HLA-Molecules. Structure, and Functions

Joannis Mytilineos MD, PhD
Department of Transplantation Immunology
Institute for Clinical Transfusion Medicine and Immunogenetics
German Red Cross Blood Transfusion Service, and
Department of Transfusion Medicine - University Clinic Ulm
Ulm, Germany
HLA-Class I Structure

[Diagram showing the structure of HLA-Class I, including exon and protein domain labels, and a depiction of the peptide-binding groove.]
HLA-Class I Crystallographic structure
HLA-Class II Molecule with Peptide
Inheritance of HLA

<table>
<thead>
<tr>
<th></th>
<th>Mother</th>
<th>Father</th>
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<tbody>
<tr>
<td>HLA-A:</td>
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<td>02:05 03:01</td>
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<tr>
<td>HLA-B:</td>
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<td>08:01 40:01</td>
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<tr>
<td>HLA-Cw:</td>
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<td>03:03 07:02</td>
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<tr>
<td>HLA-DRB1*:</td>
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<td>13:01 08:01</td>
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<tr>
<td>HLA-DQA1*:</td>
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<tr>
<td>HLA-DQB1*:</td>
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<td>06:03 04:02</td>
</tr>
<tr>
<td>HLA-DPB1*:</td>
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<td>04:01 15:01</td>
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### Expression of HLA-Antigens

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<thead>
<tr>
<th>HLA-Class I</th>
<th>All nuclated cells</th>
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<tr>
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<td>Platelets</td>
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<td>Sperms</td>
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<table>
<thead>
<tr>
<th>HLA-Class II</th>
<th>Makrophages</th>
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<td>Monocytes</td>
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<td>Aktiv. T-Lymphocytes</td>
</tr>
<tr>
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<td>B-Lymphocytes</td>
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Biological Functions of the MHC

• Distinction between „self“ and „non-self“
• Key Molecules for the Initiation of the Adaptive, Antigen specific immunological Response against infectious agents
• Ligand for Natural Killer Cells (NK-Cells)
• Maturation and Expansion of T- (and B-) cells
Antigen Presentation

The interaction between dendritic cells (DCs) and T cells involves three signals

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Antigen Präsentation

cytotoxischer T-Lymphocyt (Killerzelle)

Antigenrezeptor
Peptid
MHC-Molekül der Klasse I

infizierte Zelle

ten infizierte Zelle ab

T-Helferzelle

Antigenrezeptor
Peptid
MHC-Molekül der Klasse II

Lymphokine als Modulatoren der Immunantwort

antigen-präsentierende Zelle
Vom Gen zur Präsentation

HLA-Klasse I

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Vom Gen zur Präsentation

HLA Klasse II
Impact of Polymorphism in the Peptide Repertoire to be presented.
Direct and indirect Recognition of Allografts
T-cell Maturation and Expansion
B-cell Activation
B-cell Activation
HLA and NK-Cell Interaction

NK Cell

Inhibition
ITAM → ITIM

KIR2DS/DAP12
KIR3DL

HLA-C
HLA-Bw4

Normal Cell
No Lysis

NK Cell

ITAM
ITIM

KIR2DS/DAP12
KIR3DL

HLA-C

Transformed or Virus-Infected
Lysis
Summary

• HLA-Class I Molecules are Key Molecules for the Initiation of the Immunological Response (Infection + Transplantation)
• They act as Ligands for NK-Cells (Infection + Cancer)
• They are crucially involved in the Activation and Maturation process of T- and B-cells
Many Thanks for your Attention!