ANALYSIS OF QUALITY OF ANTISERA SET

(HLA CLASS I (A, B))

IN SIRIRAJ HOSPITAL

EKARAJ RUNGROUNG

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Knowledge of Human Leukocyte Antigen (HLA) has been studied for a long time. It was completely accepted that it played major roles in organ transplantation, allotransfusion of blood components and regulation of the immune response. Although HLA is very important in many ways, few institutes in Thailand at this time can afford to perform the HLA-testing because this kind of study requires sophisticated instruments, expensive reagents and well trained laboratory personel. Antisera is the reagent in tissue typing tray of HLA-testing.

In Siriraj Hospital, a set of tissue typing tray (HLA class I (A, B)) has been produced in the Department of Transfusion Medicine since 1992. The objective of this study is to identify the quality of antisera set (HLA class I (A, B)) used in Siriraj Hospital, by utilizing the Lambda Scan Plus Program during years 1992 to 1996. The Lambda Scan Plus Program of One Lambda Inc. is the program used for tissue typing analysis in most laboratories in Thailand.

The quality of an antisera increases as the R value approaches unity (1.0). Generally an R value of greater than 0.8 is required for reagent purposes, but antisera having values greater than 0.6 may occasionally be used in the detection of rare specificities.

This study found that antisera being used in our typing tray during years 1992 to 1996 (91.4 % of serum 's HLA-A and 83.8 % of serum 's HLA-B) had an R value greater than 0.6. This shows that the quality of antisera is in the standard of tissue typing tray. Now, this tissue typing tray (HLA class I (A, B)) is also used at Siriraj Hospital, National Blood Red-Cross and Pramongkutkaow Hospital.

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เอกราช รุ่งเรือง : การวิเคราะห์คุณภาพของแอนติซีร่าในชุดตรวจแอนติซีร่าของ เอช แอล เอ คลาสหนึ่ง (เอ, บี) ที่ผลิตและใช้ในโรงพยาบาลศิริราช (ANALYSIS OF QUALITY OF ANTISERA SET (HLA CLASS I (A, B)) IN SIRIRAJ HOSPITAL.) คณะกรรมการควบคุมวิทยานิพนธ์ : ทัศน์ยานี จันทนยิ่งยง M.D., ศศิธร เพชรจันทร M.D., ปรียาจิต เจริญวงศ์ M.D.
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ความรู้เกี่ยวกับ "HLA" ได้มีการศึกษากันมานานแล้ว และในปัจจุบันเป็นที่ยอมรับกันแล้วว่า "HLA" มีความสำคัญในด้านต่าง ๆ อย่างมากมาย เช่น งานปลูกถ่ายอวัยวะ, การให้ส่วนประกอบของเลือด และระบบภูมิคุ้มกันของร่างกาย เป็นต้น แต่การปฏิบัติงานทางด้านนี้ต้องใช้เครื่องมือที่มีราคาแพง น้ำยาตรวจที่หายาก ตลอดจนความชำนาญของเจ้าหน้าที่ที่ปฏิบัติงานในการตรวจด้วย ปัจจุบันจึงมีเพียงสถาบันใหญ่ ๆ ในประเทศไทยเท่านั้นที่ทำการตรวจทางด้าน HLA แอนติซีร่าที่ใช้ในชุดการตรวจเนื้อเยื่อของ HLA ก็จัดเป็นน้ำยาตรวจชนิดหนึ่ง

โรงพยาบาลศิริราชโดยภาควิชาเวชศาสตร์การธนาคารเลือดได้ผลิตชุดการตรวจเนื้อเยื่อด้าน HLA ตั้งแต่ปี พ.ศ.2535 ดังนั้นวัตถุประสงค์ในการศึกษาครั้งนี้เพื่อที่จะวิเคราะห์คุณภาพของแอนติซีร่าที่ใช้ในชุดตรวจนี้ในระหว่างปี พ.ศ. 2535 ถึง พ.ศ. 2539 โดยใช้โปรแกรม Lambda Scan Plus ช่วยในการวิเคราะห์ ซึ่ง Lambda Scan Plus โปรแกรมของบริษัท One Lambda เป็นโปรแกรมที่ถูกใช้มากที่สุดในห้องปฏิบัติการด้าน HLA ในประเทศไทย

เป็นที่รู้กันดีว่า คุณภาพของแอนติซีร่าที่ใช้ในการตรวจชนิดของเนื้อเยื่อด้าน HLA ขึ้นกับค่า R value ซึ่งโดยปกติควรเป็น 1.0 โดยทั่วไปแอนติซีร่าที่ใช้ควรให้ผลค่า R value มากกว่า 0.8 แต่แอนติซีร่าที่ให้ค่า R value มากกว่า 0.6 ก็สามารถบอกชนิดของเนื้อเยื่อที่หายากได้แล้ว

ในการศึกษาครั้งนี้ เราพบว่าจำนวนของแอนติซีร่าที่นำมาใช้ในชุดการตรวจเนื้อเยื่อด้าน HLA ของโรงพยาบาลศิริราช ระหว่างปี พ.ศ. 2535 ถึงปี พ.ศ. 2539 ให้ผลค่า R value มากกว่า 0.6 มีถึง 91.4 % ในกลุ่ม HLA-A และ 83.8 % ในกลุ่ม HLA-B ซึ่งแสดงว่าคุณภาพของแอนติซีร่าที่ทำการศึกษานี้อยู่ในมาตรฐานของการผลิตชุดตรวจเนื้อเยื่อด้าน HLA ปัจจุบันชุดการตรวจเนื้อเยื่อด้าน HLA นี้ยังใช้ในโรงพยาบาลศิริราชและสถาบันอื่น ๆ ได้แก่ ศูนย์บริการโลหิตแห่งชาติ, โรงพยาบาลพระมงกุฎเกล้า เป็นต้น

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LIST OF ABBREVIATIONS

Abbreviation	Term
α	alpha
ASO	allele specific oligonucleotide
β	beta
β2-m	beta-2-microglobulin
CREGs	cross reacting antigen groups
GVHD	graft versus host disease
HLA	human leucocyte antigen
kd	kilodalton
LCT	lymphocytotoxicity test
MHC	major histocompatibility complex
PBL	peripheral blood lymphocytes
PCR	polymerase chain reaction
RFLP	restriction fragment length polymorphism
SSO	sequence specific oligonucleotide
SSP	sequence specific primer
TCR	T cell receptor

CHAPTER I

INTRODUCTION

Tissue typing is the detection of antigens on the surface of lymphocytes. These antigens make up the HLA (Human Leukocyte Antigen) system. They form part of a region on chromosome six known as the Major Histocompatibility Complex or MHC.

The microlymphocytotoxicity test is universally employed for serological HLA-A, -B, -C, -DR, and -DQ typing. Peripheral blood lymphocytes (PBL) (consisting of approximately 80% T cells and 10-15% B cells in healthy subjects) or T cells are generally used as targets for HLA-A, -B, and -C typing. B cell enriched suspensions are used for typing HLA-DR and -DQ antigens which are not expressed on resting T cells.

Lymphocytes are tested with a set of HLA specific alloantibodies which are monospecific antisera or polyspecific antibodies each selected to react with one, or sometimes two or more HLA antigens. For full HLA typing the antibody set should cover as many of the various HLA antigens as possible. Reagents for HLA typing should ideally be selected to give strong reliable positive and negative results. The interpretation of a weak or doubtful positive requires an intimate knowledge of the reactivity and specificity of the antisera. It is not possible to produce sets of HLA-A, -B, -C, and -DR, -DQ typing antisera that will detect every single combination of the known HLA antigens. Antisera are obtainable commercially, by local "screening"

programmes, and by exchanges with other tissue typing laboratories.

At present, we accept the diverse important roles of the MHC in organ transplantation, allotransfusion of leukocytes or platelets, association with some diseases, regulation of immune response, etc. (1, 2, 3, 4, 5, 6).

In order to determine an individual's HLA type, three important ingredients are required : a suitable cell suspension, complements and quality reagents containing specific antibodies against HLA antigens. The reagents are of two forms : alloantibodies produced by various sensitization procedures and monoclonal antibodies.

The objective of this study is to identify the quality of antisera set (HLA class I (A, B)) used in Siriraj Hospital, by utilizing the Lambda Scan Plus Program of One Lambda Inc., 1989, during years 1992 to 1996.

CHAPTER II

LITERATURE REVIEW

Originally, the Major Histocompatibility Complex (MHC) was studied in leukocyte, thus it is called HLA (Human Leukocyte Antigen) system (7, 8). HLA antigens can be detected on the most nucleated cells and tissues, especially, immuno-competent cells (9, 10, 11). At present, HLA-testing is a component of the typical clinical immunology unit (12).

2.1 The HLA system

Early work on human histocompatibility antigens, as has often been the case in the field of genetics, grew from pioneering studies on animals. In the 1930s and 40s Peter Gorer and George Snell (13) worked on the genetics and immunology of tumour transplantation in mice. Soon afterwards Peter Medawar persued the cellular rejection mechanisms responsible for murine skin and organ transplants.

The HLA system was discovered in the 1950s, while leukocyte antibodies in patients with various blood dyscrasia were investigated (14). In 1950, Dausset and Nenna (15) found leukocyte alloantibodies in the sera of leukopenic patients. Subsequently; they also reported the first HLA antigen, Mac (A2), in 1958 by using sera of patients with multitransfusions in leukoagglutination tests (16). Shortly after

Dausset's discovery, Payne and van Rood (17) independently found similar leukoagglutinins in the sera of multiparous women.

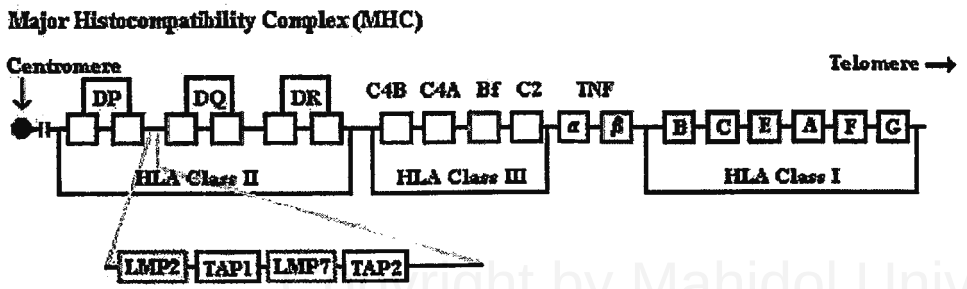
In 1964, Terasaki and McClelland (18) established an elegant test, a microdroplet-lymphocytotoxicity test (LCT), for detection of the alloantigens. The reproducibility and practicality of the LCT is remarkable. This test has been adopted as the standard procedure in subsequent international workshops, (19). After that, several groups of researchers began to investigate and found numerous lymphocytotoxic antibodies (20-37).

2.2 Structure of the MHC and HLA genes and molecules

2.2.1 Genetic map of the human MHC

With the rapid advance in genetic mapping and sequencing techniques, the number of genes identifical in the area of the human MHC on the short arm of chromosome six is rapidly increasing (Figure 1). A recent comprehensive map of the MHC listed 15 class I genes, 18 class II genes, and 49 other genes. Inevitably, some of these genes have no immunological function but are found in this part of the genome by chance. Alternatively, the genes may code for proteins whose functions are not fully understood but they may turn out to be important true MHC genes.

Figure 1. Map of the HLA system on the short arm of the human sixth chromosome.



In this discussion, Klein (38) proposed a classification of MHC coded proteins, grouping those with similar structure and function; thus HLA-A, -B and -C molecules were assigned to class I, with HLA-DR molecules assigned to class II. The gene products coded for in the region between the HLA-DR region and the HLA-B region of chromosome six were originally grouped in class III. This classification has been extended to the MHC genes in addition to their products. It has been argued that the term, class III, to describe neither class I nor class II, has become increasingly vague since these genes and their products are structurally and functionally diverse. Use of class III as a nomenclature should be discouraged. Thus, the extent of the MHC has never been defined.

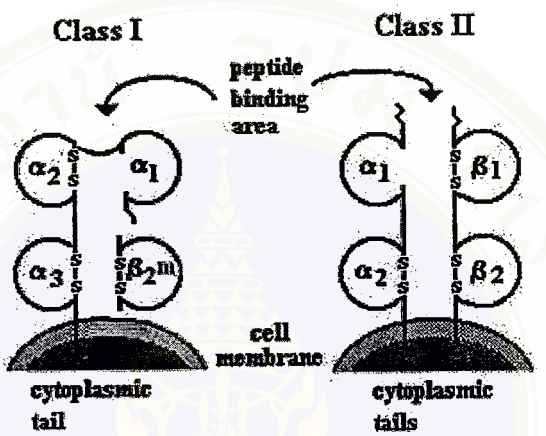
2.2.2 Structure of HLA class I molecules

Class I molecules consist of a heavy chain of 340 amino acids (45 kd) encoded by genes within the MHC, and a light chain of 12 kd, the invariant β2-microglobulin (β2-m), coded for on chromosome 15. The functional class I molecule is not expressed at the cell surface in the absence of β2-m; for example the Daudi cell line is class I negative since it lacks the β2-m gene. (Figure 2)

The intracellular portion of class I molecules is about thirty amino acids long and terminates in a hydrophilic carboxyl region. The short (25 amino acids) hydrophobic transmembrane portion is typical of that seen in other membrane bound proteins. The three extracellular domains of the heavy chain are each about 90 amino acids long and extend from the membrane adjacent α3 region to the most distal membrane regions α2 and αl, which have carbohydrate moieties attached. Most of the

sequence variation in class I molecules is found in the α1 and α2 regions and occurs in hyper-variable regions (HVR). The light chain β2-m associates non-covalently with the α3 domain.

Figure 2. Structure of HLA class I and class II molecules



The three dimensional crystallographic structure of HLA-A2 was resolved in 1987 (39) and this gave rise to many studies on the functional relevance of the sites of polymorphism and binding to the T cell receptor (TCR). The two alpha helices of the α1 and α2 regions lie adjacent on a beta pleated sheet; between these is a groove which is most open at the centre of the structure. Surprisingly the crystallographic studies revealed a small (approximately 18 amino acids) peptide to be bound in the groove and attached to the beta pleated sheet. This is now known to be endogenous peptide and there has been much speculation over its function (40).

The location of polymorphic antigenic sites (epitopes) in the class I HLA molecule groove, near to bound peptide and near to the sites of interaction with the TCR, has led to speculation on the mechanistic role of these polymorphisms in organ transplantation and disease susceptibility (41). It is interesting to note that serological specificities known to form cross reacting antigen groups (CREGs) are not

always located in the same part of the molecule. They can be found on either of the αl or α2 helices, or on the beta pleated sheet. Some parts of the molecule are likely to be more accessible to the TCR than others, which means some specificities could be of greater functional relevance than others.

2.2.3 Structure of HLA class I genes

There are three commonly recognized HLA class I genes, HLA-A, -B, and -C, coding for serologically defined antigens; and in addition, three other class I genes, HLA-E, -F, and -G, are known to code for functional molecules. Also recognized are two pseudogenes, HLA-H and HLA-J. The typical HLA class I gene consists of eight exons, including a signal peptide, occupying 3.5 kb (42). Exons two to four are found to be correlated with the extracellular regions α1-α3 respectively, and most polymorphic variation is found in sequences coding for amino acids 60-100 of αl and 150-200 of α2.

2.2.4 Structure of HLA class II molecules

HLA class II molecules consist of a heterodimer with a heavy chain (α) of 31-34 kd and a light chain (β) of 26-29 kd; the size difference is accounted for by carbohydrate moieties. The α chain of HLA-DR molecules is invariant. Both α and β chains have intracellular, transmembrane, and two extracellular regions. The three-dimensional structure of class II molecules is presumed to resemble that of class I molecules, and a hypothetical model has been proposed (43) (Figure 2). The peptide bound to HLA class II proteins is usually accepted to be of exogenous origin in

contrast to class I bound endogenous peptides. Again the most polymorphic regions of the molecule are found in the terminal regions of the extracellular domains. There are HVRs between amino acids 25 to 40 and 65 to 80 of HLA-DRB1, and these are the target regions for typing methods used to define class II gene polymorphisms by PCR amplification of DNA.

HLA-DQ and -DP class II molecules are polymorphic in both α and β chains. Definition of HLA-DQ polymorphisms by serological means is restricted to HLA-DQB. However, molecular techniques are used successfully to define HLA-DQ, -DPA, and B gene polymorphisms.

There is evidence in the mouse (44) that hybrid class II αβ heterodimers exist, and these can even be coded for by genes in *trans* combination on different haplotypes, contrasting with the usual *cis* conformation of the same haplotype. In man such hybrid molecules are possible and their expression may be relevant to susceptibility of an individual to disease.

2.2.5 Structure of HLA class II genes

Whilst there is only one HLA-DR α chain gene (HLA-DRA) there are five HLA-DR β chain genes (HLA-DRB1-5), and four pseudogenes (HLA-DRB6-9). Not all HLA-DRB genes occur on all haplotypes and some combinations are haplotype specific. Both HLA-DQ and HLA-DP regions have pseudogenes located close to the expressed genes.The typical chain gene has five exons; the leader sequence contains the 5' untranslated region, the signal sequence, and codes for the first few amino acids of protein. Two exons code for α1 and α2 domains while the

connecting peptide, transmembrane and cytoplasmic domains are coded in a fourth exon. Most of the 3' untranslated region is coded for in the fifth exon. The β chain gene is similar except that the cytoplasmic domain has two or three exons (45).

2.3 HLA AND DISEASE

Studies on associations between HLA antigens and disease began as a result of the demonstration by Lilley and his colleagues that susceptibility to murine leukemia was partially determined by a gene within the mouse MHC (46). In 1967, Amiel (47) initiated studies on the association between HLA and malignancy. The studies led to the finding of associations between a cross-reactive group of antigens, HLA-B5, B35, B15, B18 and HLA-A2 in children (48). Shortly afterwards, the very strong association between ankylosing spondylitis and HLA-B27 was discovered (49, 50).

Diseases associated with HLA antigens have several characteristics that should be noted. In general, these diseases (51) :

1) are of unknown causes and unknown pathophysiologic mechanism, with a hereditary pattern of distribution but weak penetrance;

(2) are associated with immunologic abnormalities and

(3) have little or no effect on reproduction.

Several hypotheses have been advanced to explain HLA-disease associations. Three of these appear to be most likely. The first hypothesis holds that HLA antigens are merely markers for immune response genes, or immune suppressive genes. The second postulate suggests that HLA antigens may act as receptors for etiologic agents.

The third hypothesis is that the disease associated HLA antigen is structurally and immunologically similar to the etiologic agent for the disease.

The best known of these associations is ankylosing spondylitis with HLA-B27. Whereas only 7% of the general population have B27, the frequency in patients with ankylosing spondylitis is 95%. The HLA-disease associations are showed in Table 1.

Table 1. Some HLA disease associations, with relative risk factors.

Disease	HLA Antigen Association	Relative Risk (%)
Ankylosing spondylitis	B27	90.1
Reiter's syndrome	B27	35.9
Pemphigus valgaris	DR4	14.4
Goodparture's syndrome	DR2	14.2
Celiac disease	B8	8.9
Myasthenia gravis	B8	4.4
Rheumatoid arthritis	Dw4	3.9
Proriasis	Cw6	3.6
Lupus erythematosus	B8	2.1

2.4 HLA AND ORGAN TRANSPLANTATION

Developments in the HLA field were initially influenced by clinical demands. Luekopenia and febrile transfusion reactions were of major interest. Subsequently, another area of practical importance opened up with the work of Payne and Rolfs (52) and van Rood et al (53) on the influence on foetomaternal relationships.

Currently the most important clinical application of the HLA system relates to the finding of van Rood, et al (54) that the survival of skin transplants between siblings who were HLA and ABO identical was significantly longer than that between

siblings who were identical for only one of these two systems. This demonstrated that HLA was a major histocompatibility system.

The idea that the HLA-antigens represent the major histocompatibility system in man is strongly supported by the significantly increased graft survival rate of transplanted kidneys (55 - 58). HLA class I antigens are expressed on all structures within the kidney (59). HLA class II antigens are expressed on glomerular endothelium and mesangium, and on intertubular structures, capillary endothelium and interstitial leucocytes with dendritic morphology (59). Matching for HLA within a family for living related renal transplantation can be very precise, and indeed the excellent survival of renal allografts between HLA identical siblings is the best proof that HLA is the MHC in man.

In addition, HLA compatibility is a significant factor in clinical allogeneic marrow transplantation (60). Disparity for HLA determinants, either class I or class II antigens, increases the rate of onset and overall incidence of clinically significant GVHD, and also increases the incidence of graft failure. The risk of graft failure and GVHD are proportional to the degree of HLA disparity.

Blood transfusion is the commonest type of transplantation. The HLA phenotype is significance for selecting platelet and granulocyte donors since HLA. identical blood components do survive in the transfused patient for a longer period of time than incompatible ones (61, 62).

2.5 HLA TYPING

HLA typing is used primarily for a determination of HLA compatibility prior to transplantation, for paternity testing, for anthropologic studies, and for establishing HLA-disease associations.

HLA typing was first done to identify HLA-compatible or partially compatible donors and recipients for organ transplantation. The broadest generalization which can be made regarding HLA compatibility and transplantation is that results with closely related living donors matched with the recipient for one or both haplotypes are superior to those obtained with unrelated cadaveric donors matched for a similar number of HLA antigens. Usually, the serologically determined class I and class II antigens are typed.

HLA typing is recommended as the next step if simple red cell typing does not exclude the putative father as the biologic father, because of the relatively low frequency of a given HLA antigen and the even lower frequency of a given HLA haplotype.

The finding that HLA types vary widely among different ethnic populations has allowed anthropologists to establish or confirm data regarding interrelationships among populations and migration patterns.

Finally, HLA typing has been used to establish HLA-disease associations, which are discussed above.

There are many methods for HLA typing such as the agglutination test, the lymphocytotoxicity test, primed lymphocyted typing, platelet complement fixation, mixed leukocyte reactions and restriction fragment length polymorphism. However,

nowadays almost all HLA typing is done by lymphocytotoxicity test, but the major limitations in HLA-typing are heterogeneity and the rareness of HLA antisera.

2.6 HLA ANTIBODIES

The most common sources of HLA antisera are sera from :

1. multitransfused individual
2. pregnant women
3. immunized volunteers.

In all three instances antibodies are formed as a result of transfusion of foreign lymphocytes and/or platelets. Since sera of multitransfused individuals often contain numerous HLA antibody populations they are usually unsuitable as typing reagents. Planned immunizations have a certain health risk to the recipient. Thus they are not suitable for typing reagents. Sera from parous women are the most suitable source because they have been immunized only against a restricted number of antigens, those of their husbands. Furthermore, large volumes of a reagent can be obtained by plasmapheresis of this group (63).

Although a serum may be monospecific it will still contain several antibody populations with very similar specificities. In the meantime, monoclonal antibodies against HLA antigens have been produced. A variety of monoclonal antibodies have been discovered which react with nonpolymorphic sequences of HLA polypeptide chains. These have proved to be valuable since they can help in solving some actual problems for example : tissue distribution of HLA antigens, their molecular structure, the evolution of MHC genes and the isolation of HLA antigens.

2.7 CROSS-REACTION

The HLA system is extremely polymorphic, having multiple different alleles at each known locus. For example, there are at least 124 distinct alleles at the HLA-A locus and at least 258 distinct alleles at the HLA-B locus (64). The products of the HLA-A, -B, -C, -D, -DR, -DQ, and -DP alleles are cell surface molecules that bear the antigenic determinants.

The same term is used to designate the HLA allele and its product, the HLA antigen. HLA antigens found on the molecule determined by a single allele (and no other) are termed HLA private antigens (41). In contrast, HLA public antigens are determinants common to several HLA molecules each of which bears a distinct HLA private antigen. HLA-Bw4 and -Bw6 are the best-known examples of HLA public antigens. The entire listing of officially and tentatively recognized HLA antigens determined by the HLA-A, -B, -C, -D, -DR, -DQ and -DP loci is presented in table 2. The distribution of, HLA public antigens is presented in Table 3 and 4.

In several instances, HLA antigens initially thought to be single private HLA antigens have been subsequently found to be a group of 2 or 3 closely related HLA antigens, each of narrower specificity. These latter antigens are termed "splits" of the original broad specificity. In Table 2, HLA antigens that are splits are followed in parentheses by the original broad antigen of which they are splits. Table 5 is a listing of the currently recognized splits of the broad specificities.

Conversely, HLA private antigens can be organized into groups based on apparent serologic cross-reactivity between members of the group (65). These groups are termed cross-reactive groups (CREGS). For example, the B7-CREG includes

HLA-B7, B22 (subsequently split into B54, B55, and B56), B27, B40 (subsequently split into B60 and B61), and B42. Cross reactions of HLA-A and -B locus are showed in Table 6 and 7, respectively.

2.8 Molecular typing

Molecular typing techniques were first applied to the D region, but since the introduction of the PCR methodology by Saiki and Erlich in 1985, there has been an incredible amount of progress in both class II and class I molecular typing.

The first molecular typing method applied to the MHC was restriction fragment length polymorphism (RFLP) typing by Wake in 1982. RFLP analysis is based on restriction endonuclease cleavage at polymorphic restriction sites. These sites, specific for each enzyme used, are located in both coding and non-coding regions of the genes. In general, it is the strong linkage disequilibrium between specific polymorphic restriction sites and coding sequence variations that allows RFLP analysis to be so informative in HLA class II DNA typing, and there is good correlation between DNA-RFLP and phenotypic typing for class II specificities. The technique is not now so widely used in routine laboratories. This is largely due to the dependence on radioactivity for labelling probes; inherent time constraints; difficulties in interpreting results, especially in non-Caucasian populations; the detection of irrelevant polymorphism; the inability to make distinctions between limited nucleotide differences (sub-types of DR4); and reliance upon linkage disequilibrium for the descrimination between DR3 and DR6 alleles.

Table 2. Ieke Schreuder Complete Listing of Recognized HLA Specificities 1996 from Pel-Freez Clinical Systems.

HLA-A	HLA-B	HLA-B	HLA-C	HLA-DR	HLA-D	HLA-DQ	HLA-DP
Serum-defined	Serum-defined	Serum-defined	Serum - defined	Serum-defined	Lymphocyte-defined	Serum-defined	Lymphocyte-defined
A1	B5	B50(21)	Cw1	DR1	Dw1	DQ1	DPw1
A2	B7	B51(5)	Cw2	DR103	Dw2	DQ2	DPw2
A203	B703	B5102	Cw3	DR2	Dw3	DQ3	DPw3
A210	B8	B5103	Cw4	DR3	Dw4	DQ4	DPw4
A3	B12	B52(5)	Cw5	DR4	Dw5	DQ5(1)	DPw5
A9	B13	B53	Cw6	DR5	Dw6	DQ6(1)	DPw6
A10	B14	B54(22)	Cw7	DR6	Dw7	DQ7(3)	
A11	B15	B55(22)	Cw8	DR7	Dw8	DQ8(3)	
A19	B16	B56(22)	Cw9(w3)	DR8	Dw9	DQ9(3)	
A23(9)	B17	B57(17)	Cw10(w3)	DR9	Dw10		
A24(9)	B18	B58(17)		DR10	Dw11(w7)		
A2403	B21	B59		DR11(5)	Dw12		
A25(10)	B22	B60(40)		DR12(5)	Dw13		
A26(10)	B27	B61(40)		DR13(6)	Dw14		
A28	**B2708**	B62(15)		DR14(6)	Dw15		
A29(19)	B35	B63(15)		DR1403	Dw16		
A30(19)	B37	B64(14)		DR1404	Dw17(w7)		
A31(19)	B38(16)	B65(14)		DR15(2)	Dw18(w6)		
A32(19)	B39(16)	B67		DR16(2)	Dw19(w6)		
A33(19)	B3901	B70		DR17(3)	Dw20		
A34(10)	B3902	B71(70)		DR18(3)	Dw21		
A36	B40	B72(70)			Dw22		
A43	B4005	B73		DR51	Dw23		
A66(10)	B41	B75(15)		DR52	Dw24		
A68(28)	B42	B76(15)		DR53	Dw25		
A69(28)	B44(12)	B77(15)			DW26		
A74(19)	B45(12)	**B78**					
A80	B46	**B81**					
	B47						
	B48	Bw4					
	B49(21)	Bw6					

Note : Antigens in parentheses ( ) denote "parent" antigens from which the new specificities have "split". Newly recognized specificities are in bold print.

Table 3. HLA-B Public Specificities, Inclusion/Association.

Bw4	B5, B13, B17, B27, B37, B38(16), B44(12), B47, B49, B51(5), B5102, B5103, B52(5), B53, B57(17), B58(17), B59, B63(15), B77(15)
and	A9, A23(9), A24(9), A2403, A25(10), A26(10), A31(19), A32(19), A33(19)
Bw6	B7, B703, B8, B14, B18, B22, B2708, B35, B39(16), B3901, B3902, B40, B4005, B41, B42, B45(12), B46, B48, B50(21), B54(22), B55(22), B56(22), B60(40), B61(40), B62(15), B64(14), B65(14), B67, B70, B71(70), B72(70), B73, B75(15), B76(15), B78, B18

Table 4. HLA-DR Public Specificities, Inclusions/Associations.

DR51	DR2, DR15(2), DR16(2), DR1(rare)
DR52	DR3, DR5, DR6, DR11(5), DR12(5), DR3(6), DR14(6), DR1403, DR1404, DR17(3), DR18(3)
DR53	DR4, DR7*, DR9
	DR53 is not always expressed with DR7 DR1, DR8, DR10, DR103 are not associated with a public specificity

Table 5. Broad Specificities : Splits, Associated Antigens.

Original Broad Specificities	**Splits and Associated Antigens #**
A2	A203#, A210#
A9	A23, A24, A2403#
A10	A25, A26, A34, A66
A19	A29, A30, A31, A32, A33, A74
A28	A68, A69
B5	B51, B52, B5102#, B5103#
B7	B703#
B12	B44, B45
B14	B64, B65
B15	B62, B63, B75, B76, B77
B16	B38, B39, B3901#, B3902#
B17	B57, B58
B21	B49, B50, B4005#
B22	B54, B55, B56
B27	B2708#
B40	B60, B61
B70	B71, B72
Cw3	Cw9, Cw10

Table 5. Broad Specificities : Splits, Associated Antigens. (continued)

Original Broad Specificities	Splits and Associated Antigens #
DR1	DR103#
DR2	DR15, DR16
DR3	DR17, DR18
DR5	DR11, DR12
DR6	DR13, DR14, DR1403#, DR1404#
DQ1	DQ5, DQ6
DQ3	DQ7, DQ8, DQ9
Dw6	Dw18, Dw19
Dw7	Dw11, Dw17

Table 6. Some Antigens of the HLA-A and Their Most Common Cross-Reactive Specificities.

HLA-A Antigens	Cross-Reactive Specificities
A1	A3, A11, A36
A2	A27, A23, A24
A3	A1, A11
A9	A24, A23, A2
A10	A25, A26, A11, A32
A11	A3, A26, A1
A23	A24, A9, A2
A24	A23, A9, A2
A25	A26, A32, A33
A26	A10, A25, A11
A28	A2
A30	A31, A32, A33
A31	A30, A32, A33
A32	A30, A25, A33, A31
A33	A32, A31, A30, A25

RFLP analysis still has a place in the repertoire of a molecular typing lab, but intensive molecular cloning and sequencing coupled with PCR methodology has provided a new approach to the study of MHC polymorphism.

Polymorphism of class II genes is localised to the NH2 terminal outer domain encoded by the second exon. Using PCR primers to conserved regions it is possible to specifically amplify the second exon of the different class II regions from many individuals. Genetic variation in the PCR amplified DNA can then be detected in a number of ways including RFLP, PCR fingerprinting, sequence analysis, allele specific oligonucleotide (ASO) typing, (also called sequence specific oligonucleotide or SSO typing), and PCR sequence specific primer (SSP) typing. SSO typing involves PCR amplification of a chosen sequence using primers flanking that sequence. The amplified DNA is immobilised on a nylon membrane and hybridised with selected oligonucleotide probes labelled with either radioactive S35 or P32, or by chemicals. All HLA class II alleles known so far can be identified by hybridisation with one or a combination of allele specific oligonucleotide probes. There are a number of strategies which can be used depending on the degree of resolution required. Though it utilises a powerfully reliable and accurate technology, it has largely been superceded by the more rapid and safer technique of PCR-SSP.

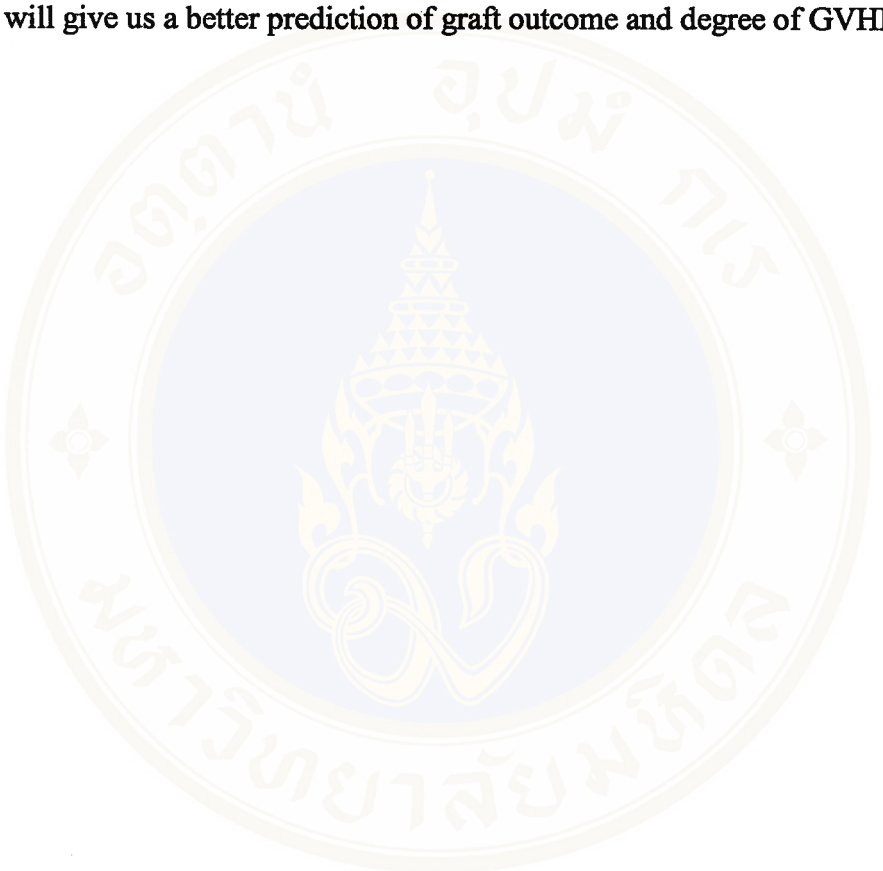
PCR-SSP has largely been developed by Olerup. In this technique, oligonucleotide primers are designed to obtain amplification of specific alleles or groups of alleles. The typing method is based on the principle that a completely matched primer will be more efficiently used in the PCR reaction than a primer with one or more mismatches. This means that the specificity of the typing system is part of the PCR reaction. Assignment of alleles is based on the presence or absence of amplified product, normally detected by agarose gel electrophoresis and transillumination.

Table 7. Some Antigens of the HLA-B and Their Most Common Cross-Reactive Specificities.

HLA-B Antigens	Cross-Reactive Specificities
B5	B35, B25, B17, B21, B18
B7	B22, B27, B40
B8	B14
B12	B21
B13	B40, B7
B14	B8,18
B15	B35, B5, B17, B21, B18
B16	B38, B39, B22
B17	B15, B5, B35, B21, B18
B18	B5, B35, B15, B14, B17
B21	B15, B5, B35, B17
B22	B7, B27, B40, B16, B38
B27	B7, B22, B40
B35	B5, B15, B17, B18, B21
B37	B16, B39, B22
B38	B16, B38, B22
B39	B13, B7

This technique has a number of merits over other PCR based typing methods. It has a high degree of resolution, with each primer pair defining two linked, cis-located polymorphic sites, which facilitates the typing of heterozygous individuals; the PCR-SSP typings are very easy to interpret; the inefficiency of the Taq polymerase to extend mismatched primers is a more precise chemical reaction than the hybridisation with ASOs; the post amplification analysis is rapid and more simple than other PCR based methods, because the typing specificity is part of the PCR reaction; the technique is inexpensive; and finally it is very versatile, because it is possible to use it for all class II loci. When a more precise definition of a DRB1 allele is desired a second step with additional pairs of primers may be performed.

The DNA techniques most relevant to bone marrow transplantation are PCR fingerprinting and DNA crossmatching, devised by Bidwell. It is this advancement of technique which will in the future give us better donor-recipient matching, and coupled with a cellular assay such as a cytotoxic T cell precursor assay or helper T cell assay, will give us a better prediction of graft outcome and degree of GVHD.



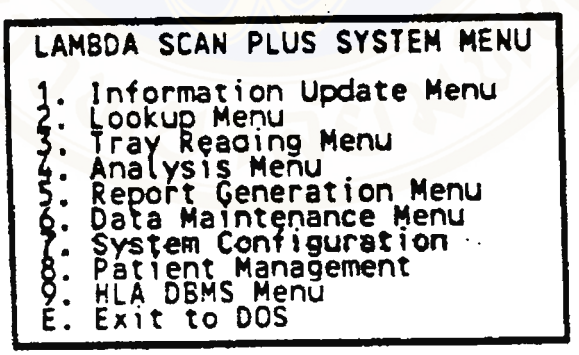
CHAPTER III

METHOD

The results of each serum reaction on a tissue typing plate are recorded, in Siriraj Hospital during years 1992 to 1996. In this study, we used the Lambda Scan Plus Program of One Lambda Inc. 1989 (Figure 3).

The Lambda Scan Plus is also a semi-automated tray reading system which includes additional software for antibody screening and tissue typing analysis (cluster and analysis). In addition, software is provided for print utility, data maintenance, quality control and report generation program.

Figure 3. Lambda Scan Plus System Menu



Three forms of data are used in this program :

1. Cell data
2. Tray format data
3. Serum reaction data

Cell data (Figure 4)

- cell ID
- patient name
- birth date
- sample date
- race
- sex
- center
- disease
- ABO
- Rh
- HLA-A
- HLA-B
- HLA-C
- HLA-DR
- HLA-DQ
- HLA-DP
- HLA-Bw4/Bw6

There are 3,444 cells (Table 8), HLA-A antigen consists of 38 antigens and HLA-B antigen consists of 55 antigens (Table 9).

Figure 4. Cell Entry/Update of Lambda Scan Plus Program

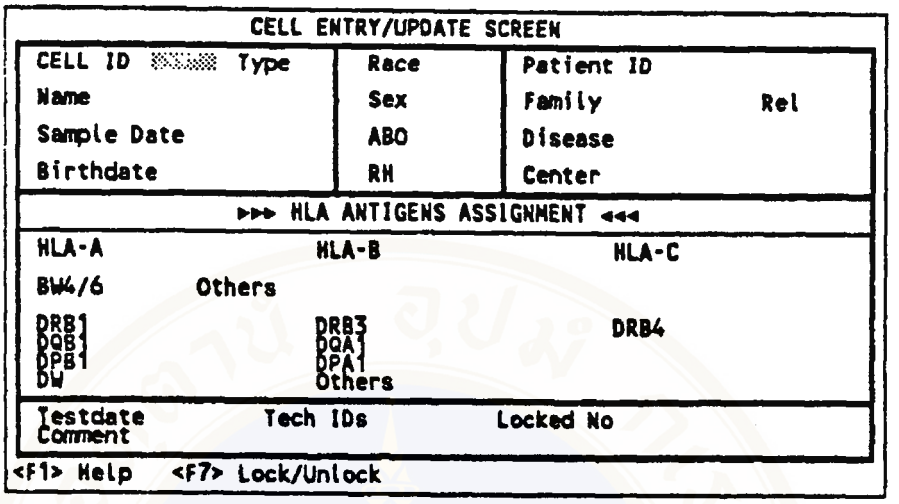


Table 8. Number of cell in Siriraj Hospital during years 1992 to 1996.

	Number of cell
Year 1992	303
Year 1993	1,033
Year 1994	808
Year 1995	550
Year 1996	750
Total	**3,444**

Tray format data (Figure 5)

- tray ID
- sera ID
- race
- Ag1
- Ag2
- Ag3
- Ag4
- Ag5

- Ag6

There are 59 trays (Table 10). The specific antibody of typing tray is showed in Table 11.

Table 9. HLA-A antigen and HLA-B antigen of cell data in Siriraj Hospital during years 1992 to 1996.

HLA-A	HLA-B	
A1	B13	B57
A10	B14	B58
A11	B15	B59
A11.1	B16	B60
A11.2	B17	B61
A19	B18	B62
A2	B21	B63
A203	B22	B67
A207	B27	B7
A23	B35	B70
A24	B37	B73
A25	B38	B75
A26	B39	B76
A28	B40	B77
A29	B41	B8
A3	B42	
A30	B44	Bw4
A31	B45	Bw6
A32	B46	
A33	B47	
A34	B48	
A36	B49	
A66	B5	
A68	B50	
A69	B51	
A74	B52	
A80	B53	
A9	B54	
A9.3	B55	
	B56	

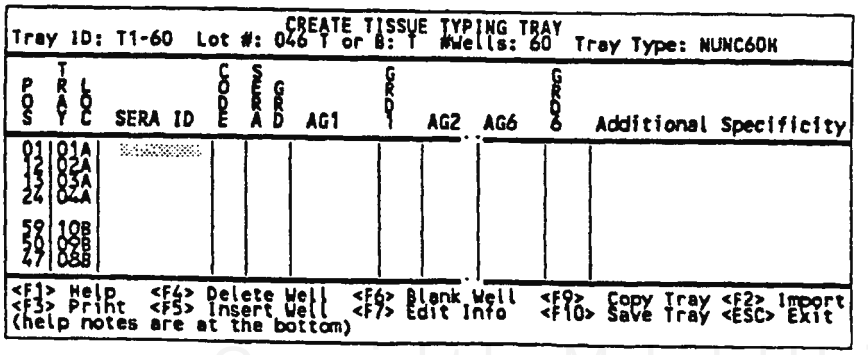
Table 10. Tray format in Siriraj Hospital during years 1992 to 1996.

1992	1993	1994	1995	1996
SI203003	SI093023	SI094029	DCH95451	DCH96461
SI203004	SI093024	SI094030	DCH95452	DCH96462
SI205005	SI093025	SI094031	DCHAB431	DCH96471
SI205006	SI093026	SI094032	DCHAB432	DCH96472
SI207007	SI093027	SI094033	SI095039	DCH96481
SI207008	SI093028	SI094034	SI095040	DCH96482
SI207009	SI211013	SI094035	SI095041	DCH96501
SI209010	SI211014	SI094036	SI095042	DCH96502
SI209011	SI211015	SI094037		DCH96511
SI209012	SI212016	SI094038		DCH96512
	SI212017			DCH96521
	SI212018			DCH96522
	SI302019			DCHAB441
	SI302020			DCHAB442
	SI307021			E9610001
	SI307022			
10	**16**	**10**	**8**	**15**

Table 11. The specific antibody of typing tray in Siriraj Hospital during years 1992 to 1996.

	1992	1993	1994	1995	1996
HLA-A	35	51	31	40	32
HLA-B	83	111	59	63	59
HLA-A & B	2	2	0	0	0
Total	**120**	**164**	**90**	**103**	**91**

Figure 5. Tray Format of Lambda Scan Plus Program



Serum reaction data (Figure 6)

- Celltray
- Reader
- Reaction

There are 7,756 records (Table 12).

Figure 6. Tissue Typing Reaction Format of Lambda Scan Plus Program

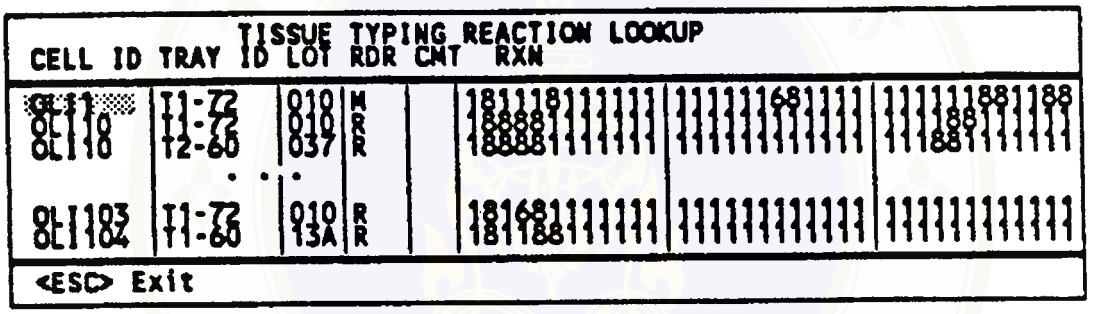


Table 12. Record of serum reaction in Siriraj Hospital during years 1992 to 1996.

1992		1993		1994		1995		1996	
SI203003	82	SI093023	211	SI094029	197	DCH95451	108	DCH96461	98
SI203004	81	SI093024	210	SI094030	200	DCH95452	107	DCH96462	98
SI205005	66	SI093025	208	SI094031	160	DCHAB431	96	DCH96471	29
SI205006	64	SI093026	174	SI094032	161	DCHAB432	96	DCH96472	29
SI207007	82	SI093027	174	SI094033	146	SI095039	176	DCH96481	49
SI207008	82	SI093028	183	SI094034	146	SI095040	176	DCH96482	50
SI207009	83	SI211013	55	SI094035	197	SI095041	179	DCH96501	96
SI209010	79	SI211014	54	SI094036	197	SI095042	178	DCH96502	94
SI209011	77	SI211015	54	SI094037	125			DCH96511	148
SI209012	79	SI212016	275	SI094038	125			DCH96512	149
		SI212017	275					DCH96521	138
		SI212018	274					DCH96522	137
		SI302019	220					DCHAB441	118
		SI302020	218					DCHAB442	118
		SI307021	93					E9610001	89
		SI307022	93						
Total	**775**	**Total**	**2761**	**Total**	**1654**	**Total**	**1116**	**Total**	**1440**

Use of Lambda Scan Plus Program

1. Select in 4. analysis menu (Figure 7)
2. Select in 4. tissue typing tray Q.C. analysis menu
3. Select in 7. combined analysis by sera ID
4. Specify the sera ID and cell type (T/B)
5. Select tray ID
6. Analysis result (Figure 8)

Figure 7. Analysis menu of Lambda Scan Plus Program

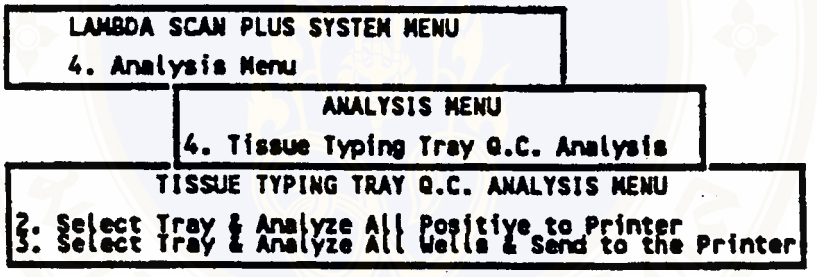
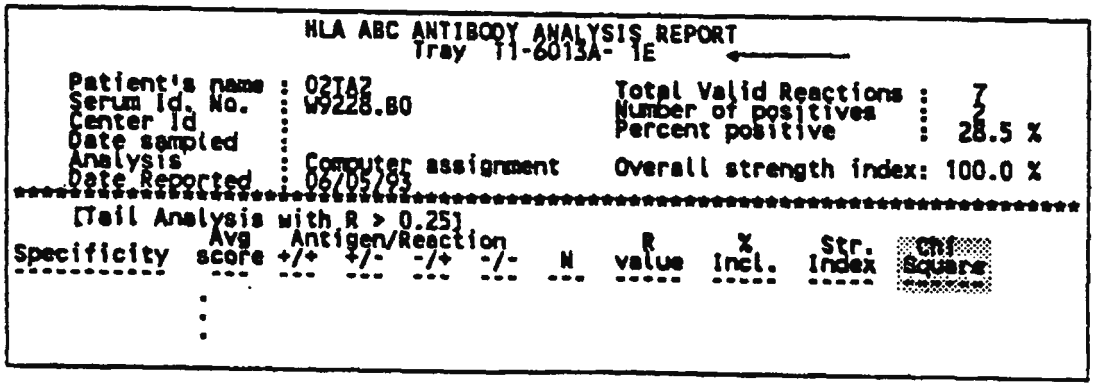


Figure 8. Analysis Report of Lambda Scan Plus Program



Average = The Average of all the positive reaction scores for a specificity.

PP (+/+) = A True Positive reaction is identified for wells that were scored positive and the assigned antigen is present in that well.

FN (+/-) = A False Negative reaction is identified for wells that were scored as negative but the assigned antigen is present in that well.

FP (-/+) = A False Positive reaction is identified for wells that were scored positive but the assigned antigen is not present in that well.

NN (-/-) = A True Negative reaction is identified for wells that were scored as negative and the assigned antigen is not present in that well.

R value = [(PP x NN) - (FP x FN)] divide by
square root [(PP + FN) x (PP + FP) x (NN + FN) x (NN + FP)]

Percent of inclusion (% Incl.) = [PP/(PP + FN)] x 100

Strength index (Str. Index, S8) = [(all 8 reactions in PP)/PP] X 100

Chi Square (X^2) = $[(PP \times NN) - (FN \times FP)]^2 \times N$ devided by
$(PP + FN) \times (PP + FP) \times (NN + FN) \times (NN + FP)$

CHAPTER IV

RESULTS

HLA-A locus (Table 13)

HLA-A1

There are 5 serums (S.1222.2*, S.219, TP.2150-33, TP.8123-33 and TP.9302.2-34), during years 1992 to 1996. The R value is 0.686, 0.743, 0.675, 0.962 and 0.605 respectively. The percent of inclusion is 100, 82.7, 99.4, 97 and 99.5 respectively. The most effective sera is "TP.8123-33" in this group (R value = 0.937 – 0.977, % inclusion = 95.2 – 100).

HLA-A1 + A36

There is one serum (S.1222.2), during years 1992 to 1996. The R value is 0.538 (0.47 – 0.621). The percent of inclusion is 99.5 (94.4 – 100).

HLA-A10

There are 3 serums (S.443, S.495 and TP.283-33), during years 1992 to 1996. The R value is 0.576, 0.501 and 0.909 respectively. The percent of inclusion is 80.7, 83.3 and 97.3 respectively. The most effective sera is "TP.283-33" in this group (R value = 0.797 – 0.968, % inclusion = 96.9 – 100).

HLA-A10 + A11

There is one serum (TP.2839-34), in year 1993. The R value is 0.848. The percent of inclusion is 99.

HLA-A10 + A31 + A33

There is one serum (TP.2813-35), during years 1992 to 1993. The R value is 0.748 (0.727 – 0.83). The percent of inclusion is 89.6 (88.5 – 93.6).

HLA-A10 + A33

There is one serum (TP.147-32), in year 1993. The R value is 0.453. The percent of inclusion is 73.7.

HLA-A10 + A74 + A28

There is one serum (TP.1369-38), during years 1995 to 1996. The R value is 0.405 (0.358 – 0.411). The percent of inclusion is 100.

HLA-A11

There are 7 serums (S.1213.2, S.782, S.936, S.986, TP.2456-35, TP.5393-33 and TP.7834.2), during years 1992 to 1996. The R value is 0.924, 0.804, 0.976, 0.986, 0.948, 0.923 and 0.867 respectively. The percent of inclusion is 98.9, 99.8, 99.5, 99.6, 98.6, 98.4 and 99.6 respectively. The most effective sera is "S.986" in this group (R value = 0.977 – 0.993, % inclusion = 99.4 – 99.7).

HLA-A11.1

There are 4 serums (TP.3714-34, TP.4599-37,TP.7054-37 and TP.822-38), during years 1992 to 1996. The R value is 0.671, 0.787, 0.926 and 0.839 respectively. The percent of inclusion is 97.3, 96.6, 98.3 and 99.1 respectively. The most effective sera is "TP.7054-37" in this group (R value = 0.918 – 0.952, % inclusion = 97.8 – 100).

HLA-A11.2

There are 5 serums (S.1481.1, S.1481.2, S.1759.2, TP.12026-33 and TP.1594-34), during years 1992 to 1996. The R value is 0.98, 0.858, 0.611, 0625 and 0.846 respectively. The percent of inclusion is 100, 96.3, 97.1, 96.1 and 100 respectively. The most effective sera is "S.1481.2" in this group (R value = 0.814 – 0.962, % inclusion = 95.2 – 97.7).

HLA-A19

There is one serum (TP.3333-33), during years 1993 to 1995. The R value is 0.841 (0.824 – 0.858). The percent of inclusion is 99.2 (99.2 - 99.4).

HLA-A2

There are 5 serums (S.975-31, TP.2704.2-33, TP.3785-33, TP.4415-37 and TP.92-32), during years 1992 to 1996. The R value is 0.98, 0.946, 0.98, 0.958 and 0.976 respectively. The percent of inclusion is 99.4, 99.9, 100, 99.7 and 99.7 respectively. The most effective sera is "S.975-31" in this group (R value = 0.967 – 0.994, % inclusion = 96.4 – 100).

HLA-A2 (-A203)

There is one serum (TP.9035-33), during years 1992 to 1993 and during years 1995 to 1996. The R value is 0.814 (0.693 – 0.901). The percent of inclusion is 78.7 (65.3 – 89.6).

HLA-A203

There is one serum (TP.1264-36), during years 1995 to 1996. The R value is 0.89 (0.767 – 0.936). The percent of inclusion is 100.

HLA-A2 + A28

There are 5 serums (S.1475.2, S.1771.2, TP.4551-36, TP.852-33 and TP.936-33), during years 1992 to 1996. The R value is 0.847, 0.883, 0.987, 0.985 and 0.978 respectively. The percent of inclusion is 99.7, 97.6, 99.9, 98.9 and 98.4 respectively. The most effective sera is "TP.4551-36" in this group (R value = 0.985 – 0.989, % inclusion = 99.6 – 100).

HLA-A24

There are 2 serums (S.158 and TP.12150-33), during years 1992 to 1996. The R value is 0.833 and 0.975 respectively. The percent of inclusion is 98.7 and 100 respectively. The most effective sera is "TP.12150-33" in this group (R value = 0.975, % inclusion = 100).

HLA-A26 + A33

There is one serum (TP.2564-33), during years 1992 to 1993. The R value is 0.792 (0.781 – 0.827). The percent of inclusion is 99 (96.4 – 100).

HLA-A28

There is one serum (TP.6845-37), during years 1995 to 1996. The R value is 0.637 (0.614 – 0.669). The percent of inclusion is 100.

HLA-A29

There is one serum (TP.10488-33), in year 1993. The R value is 0.268. The percent of inclusion is 100.

HLA-A29 + A26 + A32

There is one serum (TP.2578-34), during years 1993 to 1996. The R value is 0.668 (0.46 – 0.75). The percent of inclusion is 98.3 (97.4 – 100).

HLA-A3

There are 5 serums (S.1087.1, S.11061, TP.3013-33, TP.4830-35 and TP.8678-37), during years 1992 to 1996. The R value is 0.978, 0.676, 0.906, 0.937 and 0.911 respectively. The percent of inclusion is 95.9, 100, 97.5, 96.3 and 94.9 respectively. The most effective sera is "TP.4830-35" in this group (R value = 0.868 – 0.977, % inclusion = 92.6 – 100).

HLA-A30

There are 2 serums (TP.2681-36 and TP.740-33), in year 1993. The R value is 0.662 and 0.946 respectively. The percent of inclusion is 100 and 99.3 respectively. The most effective sera is "TP.740-33" in this group (R value = 0.762 – 1, % inclusion = 88.9 – 100).

HLA-A30 + A31

There is one serum (TP.5957-33), in year 1992. The R value is 0.761. The percent of inclusion is 71.4.

HLA-A30 + A31 + A33 + A34

There is one serum (TP.2442-34), in year 1993. The R value is 0.362. The percent of inclusion is 100.

HLA-A33

There are 6 serums (S.1054*, S.1057, TP.1057, TP.1111-35, TP.3884-35 and TP.946-33), during years 1992 to 1996. The R value is 0.885, 0.849, 0.872, 0.818, 0.768 and 0.777 respectively. The percent of inclusion is 98.4, 96.6, 100, 99.4, 93.2 and 94.7 respectively. The most effective sera is "S.1054*" in this group (R value = 0.85 – 0.917, % inclusion = 96.6 – 100).

HLA-A9

There are 7 serums (S.1209.1, S.271, S.407, S.469, TP.2622-33,TP.3702-33 and TP.7998-36), during years 1992 to 1996. The R value is 0.983, 0.965, 0.921, 0.844, 0.896, 0.973 and 0.905 respectively. The percent of inclusion is 99.1, 96.4, 99.6, 93.9, 99, 99.5 and 93.1 respectively. The most effective sera is "TP.8123-33" in this group (R value = 0.937 – 0.977, % inclusion = 95.2 – 100).

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
1	S.1222.2*		A1	108	6	0.686	100.0	50.8	6	6	0	6	96	100.0	100.0	0.0	50.0
		95		108	6	0.686	100.0	50.8	6	6	0	6	96	100.0	100.0	0.0	50.0
2	S.219		A1	1310	75	0.743	82.7	723.2	42	62	13	27	1208	56.0	82.7	17.3	30.3
		92		302	18	0.743	66.7	166.6	5	12	6	2	282	27.8	66.7	33.3	14.3
		93		1008	57	0.749	87.7	565.4	37	50	7	25	926	64.9	87.7	12.3	33.3
3	TP.2150-33		A1	2420	154	0.675	99.4	1103.0	145	153	1	157	2109	94.2	99.4	0.6	50.6
		93		387	29	0.678	96.6	178.1	27	28	1	26	332	93.1	96.6	3.4	48.1
		94		808	50	0.627	100.0	318.0	48	50	0	66	692	96.0	100.0	0.0	56.9
		95		547	33	0.750	100.0	307.9	32	33	0	23	491	97.0	100.0	0.0	41.1
		96		678	42	0.683	100.0	316.6	38	42	0	42	594	90.5	100.0	0.0	50.0
4	TP.8123-33		A1	1544	99	0.962	97.0	1430.0	83	96	3	4	1441	83.8	97.0	3.0	4.0
		94		320	24	0.977	95.8	305.6	18	23	1	0	296	75.0	95.8	4.2	0.0
		95		547	33	0.984	100.0	529.9	29	33	0	1	513	87.9	100.0	0.0	2.9
		96		677	42	0.937	95.2	594.8	36	40	2	3	632	85.7	95.2	4.8	7.0
5	TP.9302.2-34		A1	3203	195	0.605	99.5	1172.0	192	194	1	283	2725	98.5	99.5	0.5	59.3
		92		162	11	0.845	100.0	115.7	11	11	0	4	147	100.0	100.0	0.0	26.7
		93		1008	59	0.568	100.0	324.9	59	59	0	104	845	100.0	100.0	0.0	63.8
		94		806	50	0.597	98.0	287.7	47	49	1	72	684	94.0	98.0	2.0	59.5
		95		549	33	0.641	100.0	225.4	33	33	0	41	475	100.0	100.0	0.0	55.4
		96		678	42	0.604	100.0	247.1	42	42	0	62	574	100.0	100.0	0.0	59.6
6	S.1222.2		A1,36	3244	204	0.538	99.5	940.1	199	203	1	401	2639	97.5	99.5	0.5	66.4
		92		298	18	0.470	94.4	65.8	16	17	1	43	237	88.9	94.4	5.6	71.7
		93		1018	64	0.478	100.0	232.7	64	64	0	167	787	100.0	100.0	0.0	72.3
		94		807	53	0.592	100.0	282.4	51	53	0	82	672	96.2	100.0	0.0	60.7
		95		443	27	0.547	100.0	132.5	27	27	0	52	364	100.0	100.0	0.0	65.8
		96		678	42	0.621	100.0	261.9	41	42	0	57	579	97.6	100.0	0.0	57.6
7	S.443		A10	3343	187	0.576	80.7	1111.0	129	151	36	181	2975	69.0	80.7	19.3	54.5
		92		300	11	0.526	90.9	83.1	9	10	1	20	269	81.8	90.9	9.1	66.7
		93		1008	37	0.403	86.5	163.5	30	32	5	112	859	81.1	86.5	13.5	77.8
		94		808	64	0.749	82.8	453.2	43	53	11	21	723	67.2	82.8	17.2	28.4
		95		549	33	0.737	93.9	298.6	24	31	2	20	496	72.7	93.9	6.1	39.2
		96		678	42	0.653	59.5	288.9	23	25	17	8	628	54.8	59.5	40.5	24.2
8	S.495		A10	619	18	0.501	83.3	155.3	15	15	3	31	570	83.3	83.3	16.7	67.4
		92		298	11	0.742	81.8	164.2	9	9	2	4	283	81.8	81.8	18.2	30.8
		93		321	7	0.371	85.7	44.1	6	6	1	27	287	85.7	85.7	14.3	81.8

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996 (continued).

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
9	TP.283-33		A10	3354	187	0.909	97.3	2770.0	175	182	5	30	3137	93.6	97.3	2.7	14.2
		92		302	11	0.850	100.0	218.4	11	11	0	4	287	100.0	100.0	0.0	26.7
		93		1018	37	0.797	97.3	646.9	36	36	1	18	963	97.3	97.3	2.7	33.3
		94		807	64	0.958	96.9	740.5	61	62	2	3	740	95.3	96.9	3.1	4.6
		95		549	33	0.968	97.0	514.2	32	32	1	1	515	97.0	97.0	3.0	3.0
		96		678	42	0.939	97.6	598.1	35	41	1	4	632	83.3	97.6	2.4	8.9
10	TP.2839-34		A10,11	387	197	0.848	99.0	278.1	195	195	2	29	161	99.0	99.0	1.0	12.9
		93		387	197	0.848	99.0	278.1	195	195	2	29	161	99.0	99.0	1.0	12.9
11	TP.2813-35		A10,31,33	876	212	0.748	89.6	490.3	171	190	22	67	597	80.7	89.6	10.4	26.1
		92		162	47	0.830	93.6	111.6	42	44	3	9	106	89.4	93.6	6.4	17.0
		93		714	165	0.727	88.5	377.4	129	146	19	58	491	78.2	88.5	11.5	28.4
12	TP.147-32		A10,33	182	38	0.453	73.7	37.3	21	28	10	31	113	55.3	73.7	26.3	52.5
		93		182	38	0.453	73.7	37.3	21	28	10	31	113	55.3	73.7	26.3	52.5
13	TP.1369-38		A10,74,28	785	86	0.405	100.0	129.1	85	86	0	250	449	98.8	100.0	0.0	74.4
		95		108	17	0.358	100.0	13.9	16	17	0	47	44	94.1	100.0	0.0	73.4
		96		677	69	0.411	100.0	114.4	69	69	0	203	405	100.0	100.0	0.0	74.6
14	S.1213.2		A11	144	93	0.924	98.9	123.0	92	92	1	4	47	98.9	98.9	1.1	4.2
		92		144	93	0.924	98.9	123.0	92	92	1	4	47	98.9	98.9	1.1	4.2
15	S.782		A11	2468	1300	0.804	99.8	1596.0	1268	1297	3	257	911	97.5	99.8	0.2	16.5
		92		301	161	0.785	100.0	185.4	158	161	0	35	105	98.1	100.0	0.0	17.9
		93		1016	553	0.798	99.6	646.7	539	551	2	107	356	97.5	99.6	0.4	16.3
		94		805	416	0.820	99.8	540.9	406	415	1	77	312	97.6	99.8	0.2	15.7
		95		346	170	0.801	100.0	221.7	165	170	0	38	138	97.1	100.0	0.0	18.3
16	S.936		A11	1506	850	0.976	99.5	1434.0	833	846	4	14	642	98.0	99.5	0.5	1.6
		92		302	162	0.987	99.4	294.0	157	161	1	1	139	96.9	99.4	0.6	0.6
		93		324	222	0.986	100.0	314.8	221	222	0	2	100	99.5	100.0	0.0	0.9
		95		203	99	0.990	100.0	199.0	99	99	0	1	103	100.0	100.0	0.0	1.0
		96		677	367	0.961	99.2	625.8	356	364	3	10	300	97.0	99.2	0.8	2.7
17	S.986		A11	1845	919	0.986	99.6	1793.0	911	915	4	9	917	99.1	99.6	0.4	1.0
		93		691	331	0.983	99.7	667.3	327	330	1	5	355	98.8	99.7	0.3	1.5
		94		807	417	0.993	99.5	795.0	415	415	2	1	389	99.5	99.5	0.5	0.2
		95		347	171	0.977	99.4	331.2	169	170	1	3	173	98.8	99.4	0.6	1.7
18	TP.2456-35		A11	485	294	0.948	98.6	436.0	286	290	4	8	183	97.3	98.6	1.4	2.7
		92		161	71	0.950	98.6	145.3	69	70	1	3	87	97.2	98.6	1.4	4.1
		93		324	223	0.942	98.7	287.7	217	220	3	5	96	97.3	98.7	1.3	2.2
19	TP.5393-33		A11	386	184	0.923	98.4	329.0	178	181	3	12	190	96.7	98.4	1.6	6.2
		93		386	184	0.923	98.4	329.0	178	181	3	12	190	96.7	98.4	1.6	6.2
20	TP.7834.2		A11	3348	1766	0.867	99.6	2517.0	1736	1759	7	226	1356	98.3	99.6	0.4	11.4
		92		301	161	0.864	98.8	224.9	148	159	2	19	121	91.9	98.8	1.2	10.7
		93		1013	551	0.815	99.6	672.7	546	549	2	97	365	99.1	99.6	0.4	15.0
		94		806	416	0.893	100.0	643.4	413	416	0	45	345	99.3	100.0	0.0	9.8
		95		551	271	0.863	99.6	410.7	269	270	1	39	241	99.3	99.6	0.4	12.6
		96		677	367	0.919	99.5	571.2	360	365	2	26	284	98.1	99.5	0.5	6.6
21	TP.3714-34		A11.1	2323	1068	0.671	97.3	1047.0	839	1039	29	400	855	78.6	97.3	2.7	27.8
		92		162	59	0.464	91.5	34.9	46	54	5	46	57	78.0	91.5	8.5	46.0
		93		1013	513	0.691	96.9	483.8	421	497	16	153	347	82.1	96.9	3.1	23.5
		94		802	362	0.701	98.1	394.4	268	355	7	128	312	74.0	98.1	1.9	26.5
		95		346	134	0.643	99.3	143.2	104	133	1	73	139	77.6	99.3	0.7	35.4

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996 (continued).

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
22	TP.4599-37		A11.1	215	87	0.787	96.6	133.2	39	84	3	21	107	44.8	96.6	3.4	20.0
		96		119	48	0.830	93.8	81.9	16	45	3	7	64	33.3	93.8	6.3	13.5
23	TP.7054-37		A11.1	881	418	0.926	98.3	755.3	348	411	7	26	437	83.3	98.3	1.7	5.9
		95		203	93	0.952	100.0	183.9	72	93	0	5	105	77.4	100.0	0.0	5.1
		96		678	325	0.918	97.8	571.6	276	318	7	21	332	84.9	97.8	2.2	6.2
24	TP.822-38		A11.1	668	333	0.839	99.1	470.5	316	330	3	54	281	94.9	99.1	0.9	14.1
		95		108	55	0.877	100.0	83.2	54	55	0	7	46	98.2	100.0	0.0	11.3
		96		560	278	0.832	98.9	387.6	262	275	3	47	235	94.2	98.9	1.1	14.6
25	S.1481.1		A11.2	356	27	0.980	100.0	342.2	26	27	0	1	328	96.3	100.0	0.0	3.6
		92		301	26	0.980	100.0	288.8	25	26	0	1	274	96.2	100.0	0.0	3.7
26	S.1481.2		A11.2	3003	162	0.858	96.3	2213.0	147	156	6	44	2797	90.7	96.3	3.7	22.0
		93		967	43	0.825	97.7	658.7	41	42	1	17	907	95.3	97.7	2.3	28.8
		94		807	42	0.814	95.2	534.9	39	40	2	16	749	92.9	95.2	4.8	28.6
		95		551	34	0.853	97.1	401.2	30	33	1	10	507	88.2	97.1	2.9	23.3
		96		678	43	0.962	95.3	628.0	37	41	2	1	634	86.0	95.3	4.7	2.4
27	S.1759.2		A11.2	627	35	0.611	97.1	233.7	32	34	1	47	545	91.4	97.1	2.9	58.0
		92		300	26	0.809	100.0	196.3	24	26	0	12	262	92.3	100.0	0.0	31.6
		93		327	9	0.377	88.9	46.5	8	8	1	35	283	88.9	88.9	11.1	81.4
28	TP.12026-33		A11.2	3269	180	0.625	96.1	1277.0	170	173	7	219	2870	94.4	96.1	3.9	55.9
		92		222	19	0.879	100.0	171.4	17	19	0	5	198	89.5	100.0	0.0	20.8
		93		1014	43	0.527	95.3	281.2	40	41	2	86	885	93.0	95.3	4.7	67.7
		94		806	41	0.602	95.1	292.1	39	39	2	55	710	95.1	95.1	4.9	58.5
		95		549	34	0.649	97.1	231.6	33	33	1	37	478	97.1	97.1	2.9	52.9
		96		678	43	0.689	95.3	321.7	41	41	2	36	599	95.3	95.3	4.7	46.8
29	TP.1594-34		A11.2	390	16	0.846	100.0	279.1	16	16	0	6	368	100.0	100.0	0.0	27.3
		93		390	16	0.846	100.0	279.1	16	16	0	6	368	100.0	100.0	0.0	27.3
30	TP.3333-33		A19	1615	516	0.841	99.2	1144.0	459	512	4	122	977	89.0	99.2	0.8	19.2
		93		372	121	0.857	99.2	273.2	115	120	1	25	226	95.0	99.2	0.8	17.2
		94		800	236	0.824	99.2	542.9	203	234	2	66	498	86.0	99.2	0.8	22.0
		95		443	159	0.858	99.4	326.0	141	158	1	31	253	88.7	99.4	0.6	16.4
31	S.975-31		A2	2467	1138	0.980	99.4	2372.0	1095	1131	7	17	1312	96.2	99.4	0.6	1.5
		92		299	138	0.967	96.4	279.5	128	133	5	0	161	92.8	96.4	3.6	0.0
		93		1014	459	0.974	99.8	962.8	441	458	1	12	543	96.1	99.8	0.2	2.6
		94		806	382	0.988	99.7	786.1	368	381	1	4	420	96.3	99.7	0.3	1.0
		95		348	159	0.994	100.0	344.0	158	159	0	1	188	99.4	100.0	0.0	0.6
32	TP.2704.2-33		A2	1640	763	0.946	99.9	1469.0	759	762	1	44	833	99.5	99.9	0.1	5.5
		93		486	221	0.944	100.0	432.9	219	221	0	14	251	99.1	100.0	0.0	6.0
		94		806	383	0.952	100.0	729.8	382	383	0	20	403	99.7	100.0	0.0	5.0
		95		348	159	0.938	99.4	306.1	158	158	1	10	179	99.4	99.4	0.6	6.0
33	TP.3785-33		A2	390	179	0.980	100.0	374.2	178	179	0	4	207	99.4	100.0	0.0	2.2
		93		390	179	0.980	100.0	374.2	178	179	0	4	207	99.4	100.0	0.0	2.2
34	TP.4415-37		A2	881	351	0.958	99.7	809.2	350	350	1	17	513	99.7	99.7	0.3	4.6
		95		203	90	0.971	100.0	191.2	90	90	0	3	110	100.0	100.0	0.0	3.2
		96		678	261	0.954	99.6	617.7	260	260	1	14	403	99.6	99.6	0.4	5.1
35	TP.92-32		A2	834	376	0.976	99.7	794.5	372	375	1	9	449	98.9	99.7	0.3	2.3
		92		302	138	0.993	99.3	298.0	135	137	1	0	164	97.8	99.3	0.7	0.0
		93		532	238	0.966	100.0	496.9	237	238	0	9	285	99.6	100.0	0.0	3.6

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996 (continued).

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
36	TP.9035-33		A2(-A203)	2063	780	0.814	78.7	1369.0	392	614	166	17	1266	50.3	78.7	21.3	2.7
		92		162	75	0.693	65.3	77.8	26	49	26	1	86	34.7	65.3	34.7	2.0
		93		1019	455	0.777	75.8	615.8	247	345	110	8	556	54.3	75.8	24.2	2.3
		95		203	68	0.868	83.8	153.0	24	57	11	1	134	35.3	83.8	16.2	1.7
		96		679	182	0.901	89.6	551.6	95	163	19	7	490	52.2	89.6	10.4	4.1
37	TP.1264-36		A203	880	119	0.890	100.0	697.5	91	119	0	26	735	76.5	100.0	0.0	17.9
		95		203	27	0.767	100.0	119.4	22	27	0	15	161	81.5	100.0	0.0	35.7
		96		677	92	0.936	100.0	593.3	69	92	0	11	574	75.0	100.0	0.0	10.7
38	S.1475.2		A2,28	3346	1564	0.847	99.7	2399.0	1550	1559	5	271	1511	99.1	99.7	0.3	14.8
		92		300	147	0.833	97.3	208.2	141	143	4	22	131	95.9	97.3	2.7	13.3
		93		1014	480	0.850	99.8	732.1	476	479	1	81	453	99.2	99.8	0.2	14.5
		94		806	399	0.831	100.0	556.3	399	399	0	74	333	100.0	100.0	0.0	15.6
		95		549	259	0.861	100.0	407.0	258	259	0	41	249	99.6	100.0	0.0	13.7
		96		677	279	0.853	100.0	493.2	276	279	0	53	345	98.9	100.0	0.0	16.0
39	S.1771.2		A2,28	719	338	0.883	97.6	560.6	274	330	8	35	346	81.1	97.6	2.4	9.6
		93		636	296	0.871	97.3	482.4	245	288	8	34	306	82.8	97.3	2.7	10.6
40	TP.4551-36		A2,28	1840	854	0.987	99.9	1792.0	853	853	1	11	975	99.9	99.9	0.1	1.3
		94		613	315	0.987	100.0	597.2	315	315	0	4	294	100.0	100.0	0.0	1.3
		95		549	259	0.989	99.6	537.0	258	258	1	2	288	99.6	99.6	0.4	0.8
		96		678	280	0.985	100.0	657.7	280	280	0	5	393	100.0	100.0	0.0	1.8
41	TP.852-33		A2,28	388	188	0.985	98.9	376.1	185	186	2	1	199	98.4	98.9	1.1	0.5
		93		388	188	0.985	98.9	376.1	185	186	2	1	199	98.4	98.9	1.1	0.5
42	TP.936-33		A2,28	1196	554	0.978	98.4	1144.0	535	545	9	4	638	96.6	98.4	1.6	0.7
		92		290	143	0.966	96.5	270.7	135	138	5	0	147	94.4	96.5	3.5	0.0
		93		710	328	0.977	98.8	678.2	321	324	4	4	378	97.9	98.8	1.2	1.2
		94		196	83	1.000	100.0	196.0	79	83	0	0	113	95.2	100.0	0.0	0.0
43	S.158		A24	3351	990	0.833	98.7	2323.0	929	977	13	253	2108	93.8	98.7	1.3	20.6
		92		300	97	0.824	100.0	203.5	94	97	0	27	176	96.9	100.0	0.0	21.8
		93		1016	316	0.829	98.1	697.4	295	310	6	78	622	93.4	98.1	1.9	20.1
		94		808	214	0.834	98.6	562.2	201	211	3	57	537	93.9	98.6	1.4	21.3
		95		549	139	0.840	98.6	387.7	133	137	2	36	374	95.7	98.6	1.4	20.8
		96		678	224	0.832	99.1	469.8	206	222	2	55	399	92.0	99.1	0.9	19.9
44	TP.12150-33		A24	181	56	0.975	100.0	172.0	53	56	0	2	123	94.6	100.0	0.0	3.4
		93		181	56	0.975	100.0	172.0	53	56	0	2	123	94.6	100.0	0.0	3.4
45	TP.2564-33		A26,33	1113	209	0.792	99.0	698.3	194	207	2	87	817	92.8	99.0	1.0	29.6
		92		293	56	0.827	96.4	200.3	52	54	2	16	221	92.9	96.4	3.6	22.9
		93		820	153	0.781	100.0	500.5	142	153	0	71	596	92.8	100.0	0.0	31.7
46	TP.6845-37		A28	1055	38	0.637	100.0	427.9	38	38	0	51	966	100.0	100.0	0.0	57.3
		95		377	17	0.669	100.0	168.6	17	17	0	19	341	100.0	100.0	0.0	52.8
		96		678	21	0.614	100.0	255.6	21	21	0	32	625	100.0	100.0	0.0	60.4
47	TP.10488-33		A29	184	1	0.268	100.0	13.2	1	1	0	12	171	100.0	100.0	0.0	92.3
		93		184	1	0.268	100.0	13.2	1	1	0	12	171	100.0	100.0	0.0	92.3
48	TP.2578-34		A29,26,32	2250	120	0.668	98.3	1004.0	113	118	2	126	2004	94.2	98.3	1.7	51.6
		93		387	29	0.722	100.0	202.0	28	29	0	23	335	96.6	100.0	0.0	44.2
		94		808	43	0.652	97.7	343.6	41	42	1	48	717	95.3	97.7	2.3	53.3
		95		377	9	0.460	100.0	79.9	8	9	0	30	338	88.9	100.0	0.0	76.9
		96		678	39	0.750	97.4	381.4	36	38	1	25	614	92.3	97.4	2.6	39.7

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996 (continued).

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	–	Str. Index	% PP	% FN	% FP
49	S.1087.1		A3	2008	49	0.878	95.9	1550.0	27	47	2	11	1948	55.1	95.9	4.1	19.0
		92		301	7	0.832	100.0	208.6	7	7	0	3	291	100.0	100.0	0.0	30.0
		93		1018	26	0.849	96.2	734.3	14	25	1	8	984	53.8	96.2	3.8	24.2
		94		689	16	0.968	93.8	645.0	6	15	1	0	673	37.5	93.8	6.3	0.0
50	S.11061		A3	961	23	0.676	100.0	438.6	23	23	0	26	912	100.0	100.0	0.0	53.1
		94		613	16	0.709	100.0	308.4	16	16	0	15	582	100.0	100.0	0.0	48.4
		95		348	7	0.613	100.0	131.0	7	7	0	11	330	100.0	100.0	0.0	61.1
51	TP.3013-33		A3	2613	80	0.906	97.5	2146.0	76	78	2	14	2519	95.0	97.5	2.5	15.2
		92		240	6	1.000	100.0	240.0	5	6	0	0	234	83.3	100.0	0.0	0.0
		93		1021	26	0.822	100.0	690.2	26	26	0	12	983	100.0	100.0	0.0	31.6
		94		125	8	1.000	100.0	125.0	8	8	0	0	117	100.0	100.0	0.0	0.0
		95		549	13	1.000	100.0	549.0	13	13	0	0	536	100.0	100.0	0.0	0.0
		96		678	27	0.923	92.6	577.4	24	25	2	2	649	88.9	92.6	7.4	7.4
52	TP.4830-35		A3	2405	80	0.937	96.3	2112.0	76	77	3	7	2318	95.0	96.3	3.8	8.3
		93		373	18	0.868	94.4	280.8	17	17	1	4	351	94.4	94.4	5.6	19.0
		94		806	22	0.977	100.0	770.0	21	22	0	1	783	95.5	100.0	0.0	4.3
		95		548	13	0.929	100.0	473.2	13	13	0	2	533	100.0	100.0	0.0	13.3
		96		678	27	0.961	92.6	625.9	25	25	2	0	651	92.6	92.6	7.4	0.0
53	TP.8678-37		A3	1055	39	0.911	94.9	875.2	37	37	2	5	1011	94.9	94.9	5.1	11.9
		95		377	12	0.959	100.0	347.0	12	12	0	1	364	100.0	100.0	0.0	7.7
		96		678	27	0.889	92.6	535.7	25	25	2	4	647	92.6	92.6	7.4	13.8
54	TP.2681-36		A30	176	5	0.662	100.0	77.2	5	5	0	6	165	100.0	100.0	0.0	54.5
		93		176	5	0.662	100.0	77.2	5	5	0	6	165	100.0	100.0	0.0	54.5
55	TP.740-33		A30	3315	137	0.946	99.3	2969.0	135	136	1	14	3164	98.5	99.3	0.7	9.3
		92		302	9	0.762	88.9	175.3	8	8	1	4	289	88.9	88.9	11.1	33.3
		93		987	36	0.901	100.0	800.8	36	36	0	8	943	100.0	100.0	0.0	18.2
		94		804	20	0.952	100.0	729.0	20	20	0	2	782	100.0	100.0	0.0	9.1
		95		549	41	1.000	100.0	549.0	41	41	0	0	508	100.0	100.0	0.0	0.0
		96		673	31	1.000	100.0	673.0	30	31	0	0	642	96.8	100.0	0.0	0.0
56	TP.5957-33		A30,31	143	7	0.761	71.4	82.8	1	5	2	1	135	14.3	71.4	28.6	16.7
		92		143	7	0.761	71.4	82.8	1	5	2	1	135	14.3	71.4	28.6	16.7
57	TP.2442-34		A30,31,33,34	205	56	0.362	100.0	26.9	55	56	0	96	53	98.2	100.0	0.0	63.2
		93		205	56	0.362	100.0	26.9	55	56	0	96	53	98.2	100.0	0.0	63.2
58	S.1054*		A33	1959	444	0.885	98.4	1533.0	433	437	7	80	1435	97.5	98.4	1.6	15.5
		93		384	75	0.850	98.7	277.5	73	74	1	20	289	97.3	98.7	1.3	21.3
		94		808	174	0.872	96.6	613.8	167	168	6	32	602	96.0	96.6	3.4	16.0
		95		549	141	0.917	100.0	461.3	140	141	0	19	389	99.3	100.0	0.0	11.9
		96		218	54	0.900	100.0	176.6	53	54	0	9	155	98.1	100.0	0.0	14.3
59	S.1057		A33	948	149	0.849	96.6	683.5	143	144	5	38	761	96.0	96.6	3.4	20.9
		92		159	36	0.965	100.0	148.2	35	36	0	2	121	97.2	100.0	0.0	5.3
		93		327	39	0.823	89.7	221.3	35	35	4	9	279	89.7	89.7	10.3	20.5
		96		462	74	0.817	98.6	308.1	73	73	1	27	361	98.6	98.6	1.4	27.0
60	TP.1057		A33	144	19	0.872	100.0	109.4	19	19	0	5	120	100.0	100.0	0.0	20.8
		92		144	19	0.872	100.0	109.4	19	19	0	5	120	100.0	100.0	0.0	20.8

Table 13 Show the result of antisera for HLA-A during years 1992 to 1996 (continued).

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
61	TP.1111-35		A33	3200	654	0.818	99.4	2141.0	640	650	4	227	2319	97.9	99.4	0.6	25.9
		92		158	36	0.888	100.0	124.7	36	36	0	7	115	100.0	100.0	0.0	16.3
		93		1010	175	0.790	99.4	630.4	170	174	1	77	758	97.1	99.4	0.6	30.7
		94		805	174	0.831	98.3	555.5	169	171	3	51	580	97.1	98.3	1.7	23.0
		95		549	141	0.798	100.0	350.0	140	141	0	52	356	99.3	100.0	0.0	26.9
		96		678	128	0.841	100.0	479.0	125	128	0	40	510	97.7	100.0	0.0	23.8
62	TP.3884-35		A33	405	59	0.768	93.2	239.0	54	55	4	24	322	91.5	93.2	6.8	30.4
		93		326	38	0.688	89.5	154.5	33	34	4	23	265	86.8	89.5	10.5	40.4
63	TP.946-33		A33	142	19	0.777	94.7	85.7	12	18	1	8	115	63.2	94.7	5.3	30.8
		92		142	19	0.777	94.7	85.7	12	18	1	8	115	63.2	94.7	5.3	30.8
64	S.1209.1		A9	3336	1040	0.983	99.1	3221.0	1027	1031	9	16	2280	98.8	99.1	0.9	1.5
		92		299	103	0.978	100.0	286.1	103	103	0	3	193	100.0	100.0	0.0	2.8
		93		1005	319	0.970	98.1	945.9	311	313	6	7	679	97.5	98.1	1.9	2.2
		94		805	232	0.994	99.6	795.3	230	231	1	1	572	99.1	99.6	0.4	0.4
		95		549	146	0.995	99.3	543.9	145	145	1	0	403	99.3	99.3	0.7	0.0
		96		678	240	0.981	99.6	652.2	238	239	1	5	433	99.2	99.6	0.4	2.0
65	S.271		A9	312	110	0.965	96.4	290.5	87	106	4	1	201	79.1	96.4	3.6	0.9
		93		312	110	0.965	96.4	290.5	87	106	4	1	201	79.1	96.4	3.6	0.9
66	S.407		A9	2474	759	0.921	99.6	2101.0	751	756	3	85	1630	98.9	99.6	0.4	10.1
		92		302	103	0.978	100.0	289.0	103	103	0	3	196	100.0	100.0	0.0	2.8
		93		1017	323	0.912	100.0	845.5	318	323	0	42	652	98.5	100.0	0.0	11.5
		94		807	232	0.921	99.6	684.1	231	231	1	27	548	99.6	99.6	0.4	10.5
		95		348	101	0.901	98.0	282.6	99	99	2	13	234	98.0	98.0	2.0	11.6
67	S.469		A9	2499	753	0.844	93.9	1782.0	680	707	46	125	1621	90.3	93.9	6.1	15.0
		92		299	103	0.930	100.0	258.6	96	103	0	10	186	93.2	100.0	0.0	8.8
		93		978	305	0.854	95.7	713.0	280	292	13	52	621	91.8	95.7	4.3	15.1
		94		794	230	0.819	92.2	532.4	204	212	18	44	520	88.7	92.2	7.8	17.2
		95		428	115	0.800	87.0	274.1	100	100	15	19	294	87.0	87.0	13.0	16.0
68	TP.2622-33		A9	996	311	0.896	99.0	799.3	305	308	3	45	640	98.1	99.0	1.0	12.7
		92		286	96	0.919	100.0	241.7	95	96	0	11	179	99.0	100.0	0.0	10.3
		93		710	215	0.886	98.6	557.1	210	212	3	34	461	97.7	98.6	1.4	13.8
69	TP.3702-33		A9	2389	733	0.973	99.5	2261.0	718	729	4	24	1632	98.0	99.5	0.5	3.2
		93		373	118	0.964	100.0	346.6	116	118	0	6	249	98.3	100.0	0.0	4.8
		94		791	229	0.976	99.6	753.1	227	228	1	7	555	99.1	99.6	0.4	3.0
		95		549	146	0.963	98.6	509.3	143	144	2	6	397	97.9	98.6	1.4	4.0
		96		676	240	0.981	99.6	650.3	232	239	1	5	431	96.7	99.6	0.4	2.0
70	TP.7998-36		A9	786	261	0.905	93.1	643.9	234	243	18	15	510	89.7	93.1	6.9	5.8
		95		108	21	0.913	95.2	90.1	19	20	1	2	85	90.5	95.2	4.8	9.1
		96		678	240	0.903	92.9	552.8	215	223	17	13	425	89.6	92.9	7.1	5.5

HLA-B locus (Table 14)

HLA-B12

There are 5 serums (S.1239.1, S.1455.2, TP.1968-33, TP.1968-35 and TP.9544-33), during years 1992 to 1996. The R value is 0.668, 0.964, 0.875, 0.952 and 0.95 respectively. The percent of inclusion is 99.1, 98.6, 100, 99.4 and 100 respectively. The most effective sera is "S.1455.2" in this group (R value = 0.928 – 0.991, % inclusion = 97.7 – 100).

HLA-B13

There are 7 serums (S.074, S.1040, S.1776.3, S.438, TP.1327-35, TP.1734-35 and TP.1893-35), during years 1992 to 1996. The R value is 0.868, 0.861, 0.973, 0.38, 0.674, 0.895 and 0.869 respectively. The percent of inclusion is 99, 99.4, 99.4, 95.8 97, 100 and 97 respectively. The most effective sera is "S.1776.3" in this group (R value = 0.969 – 0.985, % inclusion = 99.2 – 100).

HLA-B13 + B40

There is one serum (TP.12345-33), during years 1992 to 1996. The R value is 0.948 (0.927 – 0.962). The percent of inclusion is 96.2 (95 – 96.8).

HLA-B13 + B40 + B41 + B47

There is one serum (TP.3332-34), in year 1993. The R value is 0.832. The percent of inclusion is 100.

HLA-B13 + B62

There is one serum (TP.3851-34), during years 1992 to 1996. The R value is 0.781 (0.546 – 0.888). The percent of inclusion is 96.8 (90.9 –100).

HLA-B15

There are 2 serums (TP.1121-35 and TP.1221-35), during years1992 to 1993. The R value is 0.859 and 0.755 respectively. The percent of inclusion is 83 and 74.9 respectively. The most effective sera is "TP.1121-35" in this group (R value = 0.859, % inclusion = 83).

HLA-B15 + B35 + B46

There is one serum (TP.1944-35), during years 1992 to 1996. The R value is 0.877 (0.791 – 0.909). The percent of inclusion is 99.3 (98.6 - 100).

HLA-B15 + B46

There is one serum (S.1285.2), during years 1992 to 1993. The R value is 0.682 (0.634 – 0.728). The percent of inclusion is 99.7 (99.5 – 100).

HLA-B15 + B46 + B57

There are 2 serums (TP.2671-35 and TP.3257-33), during years 1993 to 1996. The R value is 0.919 and 0.793 respectively. The percent of inclusion is 98.9 and 87.5 respectively. The most effective sera is "TP.2671-35" in this group (R value = 0.834 – 0.956, % inclusion = 97.8 – 99.3).

HLA-B15 + B57

There are 2 serums (TP.2357-33 and TP.8566.2), during years 1992 to 1993. The R value is 0.628 and 0.72 respectively. The percent of inclusion is 98.4 and 98.3 respectively. The most effective sera is "TP.8566.2" in this group (R value = 0.716 – 0.731, % inclusion = 94.9 – 99.4).

HLA-B15 + B57 + B13

There is one serum (TP.9637-33), during years 1992 to 1996. The R value is 0.961 (0.901 – 0.988). The percent of inclusion is 97 (92.6 – 98.9).

HLA-B16

There are 2 serums (TP.11106-33 and TP.3040-33), during years 1992 to 1993. The R value is 0.988 and 0.784 respectively. The percent of inclusion is 97.9 and 97.1 respectively. The most effective sera is "TP.11106-33" in this group.

HLA-B16 + B67

There is one serum (TP.6480-33), during years 1992 to 1996. The R value is 0.855 (0.786 – 0.952). The percent of inclusion is 95.7 (84.4 - 100).

HLA-B16 + B67 + B18 + B75

There is one serum (TP.1094-35), in year 1993. The R value is 0.39. The percent of inclusion is 99.3.

HLA-B17

There are 9 serums (S.003, S.1763, S.371, S.942, TP.12095-33, TP.5057-36, TP.6249-36, TP.8766-33 and TP.9611-33), during years 1992 to 1996. The R value is 0.902, 0.958, 0.962, 93, 0.957, 0978, 0.724, 0.951 and 0.927 respectively. The percent of inclusion is 99.4, 98, 99.1, 93.8, 99, 98.1, 60.1, 99.1 and 99.3 respectively. The most effective sera is "TP.5057-36" in this group.

HLA-B18

There are 4 serums (S.1773, TP.10409-33, TP.1821-35 and TP.4571-33), during years 1992 to 1996. The R value is 0.966, 0.911, 0.949 and 0.838 respectively. The percent of inclusion is 96.6, 99.2, 99.2 and 100 respectively. The

most effective sera is "S.1773" in this group (R value = 0.772 – 1, % inclusion = 60 – 100).

HLA-B18 + B35 + B51 + B75 + B77

There is one serum (S.1079.1), during years 1992 to 1996. The R value is 0.69 (0.643 – 0.734). The percent of inclusion is 99 (98.2 - 100).

HLA-B18 + B39 + B51

There is one serum (TP.12394-33), during years 1992 to 1993. The R value is 0.454 (0.395 – 0.554). The percent of inclusion is 52.9 (49.1 – 56.3).

HLA-B21 + B22 + B62 + B63

There is one serum (TP.5704-35), in year 1993. The R value is 0.613. The percent of inclusion is 63.5.

HLA-B22

There are 4 serums (TP.1983-35, TP.466.2-35, TP.5810-37 and TP.8191-33), during years 1992 to 1996. The R value is 0.639, 0.496, 0.833 and 0.827 respectively. The percent of inclusion is 58, 100, 98.5 and 92.6 respectively. The most effective sera is "TP.5810-37" in this group (R value = 0.814 – 1, % inclusion = 98.3 – 100).

HLA-B22 + B62

There is one serum (S.396), during years 1992 to 1996. The R value is 0.715 (0.548 – 0.796). The percent of inclusion is 78.2 (57.6 - 88).

HLA-B22 + B7

There is one serum (TP.4001-34), in year 1993. The R value is 0.586. The percent of inclusion is 85.7.

HLA-B27

There are 8 serums (S.084, S.1005.3-31, S.258, TP.1054-33, TP.1588-35, TP.1973-35, TP.2440-35 and TP.6465-36), during years 1992 to 1996. The R value is 0.747, 0.926, 0.774, 0.964, 0.939, 0.709, 0.889 and 0.909 respectively. The percent of inclusion is 99.2, 91.3, 100, 96.7, 98.6, 94.4, 91.8 and 100 respectively. The most effective sera is "TP.1588-35" in this group (R value = 0.914 – 0.976, % inclusion = 96.2 – 100).

HLA-B27 + B37 + B47

There is one serum (TP.1599-33), during years 1993 to 1995. The R value is 0.611 (0.551 - 0.672). The percent of inclusion is 95.1 (92.9 - 97.2).

HLA-B35

There is one serum (TP.8578-33), in year 1993. The R value is 0.712. The percent of inclusion is 88.

HLA-B35 + B51

There is one serum (TP.3984-35), during years 1995 to 1996. The R value is 0.888 (0.857 - 0.906). The percent of inclusion is 88.8 (84.3 - 91.5).

HLA-B35 + B51 + B53 + B56

There is one serum(TP.640-35), during years 1992 to 1996. The R value is 0.505 (0.456 - 0.706). The percent of inclusion is 90.8 (84.2 - 96.4).

HLA-B35 + B51 + B53 + B7801

There is one serum (TP.8869-38), in year 1996. The R value is 0.546. The percent of inclusion is 100.

HLA-B35 + B62 + B75

There is one serum (S.927.2), in year 1992. The R value is 0.533. The percent of inclusion is 74.5.

HLA-B35 + B75 + B39 + B48

There is one serum (S.927), during years 1992 to 1995. The R value is 0.567 (0.538 - 0.717). The percent of inclusion is 94.6 (91.7 - 97.2).

HLA-B38

There is one serum (TP.9787-37), during years 1995 to 1996. The R value is 0.934 (0.93 - 0.941). The percent of inclusion is 98.1 (97.2 - 100).

HLA-B40

There are 2 serums (TP.1118-33 and TP.3460-33), during years 1992 to 1993. The R value is 0.719 and 0.615 respectively. The percent of inclusion is 98.7 and 100 respectively. The most effective sera is "TP.1118-33" in this group (R value = 0.688 – 0.791, % inclusion = 98.1 – 100).

HLA-B40 + B48

There are 2 serums (S.1098 and S.362), during years 1992 to 1996. The R value is 0.872 and 0.584 respectively. The percent of inclusion is 96.3 and 99.5 respectively. The most effective sera is "S.1098" in this group (R value = 0.826 – 0.92, % inclusion = 95 – 97.6).

HLA-B40 + B48 + B7

There is one serum (S.232), in year 1992. The R value is 0.487. The percent of inclusion is 100.

HLA-B46

There are 4 serums (S.1298.2-33, S.1772.1, S.522.12 and TP.1025-33), during years 1992 to 1996. The R value is 0.866, 0.95, 0.823 and 0.793 respectively. The percent of inclusion is 99.3, 97.8, 99.5 and 99.2 respectively. The most effective sera is "S.1298.2-33" in this group (R value = 0.829 – 0.914, % inclusion = 98.8 – 100).

HLA-B48 + B60

There are 2 serums (TP.12330-33 and TP.838-33), during years 1992 to 1996. The R value is 0.926 and 0.716 respectively. The percent of inclusion is 97.5 and 96.9 respectively. The most effective sera is "TP.12330-33" in this group (R value = 0.904 – 0.957, % inclusion = 95.9 – 98.7).

HLA-B5

There are 4 serums (S.1761.3, S.275, S.834.2 and TP.171-32), during years 1992 to 1996. The R value is 0.924, 0.778, 0.987 and 0.619 respectively. The percent of inclusion is 99.4, 100, 100 and 94.3 respectively. The most effective sera is "S.1761.3" in this group (R value = 0.879 – 0.957, % inclusion = 97.6 – 100).

HLA-B5 + B18 + B35 + B75

There is one serum (S.138), during years 1992 to 1994. The R value is 0.746 (0.705 – 0.821). The percent of inclusion is 91.7 (91.2 – 93.8).

HLA-B5 + B18 + B35 + B75 + B77

There is one serum (S.1079), in year 1995. The R value is 0.698. The percent of inclusion is 100.

HLA-B5 + B35

There are 2 serums (S.228 and S.346), during years 1992 to 1993. The R value is 0.886 and 0.387 respectively. The percent of inclusion is 98.5 and 65.6 respectively. The most effective sera is "S.228" in this group.

HLA-B5 + B35 + B53 + B7801

There is one serum (TP.2733-33), during years 1993 to 1996. The R value is 0.559 (0.474 – 0.609). The percent of inclusion is 86.6 (78.9 – 96.1).

HLA-B5 + B35 + B75

There is one serum (TP.133-32), during years 1992 to 1993. The R value is 0.765 (0.744 – 0.812). The percent of inclusion is 88.2 (86.7 – 89.1).

HLA-B5 + B35 + B7801

There is one serum (TP.173-34), during years 1994 to 1995. The R value is 0.904 (0.901 – 0.905). The percent of inclusion is 97.2 (96.5 – 97.6).

HLA-B5 + B53

There is one serum (S.339), during year 1992 - 1994. The R value is 0.485 (0.476 – 0.503). The percent of inclusion is 99 (98.2 - 100).

HLA-B5 + B59

There is one serum (TP.2260-33), in year 1993. The R value is 0.455. The percent of inclusion is 100.

HLA-B51

There are 3 serums (S.1180, TP.2779-33 and TP.282-35), during years 1992 to 1996. The R value is 0.765, 0.726 and 0.666 respectively. The percent

of inclusion is 99.3, 100 and 100 respectively. The most effective sera is "S.1180" in this group (R value = 0.657 – 0.869, % inclusion = 98.2 – 100).

HLA-B51 + B53 + B7801

There is one serum (TP.173-34*), during years 1993 to 1994. The R value is 0.505 (0.474 – 0.557). The percent of inclusion is 100.

HLA-B51 + B5Y

There are 2 serums (TP.1489-33 and TP.2020-33), during years 1992 to 1993. The R value is 0.6 and 0.57 respectively. The percent of inclusion is 100 and 100 respectively. The most effective sera is "TP.1489-33" in this group (R value = 0.571 – 0.637, % inclusion = 100).

HLA-B51 + B7801

There are 2 serums (TP.2620-33 and TP.3529-34), during years 1993 to 1996. The R value is 0.764 and 0.617 respectively. The percent of inclusion is 96.6 and 98.6 respectively. The most effective sera is "TP.3529-34" in this group (R value = 0.548 – 0.745, % inclusion = 96.4 – 100).

HLA-B52

There are 2 serums (S.3859-34 and TP.882-35), during years 1993 to 1994. The R value is 0.643 and 0.341 respectively. The percent of inclusion is 100 and 100 respectively. The most effective sera is "S.3859-34" in this group.

HLA-B52 + B76

There is one serum (TP.3859-34), during years 1993 to 1996. The R value is 0.63 (0.511 – 0.665). The percent of inclusion is 91.9 (75 – 97.4).

HLA-B52 + B8 + B16

There is one serum (TP.3802-34), in year 1993. The R value is 0.244. The percent of inclusion is 62.5.

HLA-B56

There are 2 serums (TP.2698-33 and TP.7286-37), during years 1992 to 1993and during years 1995 to 1996. The R value is 0.574 and 0.81 respectively. The percent of inclusion is 100 and 100 respectively. The most effective sera is "TP.7286-37" in this group (R value = 0.81 – 0.811, % inclusion = 100).

HLA-B56 + B62

There is one serum (TP.1459-39), in year 1996. The R value is 0.81 and 0.894. The percent of inclusion is 100 and 96.8.

HLA-B60

There are 2 serums (TP.1709-33 and TP.7846-33), during years 1992 to 1996. The R value is 0.76 and 0.959 respectively. The percent of inclusion is 70.6 and 99 respectively. The most effective sera is "TP.7846-33" in this group (R value = 0.93 – 0.987, % inclusion = 96.2 – 100).

HLA-B62

There is one serum (TP.2011-37), in year 1996. The R value is 0.839. The percent of inclusion is 84.

HLA-B62 + B75 + B77

There is one serum (S.116-33), during years 1992 to 1995. The R value is 0.908 (0.879 – 0.929). The percent of inclusion is 94.6 (92 – 95.8).

HLA-B7

There are 3 serums (TP.12952-33, TP.571-33 and TP.6194-37), during years 1992 to 1996. The R value is 0.917, 0.799 and 0.739 respectively. The percent of inclusion is 99.1, 100 and 98.8 respectively. The most effective sera is "TP.12952-33" in this group (R value = 0.884 – 0.972, % inclusion = 96.2 – 100).

HLA-B7 + B22

There is one serum (S.1054), during years 1992 to 1996. The R value is 0.88 (0.805 – 0.938). The percent of inclusion is 99.2 (97.4 - 100).

HLA-B7 + B22 + B27

There is one serum (S.1228.2), in year 1992. The R value is 0.707. The percent of inclusion is 100.

HLA-B7 + B22 + B42

There is one serum (TP.2797-33), in year 1993. The R value is 0.641. The percent of inclusion is 100.

HLA-B7 + B40 + B48

There is one serum (S.378), during years 1992 to 1996. The R value is 0.856 (0.764 – 0.899). The percent of inclusion is 92.2 (83.7 - 94).

HLA-B7 + B41 + B48 + B60

There is one serum (TP.1133-33), in year 1993. The R value is 0.665. The percent of inclusion is 100.

HLA-B7 + B42

There is one serum (TP.80-32), in year 1993. The R value is 0.461. The percent of inclusion is 100.

HLA-B7 + B48+ B60

There are 3 serums (TP.1794-35, TP.716-33 and TP.5532-36), during years 1992 to 1996. The R value is 0.771, 0.93 and 0.926 respectively. The percent of inclusion is 86.4, 100 and 94.1 respectively. The most effective sera is "TP.1794-35" in this group (R value = 0.732 – 0.816, % inclusion = 82.9 – 89.7).

HLA-B75

There are 2 serums (S.50-33 and TP.8842.2), during years 1992 to 1996. The R value is 0.852 and 0.775 respectively. The percent of inclusion is 98.8 and 99.5 respectively. The most effective sera is "S.50-33" in this group (R value = 0.813 – 0.918, % inclusion = 91.9 – 100).

HLA-B75 + B77

There are 2 serums (S.1125-33 and TP.1727-35), during years 1992 to 1996. The R value is 0.858 and 0.662 respectively. The percent of inclusion is 98.4 and 98.3 respectively. The most effective sera is "S.1125-33" in this group (R value = 0.802 – 0.876, % inclusion = 97.1 – 99.3).

HLA-B76

There are 4 serums (S.1129.2, S.1779, S.464.1 and TP.11019-33), during years 1992 to 1996. The R value is 0.814, 0.446, 0.366 and 0.66 respectively. The percent of inclusion is 100, 100, 100 and 90 respectively. The most effective sera is "S.1129.2" in this group.

HLA-B8

There are 3 serums (TP.4115-33, TP.4318-33 and TP.6191-33), during years 1992 to 1996. The R value is 0.561, 0.418 and 0.851 respectively. The

percent of inclusion is 48.5, 100 and 100 respectively. The most effective sera is "TP.6191-33" in this group (R value = 0.497 – 0.92, % inclusion = 100).

HLA-B8 + B18

There is one serum (TP.4734-35), in year 1993. The R value is 0.765. The percent of inclusion is 83.7.

HLA-B8 + B59

There is one serum (TP.8992-37), during years 1995 to 1996. The R value is 0.578 (0.493 – 0.729). The percent of inclusion is 100.

HLA-Bw4

There are 5 serums (S.872-31, TP.4088-33, TP.5033-35, TP.535-33 and TP.7803-33), during years 1992 to 1996. The R value is 0.483, 0.723, 0.364, 0.483 and 0.599 respectively. The percent of inclusion is 69.2, 85, 66.1, 68.9 and 82.7 respectively. The most effective sera is "TP.7803-33" in this group (R value = 0.523 – 0.65, % inclusion = 78.1 – 87.4).

HLA-Bw6

There are 3 serums (TP.2406-33, TP.2743-37 and TP.3304-33), during years 1992 to 1993 and year 1996. The R value is 0.325, 0.897 and 0.523 respectively. The percent of inclusion is 87.3, 99.5 and 78.3 respectively. The most effective sera is "TP.2743-37" in this group.

HLA-Bw6 + B13

There is one serum (S.1067-33), during years 1992 to 1993. The R value is 0.288 (0.154 – 0.327). The percent of inclusion is 93.3 (92.9 – 94.2).

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
1	S.1239.1		B12	3298	214	0.668	99.1	1470.0	211	212	2	224	2860	98.6	99.1	0.9	51.4
		92		296	24	0.839	100.0	208.1	24	24	0	9	263	100.0	100.0	0.0	27.3
		93		1003	54	0.600	98.1	360.7	52	53	1	79	870	96.3	98.1	1.9	59.8
		94		789	56	0.656	100.0	339.4	56	56	0	63	670	100.0	100.0	0.0	52.9
		95		539	43	0.666	97.7	239.4	42	42	1	42	454	97.7	97.7	2.3	50.0
		96		671	37	0.719	100.0	347.3	37	37	0	31	603	100.0	100.0	0.0	45.6
2	S.1455.2		B12	3342	216	0.964	98.6	3105.0	210	213	3	12	3114	97.2	98.6	1.4	5.3
		92		299	25	0.978	96.0	286.0	23	24	1	0	274	92.0	96.0	4.0	0.0
		93		1013	53	0.928	100.0	872.8	53	53	0	8	952	100.0	100.0	0.0	13.1
		94		806	58	0.991	98.3	791.0	56	57	1	0	748	96.6	98.3	1.7	0.0
		95		548	43	0.975	97.7	520.7	42	42	1	1	504	97.7	97.7	2.3	2.3
		96		676	37	0.960	100.0	622.4	36	37	0	3	636	97.3	100.0	0.0	7.5
3	TP.1968-33		B12	769	42	0.875	100.0	588.2	42	42	0	12	715	100.0	100.0	0.0	22.2
		92		145	11	1.000	100.0	145.0	11	11	0	0	134	100.0	100.0	0.0	0.0
		93		624	31	0.840	100.0	440.8	31	31	0	12	581	100.0	100.0	0.0	27.9
4	TP.1968-35		B12	2396	158	0.952	99.4	2171.0	157	157	1	14	2224	99.4	99.4	0.6	8.2
		93		374	21	0.874	100.0	285.9	21	21	0	6	347	100.0	100.0	0.0	22.2
		94		795	57	0.973	100.0	752.2	57	57	0	3	735	100.0	100.0	0.0	5.0
		95		549	43	0.975	97.7	521.6	42	42	1	1	505	97.7	97.7	2.3	2.3
		96		678	37	0.947	100.0	608.0	37	37	0	4	637	100.0	100.0	0.0	9.8
5	TP.9544-33		B12	290	20	0.950	100.0	261.7	20	20	0	2	268	100.0	100.0	0.0	9.1
		93		207	12	0.921	100.0	175.6	12	12	0	2	193	100.0	100.0	0.0	14.3
6	S.074		B13	2165	313	0.868	99.0	1632.0	308	310	3	79	1773	98.4	99.0	1.0	20.3
		92		300	52	0.891	96.2	238.0	50	50	2	8	240	96.2	96.2	3.8	13.8
		93		710	100	0.824	100.0	482.4	100	100	0	38	572	100.0	100.0	0.0	27.5
		94		808	117	0.890	99.1	639.4	114	116	1	24	667	97.4	99.1	0.9	17.1
		95		347	44	0.898	100.0	279.5	44	44	0	9	294	100.0	100.0	0.0	17.0
7	S.1040		B13	3098	473	0.861	99.4	2297.0	466	470	3	128	2497	98.5	99.4	0.6	21.4
		92		294	50	0.845	98.0	209.8	48	49	1	14	230	96.0	98.0	2.0	22.2
		93		814	113	0.833	98.2	565.2	108	111	2	37	664	95.6	98.2	1.8	25.0
		94		772	112	0.879	100.0	596.6	112	112	0	27	633	100.0	100.0	0.0	19.4
		95		544	81	0.855	100.0	397.9	81	81	0	24	439	100.0	100.0	0.0	22.9
		96		674	117	0.883	100.0	525.7	117	117	0	26	531	100.0	100.0	0.0	18.2
8	S.1776.3		B13	1238	165	0.973	99.4	1171.0	163	164	1	7	1066	98.8	99.4	0.6	4.1
		92		223	40	0.985	100.0	216.4	39	40	0	1	182	97.5	100.0	0.0	2.4
		93		1015	125	0.969	99.2	952.8	124	124	1	6	884	99.2	99.2	0.8	4.6
9	S.438		B13	144	24	0.380	95.8	20.8	23	23	1	54	66	95.8	95.8	4.2	70.1
		92		144	24	0.380	95.8	20.8	23	23	1	54	66	95.8	95.8	4.2	70.1
10	TP.1327-35		B13	479	67	0.674	97.0	217.3	65	65	2	54	358	97.0	97.0	3.0	45.4
		92		157	29	0.896	93.1	126.0	27	27	2	3	125	93.1	93.1	6.9	10.0
		93		322	38	0.592	100.0	112.8	38	38	0	51	233	100.0	100.0	0.0	57.3
11	TP.1734-35		B13	3200	468	0.895	100.0	2562.0	467	468	0	96	2636	99.8	100.0	0.0	17.0
		92		159	27	0.901	100.0	129.1	27	27	0	5	127	100.0	100.0	0.0	15.6
		93		1012	126	0.854	100.0	738.8	125	126	0	39	847	99.2	100.0	0.0	23.6
		94		806	116	0.910	100.0	667.5	116	116	0	20	670	100.0	100.0	0.0	14.7
		95		547	81	0.898	100.0	441.1	81	81	0	16	450	100.0	100.0	0.0	16.5
		96		676	118	0.925	100.0	578.2	118	118	0	16	542	100.0	100.0	0.0	11.9

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
12	TP.1893-35		B13	488	67	0.869	97.0	368.3	62	65	2	15	406	92.5	97.0	3.0	18.8
		92		162	29	0.897	93.1	130.2	26	27	2	3	130	89.7	93.1	6.9	10.0
		93		326	38	0.853	100.0	237.4	36	38	0	12	276	94.7	100.0	0.0	24.0
13	TP.12345-33		B13,40	3020	1048	0.948	96.2	2714.0	838	1008	40	31	1941	80.0	96.2	3.8	3.0
		92		162	60	0.947	95.0	145.3	52	57	3	1	101	86.7	95.0	5.0	1.7
		93		835	269	0.927	96.7	717.4	224	260	9	18	548	83.3	96.7	3.3	6.5
		94		798	270	0.949	95.2	719.4	212	257	13	5	523	78.5	95.2	4.8	1.9
		95		548	201	0.961	96.5	505.7	158	194	7	3	344	78.6	96.5	3.5	1.5
		96		677	248	0.962	96.8	626.2	192	240	8	4	425	77.4	96.8	3.2	1.6
14	TP.3332-34		B13,40,41,47	388	153	0.832	100.0	268.7	152	153	0	35	200	99.3	100.0	0.0	18.6
		93		388	153	0.832	100.0	268.7	152	153	0	35	200	99.3	100.0	0.0	18.6
15	TP.3851-34		B13,62	3202	833	0.781	96.8	1955.0	549	806	27	290	2079	65.9	96.8	3.2	26.5
		92		162	44	0.546	90.9	48.4	29	40	4	35	83	65.9	90.9	9.1	46.7
		93		1010	261	0.707	95.8	505.1	190	250	11	131	618	72.8	95.8	4.2	34.4
		94		806	203	0.819	98.0	540.3	121	199	4	60	543	59.6	98.0	2.0	23.2
		95		547	134	0.834	100.0	380.5	90	134	0	40	373	67.2	100.0	0.0	23.0
		96		677	191	0.888	95.8	533.4	119	183	8	24	462	62.3	95.8	4.2	11.6
16	TP.1121-35		B15	159	53	0.859	83.0	117.3	44	44	9	1	105	83.0	83.0	17.0	2.2
		92		159	53	0.859	83.0	117.3	44	44	9	1	105	83.0	83.0	17.0	2.2
17	TP.1221-35		B15	626	235	0.755	74.9	356.7	168	176	59	13	378	71.5	74.9	25.1	6.9
		93		626	235	0.755	74.9	356.7	168	176	59	13	378	71.5	74.9	25.1	6.9
18	TP.1944-35		B15,35,46	3204	1760	0.877	99.3	2466.0	1728	1747	13	188	1256	98.2	99.3	0.7	9.7
		92		162	85	0.791	98.8	101.4	83	84	1	17	60	97.6	98.8	1.2	16.8
		93		1013	568	0.842	98.6	719.0	555	560	8	73	372	97.7	98.6	1.4	11.5
		94		806	443	0.892	100.0	641.0	438	443	0	45	318	98.9	100.0	0.0	9.2
		95		548	293	0.908	99.7	451.4	290	292	1	25	230	99.0	99.7	0.3	7.9
		96		675	371	0.909	99.2	557.9	362	368	3	28	276	97.6	99.2	0.8	7.1
19	S.1285.2		B15,46	626	336	0.682	99.7	291.3	331	335	1	109	181	98.5	99.7	0.3	24.5
		92		299	135	0.634	100.0	120.0	132	135	0	66	98	97.8	100.0	0.0	32.8
		93		327	201	0.728	99.5	173.4	199	200	1	43	83	99.0	99.5	0.5	17.7
20	TP.2671-35		B15,46,57	2409	1238	0.919	98.9	2036.0	1058	1224	14	85	1086	85.5	98.9	1.1	6.5
		93		380	184	0.834	97.8	264.4	164	180	4	29	167	89.1	97.8	2.2	13.9
		94		806	423	0.915	99.3	674.8	365	420	3	32	351	86.3	99.3	0.7	7.1
		95		548	292	0.942	99.3	486.4	247	290	2	14	242	84.6	99.3	0.7	4.6
		96		675	339	0.956	98.5	616.5	282	334	5	10	326	83.2	98.5	1.5	2.9
21	TP.3257-33		B15,46,57	261	128	0.793	87.5	164.3	99	112	16	11	122	77.3	87.5	12.5	8.9
		93		180	84	0.844	92.9	128.3	69	78	6	8	88	82.1	92.9	7.1	9.3
22	TP.2357-33		B15,57	205	62	0.628	98.4	80.8	61	61	1	43	100	98.4	98.4	1.6	41.3
		93		205	62	0.628	98.4	80.8	61	61	1	43	100	98.4	98.4	1.6	41.3
23	TP.8566.2		B15,57	1148	421	0.720	98.3	595.0	395	414	7	172	555	93.8	98.3	1.7	29.4
		92		301	98	0.731	94.9	160.7	87	93	5	36	167	88.8	94.9	5.1	27.9
		93		847	323	0.716	99.4	433.7	308	321	2	136	388	95.4	99.4	0.6	29.8
24	TP.9637-33		B15,57,13	3251	1527	0.961	97.0	3004.0	1351	1481	46	17	1707	88.5	97.0	3.0	1.1
		92		221	108	0.901	92.6	179.5	80	100	8	3	110	74.1	92.6	7.4	2.9
		93		1000	456	0.940	95.4	883.0	411	435	21	9	535	90.1	95.4	4.6	2.0
		94		805	374	0.988	98.9	785.1	345	370	4	1	430	92.2	98.9	1.1	0.3
		95		548	254	0.982	98.4	528.1	224	250	4	1	293	88.2	98.4	1.6	0.4
		96		677	335	0.965	97.3	630.0	291	326	9	3	339	86.9	97.3	2.7	0.9

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

(continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
25	TP.11106-33		B16	389	47	0.988	97.9	379.6	43	46	1	0	342	91.5	97.9	2.1	0.0
		93		389	47	0.988	97.9	379.6	43	46	1	0	342	91.5	97.9	2.1	0.0
26	TP.3040-33		B16	1006	104	0.784	97.1	617.8	93	101	3	49	853	89.4	97.1	2.9	32.7
		92		298	38	0.924	92.1	254.3	31	35	3	2	258	81.6	92.1	7.9	5.4
		93		708	66	0.736	100.0	383.2	62	66	0	47	595	93.9	100.0	0.0	41.6
27	TP.6480-33		B16,67	2825	329	0.855	95.7	2064.0	312	315	14	81	2415	94.8	95.7	4.3	20.5
		92		162	20	0.858	100.0	119.3	20	20	0	6	136	100.0	100.0	0.0	23.1
		93		633	70	0.786	100.0	391.3	69	70	0	36	527	98.6	100.0	0.0	34.0
		94		806	90	0.809	84.4	527.6	76	76	14	17	699	84.4	84.4	15.6	18.3
		95		548	81	0.952	100.0	496.8	80	81	0	7	460	98.8	100.0	0.0	8.0
		96		676	68	0.894	100.0	540.2	67	68	0	15	593	98.5	100.0	0.0	18.1
28	TP.1094-35		B16,67,18,75	207	65	0.390	92.3	31.6	53	60	5	74	68	81.5	92.3	7.7	55.2
		93		207	65	0.390	92.3	31.6	53	60	5	74	68	81.5	92.3	7.7	55.2
29	S.003		B17	2965	478	0.902	99.4	2415.0	472	475	3	84	2403	98.7	99.4	0.6	15.0
		92		298	38	0.955	97.4	272.0	36	37	1	2	258	94.7	97.4	2.6	5.1
		93		1017	153	0.845	100.0	726.6	152	153	0	49	815	99.3	100.0	0.0	24.3
		94		806	121	0.940	99.2	712.7	120	120	1	12	673	99.2	99.2	0.8	9.1
		95		548	109	0.926	100.0	470.1	108	109	0	14	425	99.1	100.0	0.0	11.4
		96		296	57	0.918	98.2	249.6	56	56	1	7	232	98.2	98.2	1.8	11.1
30	S.1763		B17	3173	496	0.958	98.0	2910.0	477	486	10	26	2651	96.2	98.0	2.0	5.1
		92		155	18	0.968	94.4	145.3	16	17	1	0	137	88.9	94.4	5.6	0.0
		93		1001	145	0.952	96.6	907.1	136	140	5	7	849	93.8	96.6	3.4	4.8
		94		792	113	0.974	98.2	751.8	109	111	2	3	676	96.5	98.2	1.8	2.6
		95		548	109	0.956	100.0	501.2	109	109	0	8	431	100.0	100.0	0.0	6.8
		96		677	111	0.948	98.2	608.1	107	109	2	8	558	96.4	98.2	1.8	6.8
31	S.371		B17	2148	317	0.962	99.1	1989.0	312	314	3	18	1813	98.4	99.1	0.9	5.4
		92		297	38	0.941	97.4	263.2	37	37	1	3	256	97.4	97.4	2.6	7.5
		93		699	91	0.924	98.9	596.7	90	90	1	12	596	98.9	98.9	1.1	11.8
		94		804	121	0.990	99.2	788.4	119	120	1	1	682	98.3	99.2	0.8	0.8
		95		348	67	0.982	100.0	335.5	66	67	0	2	279	98.5	100.0	0.0	2.9
32	S.942		B17	144	16	0.930	93.8	124.5	15	15	1	1	127	93.8	93.8	6.3	6.3
		92		144	16	0.930	93.8	124.5	15	15	1	1	127	93.8	93.8	6.3	6.3
33	TP.12095-33		B17	516	97	0.957	99.0	472.5	96	96	1	6	413	99.0	99.0	1.0	5.9
		92		154	24	0.911	100.0	127.9	24	24	0	4	126	100.0	100.0	0.0	14.3
		93		362	73	0.974	98.6	343.7	72	72	1	2	287	98.6	98.6	1.4	2.7
34	TP.5057-36		B17	382	54	0.978	98.1	365.7	52	53	1	1	327	96.3	98.1	1.9	1.9
		96		382	54	0.978	98.1	365.7	52	53	1	1	327	96.3	98.1	1.9	1.9
35	TP.6249-36		B17	879	153	0.724	60.1	461.1	31	92	61	4	722	20.3	60.1	39.9	4.2
		95		202	42	0.696	57.1	98.0	9	24	18	1	159	21.4	57.1	42.9	4.0
		96		677	111	0.734	61.3	364.6	22	68	43	3	563	19.8	61.3	38.7	4.2
36	TP.8766-33		B17	795	114	0.951	99.1	719.0	105	113	1	9	672	92.1	99.1	0.9	7.4
		92		162	24	0.954	100.0	147.4	23	24	0	2	136	95.8	100.0	0.0	7.7
		93		633	90	0.950	98.9	571.6	82	89	1	7	536	91.1	98.9	1.1	7.3
37	TP.9611-33		B17	2421	403	0.927	99.3	2079.0	393	400	3	50	1968	97.5	99.3	0.7	11.1
		93		389	63	0.878	100.0	299.7	62	63	0	15	311	98.4	100.0	0.0	19.2
		94		808	121	0.953	99.2	734.4	119	120	1	9	678	98.3	99.2	0.8	7.0
		95		547	108	0.931	100.0	473.8	106	108	0	13	426	98.1	100.0	0.0	10.7
		96		677	111	0.924	98.2	577.7	106	109	2	13	553	95.5	98.2	1.8	10.7

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	–	Str. Index	% PP	% FN	% FP
38	S.1773		B18	3333	237	0.966	96.6	3109.0	209	229	8	7	3089	88.2	96.6	3.4	3.0
		92		298	5	0.772	60.0	177.6	3	3	2	0	293	60.0	60.0	40.0	0.0
		93		1010	75	0.949	94.7	910.2	60	71	4	3	932	80.0	94.7	5.3	4.1
		94		802	70	0.976	97.1	764.6	64	68	2	1	731	91.4	97.1	2.9	1.4
		95		547	27	1.000	100.0	547.0	26	27	0	0	520	96.3	100.0	0.0	0.0
		96		676	60	0.974	100.0	640.7	56	60	0	3	613	93.3	100.0	0.0	4.8
39	TP.10409-33		B18	3205	240	0.911	99.2	2661.0	227	238	2	42	2923	94.6	99.2	0.8	15.0
		92		162	2	0.814	100.0	107.3	2	2	0	1	159	100.0	100.0	0.0	33.3
		93		1011	76	0.826	97.4	690.1	69	74	2	28	907	90.8	97.4	2.6	27.5
		94		807	75	0.986	100.0	783.9	75	75	0	2	730	100.0	100.0	0.0	2.6
		95		548	27	0.963	100.0	508.2	27	27	0	2	519	100.0	100.0	0.0	6.9
		96		677	60	0.926	100.0	580.1	54	60	0	9	608	90.0	100.0	0.0	13.0
40	TP.1821-35		B18	3187	241	0.949	99.2	2870.0	239	239	2	22	2924	99.2	99.2	0.8	8.4
		92		158	2	0.814	100.0	104.7	2	2	0	1	155	100.0	100.0	0.0	33.3
		93		1002	77	0.894	98.7	801.6	76	76	1	16	909	98.7	98.7	1.3	17.4
		94		802	75	0.985	98.7	778.6	74	74	1	1	726	98.7	98.7	1.3	1.3
		95		548	27	0.981	100.0	527.4	27	27	0	1	520	100.0	100.0	0.0	3.6
		96		677	60	0.974	100.0	641.6	60	60	0	3	614	100.0	100.0	0.0	4.8
41	TP.4571-33		B18	1141	75	0.838	100.0	800.5	73	75	0	29	1037	97.3	100.0	0.0	27.9
		92		301	8	0.778	100.0	182.1	8	8	0	5	288	100.0	100.0	0.0	38.5
		93		840	67	0.845	100.0	599.3	65	67	0	24	749	97.0	100.0	0.0	26.4
42	S.1079.1		B18,35,51,75, 77	3238	1251	0.690	99.0	1543.0	1219	1238	13	567	1420	97.4	99.0	1.0	31.4
		92		298	109	0.734	100.0	160.7	106	109	0	45	144	97.2	100.0	0.0	29.2
		93		1014	394	0.643	98.2	419.2	381	387	7	206	414	96.7	98.2	1.8	34.7
		94		806	316	0.717	99.1	414.5	307	313	3	127	363	97.2	99.1	0.9	28.9
		95		443	148	0.659	98.6	192.6	145	146	2	85	210	98.0	98.6	1.4	36.8
		96		677	284	0.730	99.6	360.6	280	283	1	104	289	98.6	99.6	0.4	26.9
43	TP.12394-33		B18,39,51	627	121	0.454	52.9	129.5	35	64	57	46	460	28.9	52.9	47.1	41.8
		92		302	57	0.554	49.1	92.6	14	28	29	8	237	24.6	49.1	50.9	22.2
		93		325	64	0.395	56.3	50.8	21	36	28	38	223	32.8	56.3	43.8	51.4
44	TP.5704-35		B21,22,62,63	388	85	0.613	63.5	145.7	35	54	31	18	285	41.2	63.5	36.5	25.0
		93		388	85	0.613	63.5	145.7	35	54	31	18	285	41.2	63.5	36.5	25.0
45	TP.1983-35		B22	3149	295	0.639	58.0	1288.0	124	171	124	51	2803	42.0	58.0	42.0	23.0
		92		161	20	0.823	80.0	108.9	9	16	4	2	139	45.0	80.0	20.0	11.1
		93		960	83	0.547	59.0	287.7	31	49	34	35	842	37.3	59.0	41.0	41.7
		94		806	83	0.691	53.0	384.8	36	44	39	2	721	43.4	53.0	47.0	4.3
		95		545	47	0.691	66.0	259.9	22	31	16	9	489	46.8	66.0	34.0	22.5
		96		677	62	0.654	50.0	289.5	26	31	31	3	612	41.9	50.0	50.0	8.8
46	TP.466.2-35		B22	488	46	0.496	100.0	120.1	46	46	0	99	343	100.0	100.0	0.0	68.3
		92		162	20	0.562	100.0	51.1	20	20	0	30	112	100.0	100.0	0.0	60.0
		93		326	26	0.459	100.0	68.7	26	26	0	69	231	100.0	100.0	0.0	72.6
47	TP.5810-37		B22	666	68	0.833	98.5	462.4	65	67	1	24	574	95.6	98.5	1.5	26.4
		95		107	8	1.000	100.0	107.0	8	8	0	0	99	100.0	100.0	0.0	0.0
		96		559	60	0.814	98.3	370.5	57	59	1	24	475	95.0	98.3	1.7	28.9

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
48	TP.8191-33		B22	3273	309	0.827	92.6	2240.0	231	286	23	85	2879	74.8	92.6	7.4	22.9
		92		225	23	0.881	91.3	174.8	19	21	2	3	199	82.6	91.3	8.7	12.5
		93		1017	93	0.764	86.0	593.9	67	80	13	31	893	72.0	86.0	14.0	27.9
		94		807	84	0.888	95.2	636.6	61	80	4	14	709	72.6	95.2	4.8	14.9
		95		548	48	0.832	97.9	379.3	38	47	1	17	483	79.2	97.9	2.1	26.6
		96		676	61	0.824	95.1	458.5	46	58	3	20	595	75.4	95.1	4.9	25.6
49	S.396		B22,62	2376	522	0.715	78.2	1215.0	228	408	114	119	1735	43.7	78.2	21.8	22.6
		92		299	66	0.564	57.6	95.2	23	38	28	14	219	34.8	57.6	42.4	26.9
		93		709	179	0.669	77.1	317.2	89	138	41	49	481	49.7	77.1	22.9	26.2
		94		806	171	0.796	81.9	511.3	70	140	31	23	612	40.9	81.9	18.1	14.1
		95		443	92	0.791	88.0	277.0	42	81	11	21	330	45.7	88.0	12.0	20.6
		96		119	14	0.548	78.6	35.7	4	11	3	12	93	28.6	78.6	21.4	52.2
50	TP.4001-34		B22,B7	208	28	0.586	85.7	71.5	20	24	4	24	156	71.4	85.7	14.3	50.0
		93		208	28	0.586	85.7	71.5	20	24	4	24	156	71.4	85.7	14.3	50.0
51	S.084		B27	1670	130	0.747	99.2	932.3	128	129	1	87	1453	98.5	99.2	0.8	40.3
		92		299	28	0.913	100.0	249.0	28	28	0	5	266	100.0	100.0	0.0	15.2
		93		1014	87	0.731	98.9	542.0	85	86	1	62	865	97.7	98.9	1.1	41.9
		94		357	15	0.635	100.0	144.1	15	15	0	20	322	100.0	100.0	0.0	57.1
52	S.1005.3-31		B27	208	23	0.926	91.3	178.2	13	21	2	1	184	56.5	91.3	8.7	4.5
		93		208	23	0.926	91.3	178.2	13	21	2	1	184	56.5	91.3	8.7	4.5
53	S.258		B27	298	28	0.774	100.0	178.4	26	28	0	16	254	92.9	100.0	0.0	36.4
		92		298	28	0.774	100.0	178.4	26	28	0	16	254	92.9	100.0	0.0	36.4
54	TP.1054-33		B27	349	30	0.964	96.7	324.0	27	29	1	1	318	90.0	96.7	3.3	3.3
		92		299	28	0.961	96.4	275.9	25	27	1	1	270	89.3	96.4	3.6	3.6
55	TP.1588-35		B27	2860	219	0.939	98.6	2524.0	199	216	3	23	2618	90.9	98.6	1.4	9.6
		92		162	19	0.945	100.0	144.5	16	19	0	2	141	84.2	100.0	0.0	9.5
		93		1013	87	0.914	98.9	846.9	77	86	1	14	912	88.5	98.9	1.1	14.0
		94		462	18	0.972	100.0	436.7	17	18	0	1	443	94.4	100.0	0.0	5.3
		95		546	43	0.976	100.0	519.7	43	43	0	2	501	100.0	100.0	0.0	4.4
		96		677	52	0.939	96.2	596.7	46	50	2	4	621	88.5	96.2	3.8	7.4
56	TP.1973-35		B27	3160	233	0.709	94.4	1590.0	206	220	13	165	2762	88.4	94.4	5.6	42.9
		92		162	19	0.641	78.9	66.5	14	15	4	10	133	73.7	78.9	21.1	40.0
		93		966	85	0.720	92.9	501.0	76	79	6	52	829	89.4	92.9	7.1	39.7
		94		807	33	0.636	100.0	326.2	29	33	0	44	730	87.9	100.0	0.0	57.1
		95		548	44	0.766	100.0	321.4	39	44	0	27	477	88.6	100.0	0.0	38.0
		96		677	52	0.731	94.2	361.9	48	49	3	32	593	92.3	94.2	5.8	39.5
57	TP.2440-35		B27	2692	183	0.889	91.8	2125.0	159	168	15	24	2485	86.9	91.8	8.2	12.5
		92		159	18	0.800	72.2	101.7	13	13	5	1	140	72.2	72.2	27.8	7.1
		93		501	36	0.724	88.9	262.8	32	32	4	19	446	88.9	88.9	11.1	37.3
		94		807	33	0.985	100.0	782.3	29	33	0	1	773	87.9	100.0	0.0	2.9
		95		548	44	0.975	95.5	521.0	38	42	2	0	504	86.4	95.5	4.5	0.0
		96		677	52	0.926	92.3	581.1	47	48	4	3	622	90.4	92.3	7.7	5.9
58	TP.6465-36		B27	880	68	0.909	100.0	726.9	67	68	0	13	799	98.5	100.0	0.0	16.0
		95		202	16	0.938	100.0	177.6	16	16	0	2	184	100.0	100.0	0.0	11.1
		96		678	52	0.900	100.0	549.8	51	52	0	11	615	98.1	100.0	0.0	17.5
59	TP.1599-33		B27,37,47	1543	162	0.611	95.1	575.2	121	154	8	180	1201	74.7	95.1	4.9	53.9
		93		390	56	0.659	96.4	169.5	47	54	2	47	287	83.9	96.4	3.6	46.5
		94		805	70	0.551	92.9	244.4	42	65	5	101	634	60.0	92.9	7.1	60.8
		95		348	36	0.672	97.2	157.0	32	35	1	32	280	88.9	97.2	2.8	47.8

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

(continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
60	TP.8578-33		B35	390	25	0.712	88.0	197.8	17	22	3	14	351	68.0	88.0	12.0	38.9
		93		390	25	0.712	88.0	197.8	17	22	3	14	351	68.0	88.0	12.0	38.9
61	TP.3984-35		B35,51	1224	187	0.888	88.8	965.3	121	166	21	14	1023	64.7	88.8	11.2	7.8
		95		547	70	0.857	84.3	401.9	43	59	11	6	471	61.4	84.3	15.7	9.2
		96		677	117	0.906	91.5	556.2	78	107	10	8	552	66.7	91.5	8.5	7.0
62	TP.640-35		B35,51,53,56	3204	649	0.505	90.8	817.7	470	589	60	737	1818	72.4	90.8	9.2	55.6
		92		155	38	0.706	84.2	77.2	23	32	6	12	105	60.5	84.2	15.8	27.3
		93		1018	219	0.535	85.4	291.6	146	187	32	182	617	66.7	85.4	14.6	49.3
		94		807	166	0.514	94.6	213.5	133	157	9	201	440	80.1	94.6	5.4	56.1
		95		547	83	0.456	96.4	114.0	64	80	3	155	309	77.1	96.4	3.6	66.0
		96		677	143	0.474	93.0	152.2	104	133	10	187	347	72.7	93.0	7.0	58.4
63	TP.8869-38		B35,51,53, 7801	287	67	0.546	100.0	85.6	66	67	0	78	142	98.5	100.0	0.0	53.8
		96		287	67	0.546	100.0	85.6	66	67	0	78	142	98.5	100.0	0.0	53.8
64	S.927.2		B35,62,75	145	47	0.533	74.5	41.2	26	35	12	19	79	55.3	74.5	25.5	35.2
		92		145	47	0.533	74.5	41.2	26	35	12	19	79	55.3	74.5	25.5	35.2
65	S.927		B35,75,39,48	2331	717	0.567	94.6	748.8	625	678	39	536	1078	87.2	94.6	5.4	44.2
		92		161	60	0.717	91.7	82.8	50	55	5	18	83	83.3	91.7	8.3	24.7
		93		1015	322	0.538	92.9	293.7	281	299	23	244	449	87.3	92.9	7.1	44.9
		94		808	246	0.576	97.2	268.5	216	239	7	195	367	87.8	97.2	2.8	44.9
		95		347	89	0.568	95.5	111.8	78	85	4	79	179	87.6	95.5	4.5	48.2
66	TP.9787-37		B38	879	53	0.934	98.1	766.4	27	52	1	6	820	50.9	98.1	1.9	10.3
		95		202	17	0.941	100.0	178.8	8	17	0	2	183	47.1	100.0	0.0	10.5
		96		677	36	0.930	97.2	585.9	19	35	1	4	637	52.8	97.2	2.8	10.3
67	TP.1118-33		B40	1001	237	0.719	98.7	517.5	214	234	3	132	632	90.3	98.7	1.3	36.1
		92		297	79	0.791	100.0	185.6	67	79	0	30	188	84.8	100.0	0.0	27.5
		93		704	158	0.688	98.1	333.5	147	155	3	102	444	93.0	98.1	1.9	39.7
68	TP.3460-33		B40	208	48	0.615	100.0	78.7	48	48	0	44	116	100.0	100.0	0.0	47.8
		93		208	48	0.615	100.0	78.7	48	48	0	44	116	100.0	100.0	0.0	47.8
69	S.1098		B40,48	625	164	0.872	96.3	475.3	146	158	6	27	434	89.0	96.3	3.7	14.6
		92		299	84	0.920	97.6	253.1	73	82	2	8	207	86.9	97.6	2.4	8.9
		93		326	80	0.826	95.0	222.7	73	76	4	19	227	91.3	95.0	5.0	20.0
70	S.362		B40,48	3339	803	0.584	99.5	1140.0	784	799	4	792	1744	97.6	99.5	0.5	49.8
		92		301	85	0.586	98.8	103.4	78	84	1	73	143	91.8	98.8	1.2	46.5
		93		1012	235	0.570	99.6	328.5	232	234	1	250	527	98.7	99.6	0.4	51.7
		94		801	184	0.565	100.0	255.5	184	184	0	203	414	100.0	100.0	0.0	52.5
		95		548	138	0.634	99.3	220.5	135	137	1	109	301	97.8	99.3	0.7	44.3
		96		677	161	0.588	99.4	234.3	155	160	1	157	359	96.3	99.4	0.6	49.5
71	S.232		B40,48,7	145	48	0.487	100.0	34.4	48	48	0	50	47	100.0	100.0	0.0	51.0
		92		145	48	0.487	100.0	34.4	48	48	0	50	47	100.0	100.0	0.0	51.0
72	S.1298.2-33		B46	3201	709	0.866	99.3	2401.0	689	704	5	164	2328	97.2	99.3	0.7	18.9
		92		162	33	0.914	100.0	135.2	29	33	0	5	124	87.9	100.0	0.0	13.2
		93		1011	242	0.844	98.8	720.8	235	239	3	63	706	97.1	98.8	1.2	20.9
		94		803	190	0.900	99.5	650.0	188	189	1	31	582	98.9	99.5	0.5	14.1
		95		548	131	0.881	100.0	424.9	130	131	0	27	390	99.2	100.0	0.0	17.1
		96		677	113	0.829	99.1	465.8	107	112	1	38	526	94.7	99.1	0.9	25.3
73	S.1772.1		B46	390	89	0.950	97.8	351.9	86	87	2	5	296	96.6	97.8	2.2	5.4
		93		390	89	0.950	97.8	351.9	86	87	2	5	296	96.6	97.8	2.2	5.4

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

(continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
74	S.522.12		B46	3352	746	0.823	99.5	2271.0	736	742	4	243	2363	98.7	99.5	0.5	24.7
		92		301	66	0.834	98.5	209.3	63	65	1	19	216	95.5	98.5	1.5	22.6
		93		1019	244	0.808	99.6	664.7	241	243	1	86	689	98.8	99.6	0.4	26.1
		94		807	191	0.881	99.5	626.2	190	190	1	38	578	99.5	99.5	0.5	16.7
		95		548	132	0.840	100.0	386.6	132	132	0	38	378	100.0	100.0	0.0	22.4
		96		677	113	0.752	99.1	382.8	110	112	1	62	502	97.3	99.1	0.9	35.6
75	TP.1025-33		B46	604	131	0.793	99.2	379.4	129	130	1	52	421	98.5	99.2	0.8	28.6
		92		296	64	0.883	98.4	230.6	63	63	1	12	220	98.4	98.4	1.6	16.0
		93		308	67	0.723	100.0	160.8	66	67	0	40	201	98.5	100.0	0.0	37.4
76	TP.12330-33		B48,60	3117	593	0.926	97.5	2673.0	555	578	15	59	2465	93.6	97.5	2.5	9.3
		93		1013	188	0.904	96.8	828.2	170	182	6	25	800	90.4	96.8	3.2	12.1
		94		805	154	0.946	98.7	720.2	151	152	2	12	639	98.1	98.7	1.3	7.3
		95		543	116	0.957	98.3	497.2	110	114	2	6	421	94.8	98.3	1.7	5.0
		96		677	121	0.908	95.9	558.1	110	116	5	14	542	90.9	95.9	4.1	10.8
77	TP.838-33		B48,60	138	32	0.716	96.9	70.8	30	31	1	17	89	93.8	96.9	3.1	35.4
		92		138	32	0.716	96.9	70.8	30	31	1	17	89	93.8	96.9	3.1	35.4
78	S.1761.3		B5	3337	483	0.924	99.4	2850.0	474	480	3	65	2789	98.1	99.4	0.6	11.9
		92		299	41	0.920	97.6	253.0	39	40	1	5	253	95.1	97.6	2.4	11.1
		93		1015	165	0.879	98.8	783.7	160	163	2	36	814	97.0	98.8	1.2	18.1
		94		805	115	0.948	100.0	723.0	115	115	0	11	679	100.0	100.0	0.0	8.7
		95		549	73	0.955	100.0	500.9	72	73	0	6	470	98.6	100.0	0.0	7.6
		96		669	89	0.957	100.0	612.7	88	89	0	7	573	98.9	100.0	0.0	7.3
79	S.275		B5	212	29	0.778	100.0	128.3	28	29	0	15	168	96.6	100.0	0.0	34.1
		92		212	29	0.778	100.0	128.3	28	29	0	15	168	96.6	100.0	0.0	34.1
		93		1018	164	0.469	98.8	224.0	162	162	2	301	553	98.8	98.8	1.2	65.0
80	S.834.2		B5	669	86	0.987	100.0	651.6	86	86	0	2	581	100.0	100.0	0.0	2.3
		94		321	41	1.000	100.0	321.0	41	41	0	0	280	100.0	100.0	0.0	0.0
		95		348	45	0.975	100.0	331.0	45	45	0	2	301	100.0	100.0	0.0	4.3
81	TP.171-32		B5	388	53	0.619	94.3	148.8	43	50	3	51	284	81.1	94.3	5.7	50.5
		93		388	53	0.619	94.3	148.8	43	50	3	51	284	81.1	94.3	5.7	50.5
82	S.138		B5,18,35,75	1811	770	0.746	91.7	1009.0	606	706	64	169	872	78.7	91.7	8.3	19.3
		92		298	113	0.821	93.8	201.0	92	106	7	19	166	81.4	93.8	6.2	15.2
		93		708	317	0.705	91.5	351.5	252	290	27	81	310	79.5	91.5	8.5	21.8
		94		805	340	0.755	91.2	459.4	262	310	30	69	396	77.1	91.2	8.8	18.2
83	S.1079		B5,18,35,75, 77	107	47	0.698	100.0	52.1	45	47	0	19	41	95.7	100.0	0.0	28.8
		95		107	47	0.698	100.0	52.1	45	47	0	19	41	95.7	100.0	0.0	28.8
84	S.228		B5,35	302	66	0.886	98.5	236.9	64	65	1	12	224	97.0	98.5	1.5	15.6
		92		302	66	0.886	98.5	236.9	64	65	1	12	224	97.0	98.5	1.5	15.6
85	S.346		B5,35	265	61	0.387	65.6	39.7	28	40	21	46	158	45.9	65.6	34.4	53.5
		93		265	61	0.387	65.6	39.7	28	40	21	46	158	45.9	65.6	34.4	53.5
86	TP.2733-33		B5,35,53, 7801	1173	239	0.559	86.6	366.7	186	207	32	194	740	77.8	86.6	13.4	48.4
		93		383	77	0.609	96.1	142.3	64	74	3	69	237	83.1	96.1	3.9	48.3
		94		199	52	0.577	86.5	66.2	42	45	7	33	114	80.8	86.5	13.5	42.3
		95		202	39	0.474	82.1	45.4	29	32	7	40	123	74.4	82.1	17.9	55.6
		96		389	71	0.539	78.9	113.1	51	56	15	52	266	71.8	78.9	21.1	48.1
87	TP.133-32		B5,35,75	544	170	0.765	88.2	318.0	96	150	20	37	337	56.5	88.2	11.8	19.8
		92		160	60	0.812	86.7	105.6	28	52	8	6	94	46.7	86.7	13.3	10.3
		93		384	110	0.744	89.1	212.8	68	98	12	31	243	61.8	89.1	10.9	24.0

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
88	TP.173-34		B5,35,7801	961	180	0.904	97.2	784.7	163	175	5	25	756	90.6	97.2	2.8	12.5
		94		613	123	0.905	97.6	501.6	113	120	3	17	473	91.9	97.6	2.4	12.4
		95		348	57	0.901	96.5	282.5	50	55	2	8	283	87.7	96.5	3.5	12.7
89	S.339		B5,53	1820	297	0.485	99.0	428.5	289	294	3	514	1009	97.3	99.0	1.0	63.6
		92		302	43	0.485	100.0	71.0	43	43	0	82	177	100.0	100.0	0.0	65.6
		94		500	83	0.503	100.0	126.7	79	83	0	137	280	95.2	100.0	0.0	62.3
90	TP.2260-33		B5,59	207	28	0.455	100.0	42.9	28	28	0	61	118	100.0	100.0	0.0	68.5
		93		207	28	0.455	100.0	42.9	28	28	0	61	118	100.0	100.0	0.0	68.5
91	S.1180		B51	3352	293	0.765	99.3	1962.0	280	291	2	174	2885	95.6	99.3	0.7	37.4
		92		302	30	0.794	100.0	190.2	28	30	0	15	257	93.3	100.0	0.0	33.3
		93		1018	86	0.657	98.8	439.9	83	85	1	90	842	96.5	98.8	1.2	51.4
		94		806	72	0.837	100.0	564.6	69	72	0	27	707	95.8	100.0	0.0	27.3
		95		549	49	0.869	100.0	415.0	45	49	0	14	486	91.8	100.0	0.0	22.2
		96		677	56	0.787	98.2	419.3	55	55	1	28	593	98.2	98.2	1.8	33.7
92	TP.2779-33		B51	1523	130	0.726	100.0	803.1	125	130	0	99	1294	96.2	100.0	0.0	43.2
		93		372	22	0.577	100.0	124.0	22	22	0	37	313	100.0	100.0	0.0	62.7
		94		806	73	0.740	100.0	441.5	69	73	0	51	682	94.5	100.0	0.0	41.1
		95		345	35	0.857	100.0	253.2	34	35	0	11	299	97.1	100.0	0.0	23.9
93	TP.282-35		B51	184	12	0.666	100.0	81.6	11	12	0	13	159	91.7	100.0	0.0	52.0
		93		184	12	0.666	100.0	81.6	11	12	0	13	159	91.7	100.0	0.0	52.0
94	TP.173-34*		B51,53,7801	583	53	0.505	100.0	148.9	53	53	0	111	419	100.0	100.0	0.0	67.7
		93		383	30	0.474	100.0	86.2	30	30	0	75	278	100.0	100.0	0.0	71.4
		94		200	23	0.557	100.0	62.1	23	23	0	36	141	100.0	100.0	0.0	61.0
95	TP.1489-33		B51,5Y	624	70	0.600	100.0	224.9	69	70	0	92	462	98.6	100.0	0.0	56.8
		92		297	33	0.637	100.0	120.4	32	33	0	37	227	97.0	100.0	0.0	52.9
		93		327	37	0.571	100.0	106.6	37	37	0	55	235	100.0	100.0	0.0	59.8
96	TP.2020-33		B51,5Y	614	69	0.570	100.0	199.8	69	69	0	103	442	100.0	100.0	0.0	59.9
		92		286	32	0.736	100.0	154.8	32	32	0	22	232	100.0	100.0	0.0	40.7
		93		328	37	0.476	100.0	74.2	37	37	0	81	210	100.0	100.0	0.0	68.6
97	TP.2620-33		B51,7801	390	29	0.764	96.6	227.6	25	28	1	16	345	86.2	96.6	3.4	36.4
		93		390	29	0.764	96.6	227.6	25	28	1	16	345	86.2	96.6	3.4	36.4
98	TP.3529-34		B51,7801	2418	208	0.617	98.6	919.5	196	205	3	261	1949	94.2	98.6	1.4	56.0
		93		383	28	0.548	96.4	115.2	26	27	1	47	308	92.9	96.4	3.6	63.5
		94		808	73	0.628	98.6	319.0	71	72	1	86	649	97.3	98.6	1.4	54.4
		95		549	50	0.745	100.0	304.5	46	50	0	34	465	92.0	100.0	0.0	40.5
		96		678	57	0.556	98.2	209.3	53	56	1	94	527	93.0	98.2	1.8	62.7
99	S.3859-34		B52	146	9	0.643	100.0	60.4	9	9	0	11	126	100.0	100.0	0.0	55.0
		94		146	9	0.643	100.0	60.4	9	9	0	11	126	100.0	100.0	0.0	55.0
100	TP.882-35		B52	184	11	0.341	100.0	21.4	10	11	0	54	119	90.9	100.0	0.0	83.1
		93		184	11	0.341	100.0	21.4	10	11	0	54	119	90.9	100.0	0.0	83.1
101	TP.3859-34		B52,76	2068	123	0.630	91.9	821.3	100	113	10	127	1818	81.3	91.9	8.1	52.9
		93		175	16	0.511	75.0	45.6	9	12	4	16	143	56.3	75.0	25.0	57.1
		94		666	38	0.660	97.4	290.2	33	37	1	40	588	86.8	97.4	2.6	51.9
		95		549	33	0.608	90.9	203.0	28	30	3	37	479	84.8	90.9	9.1	55.2
		96		678	36	0.665	94.4	300.2	30	34	2	34	608	83.3	94.4	5.6	50.0
102	TP.3802-34		B52,8,16	207	32	0.244	62.5	12.3	8	20	12	53	122	25.0	62.5	37.5	72.6
		93		207	32	0.244	62.5	12.3	8	20	12	53	122	25.0	62.5	37.5	72.6

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
103	TP.2698-33		B56	796	23	0.574	100.0	262.0	22	23	0	43	730	95.7	100.0	0.0	65.2
		92		162	9	0.733	100.0	87.0	8	9	0	7	146	88.9	100.0	0.0	43.8
		93		634	14	0.514	100.0	167.2	14	14	0	36	584	100.0	100.0	0.0	72.0
104	TP.7286-37		B56	1053	30	0.810	100.0	691.7	15	30	0	15	1008	50.0	100.0	0.0	33.3
		95		376	10	0.811	100.0	247.2	7	10	0	5	361	70.0	100.0	0.0	33.3
		96		677	20	0.810	100.0	444.5	8	20	0	10	647	40.0	100.0	0.0	33.3
105	TP.1459-39		B56,62	383	63	0.894	96.8	306.0	37	61	2	10	310	58.7	96.8	3.2	14.1
		96		383	63	0.894	96.8	306.0	37	61	2	10	310	58.7	96.8	3.2	14.1
106	TP.1709-33		B60	146	34	0.760	70.6	84.4	9	24	10	2	110	26.5	70.6	29.4	7.7
		92		146	34	0.760	70.6	84.4	9	24	10	2	110	26.5	70.6	29.4	7.7
107	TP.7846-33		B60	3349	574	0.959	99.0	3081.0	557	568	6	34	2741	97.0	99.0	1.0	5.6
		92		299	59	0.969	100.0	281.0	59	59	0	3	237	100.0	100.0	0.0	4.8
		93		1019	164	0.930	100.0	881.1	161	164	0	21	834	98.2	100.0	0.0	11.4
		94		808	137	0.987	100.0	787.2	133	137	0	3	668	97.1	100.0	0.0	2.1
		95		547	108	0.971	98.1	516.0	104	106	2	3	436	96.3	98.1	1.9	2.8
		96		676	106	0.955	96.2	616.8	100	102	4	4	566	94.3	96.2	3.8	3.8
108	TP.2011-37		B62	215	25	0.839	84.0	151.3	5	21	4	3	187	20.0	84.0	16.0	12.5
		96		119	12	0.703	66.7	58.9	0	8	4	2	105	0.0	66.7	33.3	20.0
109	S.116-33		B62,75,77	2476	734	0.908	94.6	2040.0	570	694	40	56	1686	77.7	94.6	5.4	7.5
		92		302	87	0.879	92.0	233.5	71	80	7	8	207	81.6	92.0	8.0	9.1
		93		1019	314	0.898	95.2	822.3	263	299	15	30	675	83.8	95.2	4.8	9.1
		94		807	237	0.922	94.1	686.3	165	223	14	12	558	69.6	94.1	5.9	5.1
		95		348	96	0.929	95.8	300.1	71	92	4	6	246	74.0	95.8	4.2	6.1
110	TP.12952-33		B7	3361	223	0.917	99.1	2829.0	217	221	2	36	3102	97.3	99.1	0.9	14.0
		92		300	18	0.972	100.0	283.2	18	18	0	1	281	100.0	100.0	0.0	5.3
		93		1031	66	0.884	100.0	805.4	65	66	0	17	948	98.5	100.0	0.0	20.5
		94		803	55	0.929	100.0	693.5	53	55	0	8	740	96.4	100.0	0.0	12.7
		95		549	26	0.890	96.2	434.5	25	25	1	5	518	96.2	96.2	3.8	16.7
		96		678	58	0.946	98.3	606.5	56	57	1	5	615	96.6	98.3	1.7	8.1
111	TP.571-33		B7	628	48	0.799	100.0	401.3	48	48	0	24	556	100.0	100.0	0.0	33.3
		92		302	18	0.877	100.0	232.2	18	18	0	5	279	100.0	100.0	0.0	21.7
		93		326	30	0.757	100.0	186.8	30	30	0	19	277	100.0	100.0	0.0	38.8
112	TP.6194-37		B7	1221	84	0.739	98.8	667.1	78	83	1	59	1078	92.9	98.8	1.2	41.5
		95		543	26	0.682	100.0	252.5	24	26	0	27	490	92.3	100.0	0.0	50.9
		96		678	58	0.771	98.3	403.3	54	57	1	32	588	93.1	98.3	1.7	36.0
113	S.1054		B7,22	3344	531	0.880	99.2	2587.0	521	527	4	119	2694	98.1	99.2	0.8	18.4
		92		298	51	0.805	100.0	193.1	47	51	0	21	226	92.2	100.0	0.0	29.2
		93		1015	157	0.868	99.4	763.9	156	156	1	40	818	99.4	99.4	0.6	20.4
		94		806	134	0.938	100.0	708.7	133	134	0	15	657	99.3	100.0	0.0	10.1
		95		548	72	0.860	100.0	405.5	72	72	0	21	455	100.0	100.0	0.0	22.6
		96		677	117	0.882	97.4	527.1	113	114	3	22	538	96.6	97.4	2.6	16.2
114	S.1228.2		B7,22,27	144	31	0.707	100.0	72.0	29	31	0	20	93	93.5	100.0	0.0	39.2
		92		144	31	0.707	100.0	72.0	29	31	0	20	93	93.5	100.0	0.0	39.2
115	TP.2797-33		B7,22,42	378	57	0.641	100.0	155.4	55	57	0	57	264	96.5	100.0	0.0	50.0
		93		378	57	0.641	100.0	155.4	55	57	0	57	264	96.5	100.0	0.0	50.0

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

(continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
116	S.378		B7,40,48	3040	932	0.856	92.2	2228.0	575	859	73	116	1992	61.7	92.2	7.8	11.9
		92		299	98	0.764	83.7	174.6	62	82	16	15	186	63.3	83.7	16.3	15.5
		93		709	216	0.814	94.0	469.2	165	203	13	47	446	76.4	94.0	6.0	18.8
		94		806	242	0.899	92.1	651.7	140	223	19	15	549	57.9	92.1	7.9	6.3
		95		549	162	0.876	93.8	421.0	88	152	10	19	368	54.3	93.8	6.2	11.1
		96		677	214	0.881	93.0	525.8	120	199	15	20	443	56.1	93.0	7.0	9.1
117	TP.1133-33		B7,41,48,60	383	100	0.665	100.0	169.6	100	100	0	70	213	100.0	100.0	0.0	41.2
		93		383	100	0.665	100.0	169.6	100	100	0	70	213	100.0	100.0	0.0	41.2
118	TP.80-32		B7,42	390	20	0.461	100.0	83.0	20	20	0	59	311	100.0	100.0	0.0	74.7
		93		390	20	0.461	100.0	83.0	20	20	0	59	311	100.0	100.0	0.0	74.7
119	TP.1794-35		B7,48,60	3210	811	0.771	86.4	1910.0	429	701	110	176	2223	52.9	86.4	13.6	20.1
		92		162	39	0.766	89.7	95.1	26	35	4	11	112	66.7	89.7	10.3	23.9
		93		1017	246	0.732	82.9	544.7	136	204	42	61	710	55.3	82.9	17.1	23.0
		94		804	210	0.816	88.6	535.8	105	186	24	34	560	50.0	88.6	11.4	15.5
		95		549	141	0.773	86.5	328.1	66	122	19	30	378	46.8	86.5	13.5	19.7
		96		678	175	0.775	88.0	407.3	96	154	21	40	463	54.9	88.0	12.0	20.6
120	TP.716-33		B7,48,60	388	99	0.930	100.0	335.9	97	99	0	11	278	98.0	100.0	0.0	10.0
		93		388	99	0.930	100.0	335.9	97	99	0	11	278	98.0	100.0	0.0	10.0
121	TP.5532-36		B7,48,60,7	382	102	0.926	94.1	327.7	65	96	6	5	275	63.7	94.1	5.9	5.0
		96		382	102	0.926	94.1	327.7	65	96	6	5	275	63.7	94.1	5.9	5.0
122	S.50-33		B75	3274	573	0.852	98.8	2379.0	538	566	7	156	2545	93.9	98.8	1.2	21.6
		92		223	37	0.821	91.9	150.3	33	34	3	9	177	89.2	91.9	8.1	20.9
		93		1019	182	0.813	98.4	673.6	173	179	3	65	772	95.1	98.4	1.6	26.6
		94		808	137	0.863	100.0	601.1	128	137	0	37	634	93.4	100.0	0.0	21.3
		95		548	94	0.918	100.0	462.3	90	94	0	14	440	95.7	100.0	0.0	13.0
		96		676	123	0.863	99.2	503.2	114	122	1	31	522	92.7	99.2	0.8	20.3
123	TP.8842.2		B75	933	188	0.775	99.5	560.7	159	187	1	86	659	84.6	99.5	0.5	31.5
		92		299	52	0.793	100.0	188.0	50	52	0	23	224	96.2	100.0	0.0	30.7
		93		634	136	0.767	99.3	373.1	109	135	1	63	435	80.1	99.3	0.7	31.8
124	S.1125-33		B75,77	2420	446	0.858	98.4	1780.0	411	439	7	112	1862	92.2	98.4	1.6	20.3
		93		390	51	0.802	98.0	251.1	48	50	1	21	318	94.1	98.0	2.0	29.6
		94		806	152	0.858	99.3	592.8	142	151	1	40	614	93.4	99.3	0.7	20.9
		95		548	105	0.876	97.1	420.8	97	102	3	20	423	92.4	97.1	2.9	16.4
		96		676	138	0.867	98.6	508.4	124	136	2	31	507	89.9	98.6	1.4	18.6
125	TP.1727-35		B75,77	435	121	0.662	98.3	190.5	118	119	2	78	236	97.5	98.3	1.7	39.6
		92		162	39	0.724	94.9	85.0	37	37	2	18	105	94.9	94.9	5.1	32.7
		93		273	82	0.629	100.0	108.1	81	82	0	60	131	98.8	100.0	0.0	42.3
126	S.1129.2		B76	162	2	0.814	100.0	107.3	2	2	0	1	159	100.0	100.0	0.0	33.3
		92		162	2	0.814	100.0	107.3	2	2	0	1	159	100.0	100.0	0.0	33.3
127	S.1779		B76	3339	44	0.446	100.0	664.4	42	44	0	166	3129	95.5	100.0	0.0	79.0
		92		294	6	0.565	100.0	93.9	6	6	0	12	276	100.0	100.0	0.0	66.7
		93		1015	14	0.313	100.0	99.3	12	14	0	113	888	85.7	100.0	0.0	89.0
		94		806	11	0.598	100.0	288.5	11	11	0	19	776	100.0	100.0	0.0	63.3
		95		548	8	0.625	100.0	214.3	8	8	0	12	528	100.0	100.0	0.0	60.0
		96		676	5	0.573	100.0	222.0	5	5	0	10	661	100.0	100.0	0.0	66.7

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996

(continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
128	S.464.1		B76	3351	44	0.366	100.0	448.5	44	44	0	259	3048	100.0	100.0	0.0	85.5
		92		302	6	0.393	100.0	46.7	6	6	0	29	267	100.0	100.0	0.0	82.9
		93		1018	14	0.247	100.0	62.3	14	14	0	175	829	100.0	100.0	0.0	92.6
		94		807	11	0.508	100.0	208.4	11	11	0	30	766	100.0	100.0	0.0	73.2
		95		548	8	0.557	100.0	169.8	8	8	0	17	523	100.0	100.0	0.0	68.0
		96		676	5	0.616	100.0	256.9	5	5	0	8	663	100.0	100.0	0.0	61.5
129	TP.11019-33		B76	390	10	0.660	90.0	170.0	8	9	1	9	371	80.0	90.0	10.0	50.0
		93		390	10	0.660	90.0	170.0	8	9	1	9	371	80.0	90.0	10.0	50.0
130	TP.4115-33		B8	1541	33	0.561	48.5	484.4	1	16	17	8	1500	3.0	48.5	51.5	33.3
		93		387	11	0.230	18.2	20.5	1	2	9	4	372	9.1	18.2	81.8	66.7
		94		806	18	0.725	66.7	423.4	0	12	6	3	785	0.0	66.7	33.3	20.0
		95		348	4	0.573	50.0	114.3	0	2	2	1	343	0.0	50.0	50.0	33.3
131	TP.4318-33		B8	1317	19	0.418	100.0	229.6	19	19	0	83	1215	100.0	100.0	0.0	81.4
		92		302	1	0.405	100.0	49.5	1	1	0	5	296	100.0	100.0	0.0	83.3
		93		1015	18	0.416	100.0	175.4	18	18	0	78	919	100.0	100.0	0.0	81.3
132	TP.6191-33		B8	3341	51	0.851	100.0	2420.0	50	51	0	19	3271	98.0	100.0	0.0	27.1
		92		296	1	0.497	100.0	73.2	1	1	0	3	292	100.0	100.0	0.0	75.0
		93		1013	18	0.829	100.0	695.7	18	18	0	8	987	100.0	100.0	0.0	30.8
		94		805	17	0.920	100.0	681.6	16	17	0	3	785	94.1	100.0	0.0	15.0
		95		549	9	0.903	100.0	447.5	9	9	0	2	538	100.0	100.0	0.0	18.2
		96		678	6	0.815	100.0	450.0	6	6	0	3	669	100.0	100.0	0.0	33.3
133	TP.4734-35		B8,18	390	43	0.765	83.7	228.4	33	36	7	12	335	76.7	83.7	16.3	25.0
		93		390	43	0.765	83.7	228.4	33	36	7	12	335	76.7	83.7	16.3	25.0
134	TP.8992-37		B8,59	881	12	0.578	100.0	294.1	12	12	0	23	846	100.0	100.0	0.0	65.7
		95		203	6	0.729	100.0	107.9	6	6	0	5	192	100.0	100.0	0.0	45.5
		96		678	6	0.493	100.0	165.0	6	6	0	18	654	100.0	100.0	0.0	75.0
135	S.872-31		Bw4	625	480	0.483	69.2	145.6	276	332	148	18	127	57.5	69.2	30.8	5.1
		92		299	242	0.529	68.6	83.6	137	166	76	1	56	56.6	68.6	31.4	0.6
		93		326	238	0.451	69.7	66.4	139	166	72	17	71	58.4	69.7	30.3	9.3
136	TP.4088-33		Bw4	207	167	0.723	85.0	108.3	132	142	25	0	40	79.0	85.0	15.0	0.0
		93		207	167	0.723	85.0	108.3	132	142	25	0	40	79.0	85.0	15.0	0.0
137	TP.5033-35		Bw4	582	443	0.364	66.1	77.2	198	293	150	33	106	44.7	66.1	33.9	10.1
		93		582	443	0.364	66.1	77.2	198	293	150	33	106	44.7	66.1	33.9	10.1
138	TP.535-33		Bw4	487	373	0.483	68.9	113.4	207	257	116	14	100	55.5	68.9	31.1	5.2
		92		162	136	0.474	67.6	36.3	68	92	44	1	25	50.0	67.6	32.4	1.1
		93		325	237	0.490	69.6	77.9	139	165	72	13	75	58.6	69.6	30.4	7.3
139	TP.7803-33		Bw4	2412	1875	0.599	82.7	866.6	1474	1550	325	82	455	78.6	82.7	17.3	5.0
		93		381	304	0.650	86.2	161.2	254	262	42	10	67	83.6	86.2	13.8	3.7
		94		806	605	0.613	81.7	303.2	471	494	111	28	173	77.9	81.7	18.3	5.4
		95		548	428	0.644	87.4	227.4	359	374	54	21	99	83.9	87.4	12.6	5.3
		96		677	538	0.523	78.1	184.8	390	420	118	23	116	72.5	78.1	21.9	5.2
140	TP.2406-33		Bw6	162	142	0.325	87.3	17.1	117	124	18	10	10	82.4	87.3	12.7	7.5
		92		162	142	0.325	87.3	17.1	117	124	18	10	10	82.4	87.3	12.7	7.5
141	TP.2743-37		Bw6	461	390	0.897	99.5	371.3	372	388	2	10	61	95.4	99.5	0.5	2.5
		96		461	390	0.897	99.5	371.3	372	388	2	10	61	95.4	99.5	0.5	2.5
142	TP.3304-33		Bw6	628	553	0.523	78.3	171.8	353	433	120	3	72	63.8	78.3	21.7	0.7
		93		628	553	0.523	78.3	171.8	353	433	120	3	72	63.8	78.3	21.7	0.7

Table 14 Show the result of antisera for HLA-B during years 1992 to 1996 (continued)

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
143	S.1067-33		Bw6,B13	1017	913	0.288	93.3	84.4	791	852	61	68	36	86.6	93.3	6.7	7.4
		92		301	276	0.154	94.2	7.1	233	260	16	20	5	84.4	94.2	5.8	7.1
		93		716	637	0.327	92.9	76.7	558	592	45	48	31	87.6	92.9	7.1	7.5

HLA-A & B locus (Table 15)

HLA-A31 + A33 + B75

There is one serum (S.551), in year 1992. The R value is 0.584. The percent of inclusion is 97.4.

HLA-A9 + B27

There is one serum (S.1172), during years 1992 to 1993. The R value is 0.667 (0.64 – 0.675). The percent of inclusion is 97 (96.5 - 98.4).

Table 15 Show the result of antisera for HLA-A & B during years 1992 to 1996

No	Seraid	Ye	Specificity	N	Tr. Cell	R value	% Incl.	X^2	S8	++	+-	-+	--	Str. Index	% PP	% FN	% FP
1	S.551		A31,33,B75	144	38	0.584	97.4	49.1	33	37	1	33	73	86.8	97.4	2.6	47.1
		92		144	38	0.584	97.4	49.1	33	37	1	33	73	86.8	97.4	2.6	47.1
2	S.1172		A9,B27	1319	495	0.667	97.0	587.5	470	480	15	233	591	94.9	97.0	3.0	32.7
		92		301	125	0.640	98.4	123.1	123	123	2	62	114	98.4	98.4	1.6	33.5
		93		1018	370	0.675	96.5	463.6	347	357	13	171	477	93.8	96.5	3.5	32.4

CHAPTER V

DISCUSSION

The quality of a serum increases as the R value approaches unity (1.0). Criteria for selecting reagent sera may vary with the rarity of the specificity. For common specificities an R value of 0.95 is sought but for rare specificities the only sera available may have a lower R value. Generally R value of greater than 0.8 are required for reagent purposes, but sera having values greater than 0.6 may occasionally be used in the detection of rare specificities.

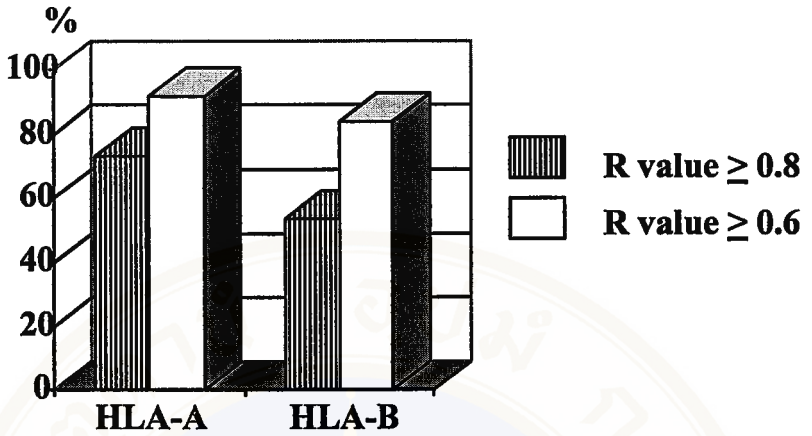
In this study, 51 in 70 serums (72.8 %) 's R value of HLA-A is greater than 0.8 and 64 in 70 serums (91.4 %) 's R value of HLA-A is greater than 0.6, 76 in 142 serums (53.5 %) 's R value of HLA-B is greater than 0.8 and 119 in 142 serums (83.8 %) 's R value of HLA-B is greater than 0.6 during years 1992 to 1996 (Table 16).

For HLA-A, TP.4551-36's serum (A2 + A28) show the highest R value (0.987) (% inclusion = 99.9, % Str. index = 99.9 and % PP = 99.9).

For HLA-B, TP.11106-33's serum (B16) show the highest R value (0.988) (% inclusion = 97.9, % Str. index = 91.5 and % PP = 97.9).

In year 1992, 29 in 35 serums (82.9 %) 's R value of HLA-A is greater than 0.8 and 32 in 35 serums (91.4 %) 's R value of HLA-A is greater than 0.6, 54 in 83 serums (65.1 %) 's R value of HLA-B is greater than 0.8 and 70 in 83 serums (84.3 %) 's R value of HLA-B is greater than 0.6 (Table 17).

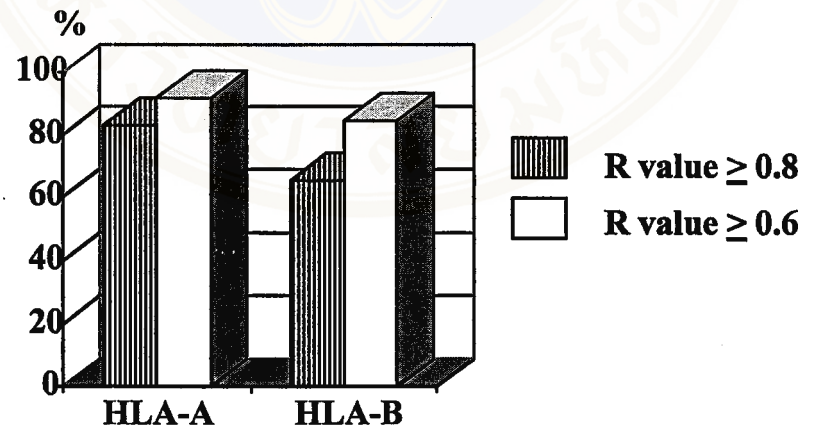
Table 16 Show the quality of antisera during years 1992 to 1996



For HLA-A, TP.3013-33's serum (A3) show the highest R value (1.0) (% inclusion = 100, % Str. index = 83.3 and % PP = 100).

For HLA-B, TP.1968-33's serum (B12) show the highest R value (1.0) (% inclusion = 100, % Str. index = 100 and % PP = 100).

Table 17 Show the quality of antisera in year 1992.

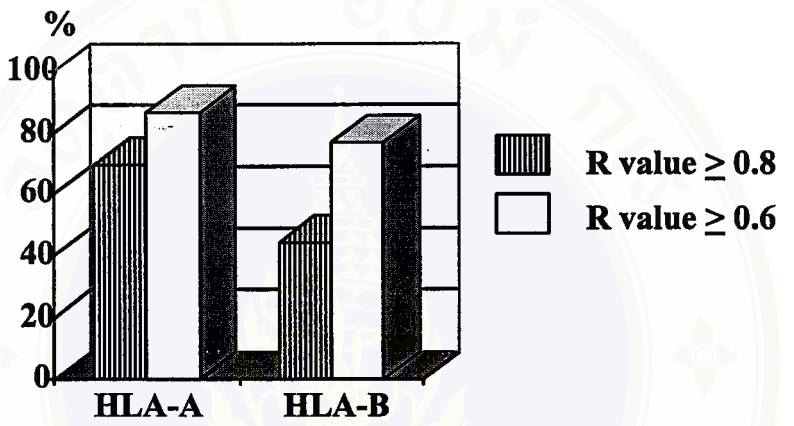


In year 1993, 36 in 52 serums (69.2 %) 's R value of HLA-A is greater than 0.8 and 45 in 52 serums (86.5 %) 's R value of HLA-A is greater than 0.6, 49 in 111 serums (44.1 %) 's R value of HLA-B is greater than 0.8 and 85 in 111 serums (76.6 %) 's R value of HLA-B is greater than 0.6 (Table 18).

For HLA-A, S.936's serum (A11) show the highest R value (0.986) (% inclusion = 100, % Str. index = 99.5 and % PP = 100).

For HLA-B, TP.11106-33's serum (B16) show the highest R value (0.988) (% inclusion = 97.9, % Str. index = 91.5 and % PP = 97.9).

Table 18 Show the quality of antisera in year 1993.



In year 1994, 23 in 31 serums (74.2 %) 's R value of HLA-A is greater than 0.8 and 31 in 31 serums (100 %) 's R value of HLA-A is greater than 0.6, 38 in 59 serums (64.4 %) 's R value of HLA-B is greater than 0.8 and 55 in 59 serums (93.2 %) 's R value of HLA-B is greater than 0.6 (Table 19).

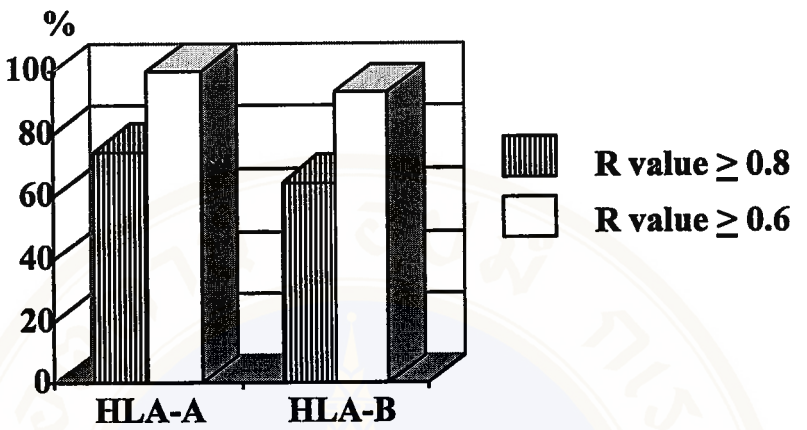
For HLA-A, TP.936-33's serum (A2 + A28) and TP.3013-33's serum (A3) show the highest R value (1.0) (% inclusion = 100, % Str. index = (95.2, 100) and % PP = 100).

For HLA-B, S.834.2's serum (B5) show the highest R value (1.0) (% inclusion = 100, % Str. index = 100 and % PP = 100).

In year 1995, 29 in 40 serums (72.5 %) 's R value of HLA-A is greater than 0.8 and 37 in 40 serums (92.5 %) 's R value of HLA-A is greater than 0.6, 45 in 63 serums (71.4 %) 's R value of HLA-B is greater than 0.8 and 61 in 63 serums (96.8

%) 's R value of HLA-B is greater than 0.6 (Table 20).

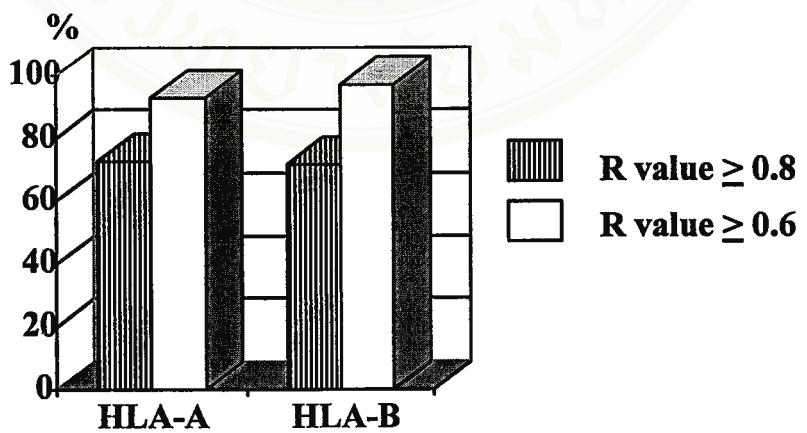
Table 19 Show the quality of antisera in year 1994.



For HLA-A, TP.3013-33's serum (A3) and TP.740-33's serum (A30) show the highest R value (1.0) (% inclusion = 100, % Str. index = 100 and % PP = 100).

For HLA-B, S.1773's serum (B18) and TP.5810-37's serum (B22) show the highest R value (1.0) (% inclusion = 100, % Str. index = (96.3, 100) and % PP = 100).

Table 20 Show the quality of antisera in year 1995.

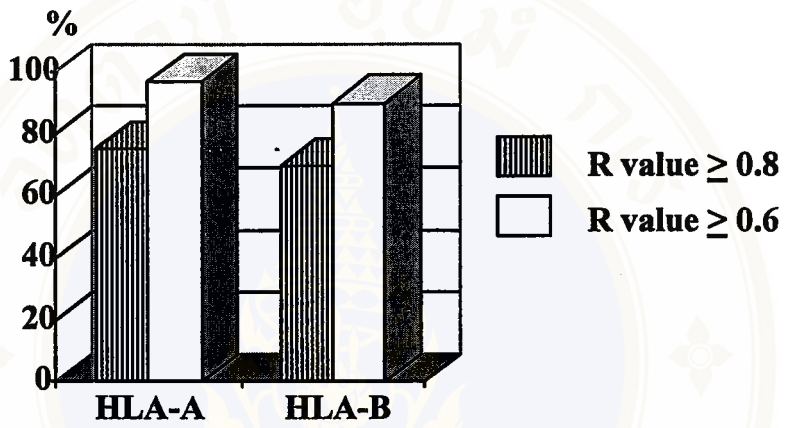


In year 1996, 24 in 32 serums (75 %) 's R value of HLA-A is greater than 0.8 and 31 in 32 serums (96.9 %) 's R value of HLA-A is greater than 0.6, 41 in 59 serums (69.5 %) 's R value of HLA-B is greater than 0.8 and 53 in 59 serums (89.8 %) 's R value of HLA-B is greater than 0.6 (Table 21).

For HLA-A, TP.740-33's serum (A30) show the highest R value (1.0) (% inclusion = 100, % Str. index = 96.8 and % PP = 100).

For HLA-B, TP.5057-36's serum (B17) show the highest R value (0.978) (% inclusion = 98.1, % Str. index = 96.3 and % PP = 98.1).

Table 21 Show the quality of antisera in year 1996.



CHAPTER VI

CONCLUSION

At present, serology is the principle technique used in routine clinical laboratories to type for HLA-A and -B specificities. It is a rapid and relatively sensitive technique.

The Lambda Scan Plus Program is the program used for tissue typing analysis. It is used the most laboratories in Thailand (Siriraj Hospital, Chulalongkorn Hospital, Ramathibodi Hospital, Vachira Hospital, Rajvithi Hospital, Pramongkutkaow Hospital, etc.).

In this study, we found that sera that being used in our typing tray (91.4 % of serum 's HLA-A and 83.8 % of serum 's HLA-B) has the R value greater than 0.6 during years 1992 to 1996. This tissue typing tray is productively of Department of Transfusion Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, beginning 1992.

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