### Natural History of Hepatitis B Infection

<table>
<thead>
<tr>
<th>Immune Tolerant Phase</th>
<th>Immune Activation/ HBeAg Seroconversion</th>
<th>HBV Carrier</th>
<th>Reactivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT ≤ 2x upper limit of normal</td>
<td>ALT &gt; 2x upper limit of normal</td>
<td>ALT normal</td>
<td>Rising ALT</td>
</tr>
<tr>
<td>HBsAg+/ Anti-HBs−</td>
<td>Development of Anti-HBe, loss of HBeAg</td>
<td>HBsAg+/ Anti-HBs−/HBeAg−/ Anti-HBe+</td>
<td>HBeAg+/ Anti-HBs−/HBeAg−/ Anti-HBe+</td>
</tr>
<tr>
<td>High HBV DNA</td>
<td>Decreasing HBV DNA</td>
<td>Low HBV DNA</td>
<td>Rising DNA</td>
</tr>
</tbody>
</table>

### Interpreting Hepatitis B Serology in Patients Older than 1 year**

<table>
<thead>
<tr>
<th>HBsAg</th>
<th>Anti-HBs</th>
<th>Not infected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Negative</td>
<td>Not infected</td>
</tr>
<tr>
<td>Positive</td>
<td>Negative</td>
<td>Active infection with hepatitis B</td>
</tr>
<tr>
<td>Anti-HBs</td>
<td>Negative</td>
<td>With normal ALT = immune tolerant phase of infection</td>
</tr>
<tr>
<td>HBeAg</td>
<td>Positive</td>
<td>With increased ALT = possible seroconversion or consider treatment</td>
</tr>
<tr>
<td>Anti-HBe</td>
<td>Negative</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HBsAg</th>
<th>Anti-HBs</th>
<th>HBeAg</th>
<th>Anti-HBe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Positive</td>
<td>With normal ALT = Hepatitis B “carrier”</td>
<td></td>
</tr>
<tr>
<td>Anti-H Bs</td>
<td>Negative</td>
<td>Partial immune response to hepatitis B infection with HBeAg seroconversion</td>
<td></td>
</tr>
<tr>
<td>HBeAg</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-HBe</td>
<td>Positive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HBV DNA</th>
<th>High viral load</th>
<th>Low viral load</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 10⁵ iu/mL</td>
<td>Active replication of virus, expected in HBeAg + patients</td>
<td>Decreased viral replication, expected in HBeAg − patients</td>
</tr>
<tr>
<td>≤ 10⁴ iu/mL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** In patients under 1 year of age, antibodies may be maternal. To verify infectious status, repeat full serology with HBV DNA between 12 and 18 months of age.

### Caring for the Child with Chronic Hepatitis B Infection

**A Guide for Community Healthcare Providers**

For more information please contact: 416-813-7270

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### Children 0-5 years of age

Confirm chronic infection at 12-18 months of age with hepatitis B serology:
- HBsAg, Anti-HBs, HBeAg, Anti-HBe, HBV DNA

**Action plan:**
- All household members should be immunized against hepatitis B
- Patient should receive immunization against hepatitis A and all other recommended immunizations

**Teaching for parents:**
- Natural history of hepatitis B infection in childhood
- Blood and body fluid precautions
- Disclosure of hepatitis B status
- OTC and prescription medication

**Monitoring:**
- Blood work every 6 months: conjugated bilirubin, unconjugated bilirubin, ALT, AST, GGT, albumin, creatinine, CBC, differential
- Annual hepatitis B serology: HBsAg, HBeAg, anti-HBe, HBV DNA
- Liver ultrasound every 2 years

### School-age Children

**Action plan:**
- All household members should be immunized against hepatitis B
- Patient should receive immunization against hepatitis A and all other recommended immunizations

**Teaching for the child:**
- General health: healthy diet, exercise
- Blood and body fluid precautions

**Teaching for parents:**
- Natural history of hepatitis B infection in childhood
- Blood and body fluid precautions
- Disclosure of hepatitis B status
- OTC and prescription medication

**Monitoring:**
- Blood work every 6 months: conjugated bilirubin, unconjugated bilirubin, ALT, AST, GGT, albumin, creatinine, CBC, differential
- Annual hepatitis B serology: HBsAg, HBeAg, anti-HBe, HBV DNA
- Liver ultrasound every 2 years

### Adolescents and Young Adults

**Action plan:**
- All household members should be immunized against hepatitis B
- Patient should receive immunization against hepatitis A and all other recommended immunizations

**Teaching for the adolescent:**
- Natural history of hepatitis B infection
- General health: healthy diet, exercise
- Blood and body fluid precautions
- Disclosure of hepatitis B status
- Sexual transmission
- Alcohol
- OTC and prescription medication
- Illicit drugs
- Child-bearing
- Cancer risk and screening

**Monitoring:**
- Blood work every 6 months: conjugated bilirubin, unconjugated bilirubin, ALT, AST, GGT, albumin, creatinine, CBC, differential
- Annual hepatitis B serology: HBsAg, HBeAg, anti-HBe, HBV DNA
- Liver ultrasound every 2 years

*To refer to SickKids Liver Clinic use our on-line referral system at: [www.sickkids.ca/referralsystem/default.asp]*

**SickKids Liver Clinic is happy to accept referrals for all children with hepatitis B. Our program offers consultation and collaborative medical care, including treatment and patient and family education**