Its all about Human Blood ...

Human blood is classified based on presence or absence of inherited antigens on the surface of red blood cells (RBCs).

Blood antigens are inherited and represent contribution from both parents. The most common antigens are classified as A, B and O. Hence the blood phenotyping is called ABO typing. As recognised by International society of blood transfusion (ISBT) ABO blood group systems have 30 different phenotypes.

These 30 different phenotypes are further classified as 600 different genotypes. But many of these are very rare and are mainly found in certain ethnic groups (and mostly for academic interest).

**ABO blood group System**

ABO blood typing is being done using specific antibody to A, B, AB antigens. O antigen is determined on the basis of absence of either A or B or AB antigens. The antibodies for blood phenotyping generally been done as agglutination assay, where the antibodies are of IgM type.

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>Antigen</th>
<th>Antibodies</th>
<th>Population distribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>A</td>
<td>B</td>
<td>35</td>
</tr>
<tr>
<td>Group B</td>
<td>B</td>
<td>A</td>
<td>16</td>
</tr>
<tr>
<td>Group AB</td>
<td>AB</td>
<td>None</td>
<td>5</td>
</tr>
<tr>
<td>Group O</td>
<td>None</td>
<td>AB</td>
<td>44</td>
</tr>
</tbody>
</table>

**Most common phenotypes and respective genotypes;**

<table>
<thead>
<tr>
<th>Phenotype</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AA or AO</td>
</tr>
<tr>
<td>B</td>
<td>BB or BO</td>
</tr>
<tr>
<td>AB</td>
<td>AB</td>
</tr>
<tr>
<td>O</td>
<td>OO</td>
</tr>
</tbody>
</table>

**Rh blood group System**

ISBT have documented atleast 50 different Rh antigens, of which five are most significant antigens (C,D,E,c,e). The D antigen is more likely to provoke an immune response in Rh negative individuals.

3% of asian population and 15% of white have Rh negative blood types.

**Clinical Significance**

The routine work of a blood bank involves testing blood from both donors and recipients to ensure that recipient is given compatible blood.

If a unit of incompatible blood is transfused to a recipient, a severe acute hemolytic reaction with hemolysis, renal failure and shock is likely to occur, and death is a possibility.

<table>
<thead>
<tr>
<th>Acute Hemolytic Reaction</th>
<th>Systemic</th>
<th>Vascular</th>
<th>Transfused Vein</th>
<th>Lunbar Region</th>
<th>Heart</th>
<th>Chest</th>
<th>Urinary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chills, fever</td>
<td>Hypotension, Uncontrol bleeding</td>
<td>Heat Sensation</td>
<td>Pain</td>
<td>Increased heart rate</td>
<td>Constricting Pain</td>
<td>Hemoglobiuria, Hyper bilirubinemia</td>
</tr>
</tbody>
</table>

After doing blood phenotyping, cross matching is to be done with the donor and the accepter Blood sample individually before undertaking transfusion.

**Monoclonal Antibodies**

From the time Kohler and Milstein made the Nobel Prize winning discovery of B cells acquiring the infinite ability to produce monoclonal antibodies, there have been questions raised as to the commercial viability of this amazing discovery. The usefulness of monoclonal antibodies as a very important diagnostic tool became palpable, and such prospects gave rise to our venture, Mediclone Biotech Pvt. Ltd.
Monoclonal antibodies (mAb) are derived from hybridoma cell lines, obtained by fusing mouse antibody producing B lymphocytes with mouse myeloma cells. Each hybridoma cell line produces homogenous antibodies of only one immunoglobulin class, which are identical in their immunological activity.

**ABO BLOOD GROUPING SERA**

**Mediclone A / Monoclonal Anti A**
- Presence of **haemagglutination** determines the group of the tested blood as group A.
- **Colorant**: Brilliant Blue dye
- **Isotype**: IgM
- **Specificity**: - A₁, A₂, A₁B, A₂B, Aᵢ, Aₑᵲᵳₑᵲ,
- **Avidity**: -2 -3 Sec
- **Shelf life**: – 24 months
- **Storage condition**: – 2 - 8°C
- **Available as**
  - FFMU *(For Further Manufacturing Use)*
  - Ready to use reagents

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG01J</td>
<td>Anti A</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG01K</td>
<td>Anti A</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG01Q</td>
<td>Anti A(Ready to use)</td>
<td>1 Lit</td>
</tr>
<tr>
<td>BG01Z</td>
<td>Anti A(FFMU)</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>

**Mediclone B / Monoclonal Anti B**
- Presence of **haemagglutination** determines the group of the tested blood as group B.
- **Colorant**: Tartrazine
- **Isotype**: IgM
- **Specificity**: - B, A₁B, A₂B
- **Avidity**: -2 – 3 sec
- **Shelf life**: – 24 months
- **Storage condition**: – 2 - 8°C
- **Format**
  - FFMU *(For Further Manufacturing Use)*
  - Ready to use reagents.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG02J</td>
<td>Anti B</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG02K</td>
<td>Anti B</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG02Q</td>
<td>Anti B(Ready to use)</td>
<td>1 Lit</td>
</tr>
<tr>
<td>BG02Z</td>
<td>Anti B(FFMU)</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>

**Mediclone AB / Monoclonal Anti AB**
- Presence of **haemagglutination** determines the group of the tested blood as group AB.
- **Colorant**: Eosin
- **Isotype**: IgM
- **Specificity**: - A₁, A₂, A₁B, A₂B, B,
- **Avidity**: - 3 – 4 sec
- **Shelf life**: – 24 months
- **Storage condition**: – 2 - 8°C
- **Available as**
  - FFMU *(For Further Manufacturing use)*
  - Reagents ready to use.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG03J</td>
<td>Anti AB</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG03K</td>
<td>Anti AB</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG03Q</td>
<td>Anti AB(Ready to use)</td>
<td>1 Lit</td>
</tr>
<tr>
<td>BG03Z</td>
<td>Anti AB(FFMU)</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>

**Rhesus Blood Grouping Sera**

**Mediclone D (IgM) / Monoclonal Anti D (IgM)**
- Presence of **haemagglutination** determines the group of the tested blood as Rh+ve.
- **Isotype**: IgM
- **Specificity**: - Rh +ve
- **Avidity**: - 4 – 5 sec
- **Shelf life**: – 24 months
- **Storage condition**: – 2 - 8°C
- **Available as**
  - FFMU *(For Further Manufacturing use)*
  - Reagents ready to use
Mediclone D (IgG + IgM) / Monoclonal Anti D (IgG + IgM)

- Presence of **haemagglutination** determines the group of the tested blood as Rh+ve.
- Intended for phenotyping Rhesus D antigen and its weaker variants including D^u
- **Isotype:** IgM and IgG
- **Specificity** - Rh +ve ,
- **Avidity** - 4 – 5 sec
- **Shelf life** – 24 months
- **Storage condition** – 2 - 8°C
- **Available as**
  - FFMU (*For Further Manufacturing use*)
  - Reagents ready to use

### Procedure

1. Take a clean glass slide and drawn circles as shown in figure.
2. Add one drop of whole blood or red cell saline suspension to each circle.
3. Add respective antigen for which the blood is tested and mix well with applicator stick.
4. Gently tilt the slide forward and backward at room temperature.
5. Read the slide for haemagglutination.

---

**Heamagglutination assay**

Only manufacturer in South Asian countries
**D\textsuperscript{u} Test**

- One drop of Monoclonal Anti D (IgG + IgM)
- One drop of 10% RBC-saline suspension

Mix and incubate at 37°C for 15 minutes

Wash the cells with isotonic saline 3 times

Add 2 drops of AHG

Centrifuge at 1000 rpm for one minute

Gently dislodge the sedimented cells and examine macroscopically or microscopically for agglutination

**Titre Analysis**

**Procedure**

- Take 10 clean-dry test tubes and number them consequently.
- Add 0.5ml of saline to each test tubes.
- Add 0.5ml of Anti A to the first tube.
- The saline and Anti A mixture are serially diluted to get 1:1024 dilution containing 1ml of solution in the last test tube (no.10).
- Take Blood sample (RBC) and wash with normal saline for 3-4 times.
- Add isotonic solution to the packed cell to make it 10% suspension.
- Add 50µl of 10% RBC saline suspension to all the 10 tubes.
- Shake each tube thoroughly and centrifuge at 1000 rpm for 1 min.
- Read haemagglutination, either macroscopically (or) microscopically in the sedimented cells by gentle dislodging.
SUBGROUPS OF BLOOD GROUPING

LECTINS

Mediclone A1 Lectin / A1 Lectin db

- **Intended use:** Used in Human RBC subgrouping, to differentiate A₁ subgroup from other weaker subgroups of ‘A’ RBC like A₂, Aₓ, Aₑₐₙ, Aₑᵢ, or A₂B, AₓB etc.
- **Shelf Life** – 24 months
- **Storage condition** – 2 - 8°C
- **Available as**
  - Reagents ready to use

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG06J</td>
<td>A1 Lectin db</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG06K</td>
<td>A1 Lectin db</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG06Q</td>
<td>A1 Lectin db</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>

Mediclone H Lectin / H Lectin

- **Intended Use:** Used in Human RBC subgrouping
- **Agglutinates** Human RBC having ‘H’ antigen in the cell surface
- **Shelf Life** – 24 months
- **Storage condition** – 2 - 8°C
- **Available as**
  - Reagents ready to use

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG07J</td>
<td>H Lectin</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG07K</td>
<td>H Lectin</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG07Q</td>
<td>H Lectin</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>

REAGENTS FOR THE INDIRECT ANTIGLOBULIN TEST

Mediclone AHG (Coombs) / Anti Human Globulin (Coombs Sera)

- **Intended Use:** Used to detect/ demonstrate the presence of immunoglobulins and components of human complement adsorbed to the erythrocytes.
- **Shelf life** – 24 months
- **Storage condition** – 2 - 8°C
- **Available as**
  - Reagents ready to use

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG08J</td>
<td>Anti Human Globulin</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG08K</td>
<td>Anti Human Globulin</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG08Q</td>
<td>Anti Human Globulin</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>
**AGGLUTINATION POTENTIATING REAGENTS**

Mediclone BSA 22 % / Bovine Serum Albumin 22 %

Intended Use: A high protein solution to detect incomplete antibody sensitization phenomina.

Shelf life – 24 months

Storage condition – 2 - 8°C

Available as

- Reagent to use reagents

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG09J</td>
<td>Bovine Serum Albumin 22 %</td>
<td>5 ml</td>
</tr>
<tr>
<td>BG09K</td>
<td>Bovine Serum Albumin 22 %</td>
<td>10 ml</td>
</tr>
<tr>
<td>BG09Q</td>
<td>Bovine Serum Albumin 22 %</td>
<td>1 Lit</td>
</tr>
</tbody>
</table>