hla.alleles.org.

Sample type

Four EDTA (purple top)or ACD (light yellow top) tubes can be collected from Mondays to Fridays.



HLA antibody screening

Introduction

Antibody screening is essential in determining the risk of the patient both before and after organ or stem cell transplants. The presence of antibodies to donor tissue (donor-specific antibodies (DSA)) is associated with decreased graft survival and poor outcome due to acute or chronic graft rejection.

Donor-specific antibodies have become an established biomarker, predicting the risk for antibody-mediated rejection. Knowing the complex characteristic of DSA can stratify the recipient's immunological risk and also guide post-transplant monitoring and outcomes.

Luminex technology – LabScreen testing

A screening test will first be performed and will determine the presence of HLA Class I or Class II antibodies. If the screen is positive, an assay will be performed to specify the antibody to allelic level.

Post-transplant antibody monitoring in solid organ transplants

In the post-transplant period, monitoring for low-level or newly formed DSA is important, as it is associated with graft loss. HLA antibodies may provide a clinical prediction for patient alloreactivity to graft dysfunction due to immunological or non-immunological causes. DSA may also serve as an early indicator for chronic graft rejection that is not yet manifested by biochemical markers (such as creatinine) in kidney transplants.

Sample type

One SST tube (yellow top) can be collected from Mondays to Fridays.

HLA and disease associations

HLA typing can also be used for disease associations. The pathophysiology of why certain diseases are associated with specific HLA types is incompletely understood and various hypotheses exist. Examples include the following:

- HLA -B*27 in ankylosing spondylitis
- HLA-DRB1*03/*04 in insulin-dependent diabetes mellitus
- HLA-DQ*02/*08 in coeliac disease

HLA typing can also be useful in drug reactions. The most common example is hypersensitivity to the antiretroviral drug Abacavir in patients with HLA-B*57:01.

For any queries regarding HLA typing and screening, please contact Ampath's Cellular Immunology Laboratory at 012 678 0530 or Dr Petri Swanepoel at 012 678 0613/4

References

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3. Takemore S, Port FK, Claas FHJ, Duquesnoy RJ. 2004. HLA matching for kidney transplantation. Human Immunology 65(12): 1489–505.
4. Nunes E, Heslop H, Fernandez-Vina M, Taves C, Wagenknecht DR, Eisenbrey AB, Fischer G, Poulton K, Wacker K, Hurley CK, Noreen H, Sacchi N. Definitions of histocompatibility typing terms. 2011. Human Immunology 72:1214–6
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