Hepatitis B Vaccine (HBV)

Revision Date: August 25, 2016

Rationale for Policy Update: Incorporated updated CIG and ACIP recommendations for immune compromised individuals and those with renal disease.

Included schedule for infants born to HBsAg negative mothers weighing less than 2000 grams who received Hepatitis B vaccine at birth.

Please consult the Product Monograph\(^1\) for further information about the vaccine.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>ENGERIX®-B</th>
<th>RECOMBIVAX HB®</th>
</tr>
</thead>
<tbody>
<tr>
<td>GlaxoSmithKline Inc.</td>
<td>Merck Canada Inc.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Licensed use</th>
<th>Hepatitis B vaccine can be administered at any age from birth onward.</th>
<th>Vaccine dose for all children from birth up to and including 10 years of age in Alberta is 0.5 mL (5 µg).(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-license use</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Indications for use of provincially funded vaccine

Note: Eligible individuals with anaphylactic reactions to latex should receive ENGERIX®-B vaccine.

Pre-exposure:

- Students in Grade 5 – Universal program in Alberta.
- Students in Grades 6 through 12 who have not received a series of hepatitis B vaccine.
- Children younger than seven years of age whose families have immigrated to Canada from areas where there is a high prevalence (8% or higher) of hepatitis B (endemic for hepatitis B). See Hepatitis B Virus Infection – High Endemic Geographic Areas.
- Individuals who are workers, volunteers or students (accepted into post-secondary educational programs) and who have a reasonable anticipated risk of exposure to blood/bloody body fluids and/or sharps injuries during the course of their work. See Provision of Occupational Vaccines.
- Non-immune individuals with chronic health conditions including:
  - Hemophiliacs and others receiving repeated infusions of blood or blood products (hepatitis B vaccine is not provided for parents providing home infusion for their children).
  - Individuals with chronic liver disease from any cause, including hepatitis C infection.\(^3\)
- Non-immune individuals with chronic health conditions that may be HYPORESPONSIVE to hepatitis B vaccine should receive a higher dose of hepatitis B (see dose section for hyporesponsive individuals). These include:
  - Individuals with chronic renal disease or who are undergoing chronic hemodialysis/peritoneal dialysis, including those who are pre-dialysis (progressive renal insufficiency).
  - Individuals with congenital immunodeficiencies.\(^3\)
  - Individuals infected with HIV.\(^3\)
  - Candidates for and recipients of solid organ transplant. See:
    - Immunization for Children Expecting Solid Organ Transplant before 18 Months of Age (Accelerated).
### Immunization for Children Expecting Solid Organ Transplant at 18 months of Age or Older (Catch-up Schedule) and
### Immunization for Adult Solid Organ Candidates and Recipients.

- Recipients of hematopoietic stem cell transplant (HSCT). See:
  - Immunization for Child Hematopoietic Stem Cell Transplant Recipients
  - Immunization for Adult Hematopoietic Stem Cell Transplant Recipients.

### Non-immune individuals with lifestyle risks for infection including:

- Men who have sex with men (MSM).
- Individuals with more than one sexual partner in the previous six months.
- Individuals with a history of a sexually transmitted infection.
- Individuals seeking evaluation or treatment for a sexually transmitted infection.
- Individuals who engage in high risk sexual practices.
- Individuals who have unprotected sex with new partners.
- Individuals who use illicit drugs and associated drug-using paraphernalia (e.g., tubes used for snorting), resulting in blood exposure.

### Children and workers in child care settings in which there is a hepatitis B infected (acute or chronic) child or worker.

### Non-immune adults who have immigrated to Canada from areas where there is a high prevalence of hepatitis B. See Hepatitis B Virus Infection – High Endemic Geographic Areas.

### Residents and staff of institutions or group homes for the developmentally challenged.

### Populations or communities in which hepatitis B is highly endemic, following consultation with the Office of the Chief Medical Officer (OCMOH).

### Inmates in provincial correctional facilities who will be incarcerated for a sufficient length of time to complete a hepatitis B vaccine series.

### Inmates in long-term correctional facilities: Immunization is the responsibility of the Federal Correctional Service. However, vaccine will be provided provincially for completion of immunization of discharged inmates who began their hepatitis B series in the correctional facility.

#### Post-exposure:

##### Infants:

- **Newborns** born to hepatitis B infected mothers (acute cases or carriers) should receive hepatitis immune globulin (HBIG) and the first dose of hepatitis B vaccine as soon as possible after birth (within 12 hours) but within seven days after birth if HBIG/hepatitis B vaccine is delayed for any reason.

#### Notes:

- If prenatal screening has not been done prior to delivery, it should be done as soon as possible after admission for delivery. In addition, repeat testing should be considered in uninfected, susceptible women with continuing high risk factors.
- If results can be obtained within 12 hours, the first dose of hepatitis B vaccine should be administered. HBIG administration should be delayed pending results.
If results will not be available within 12 hours, administer hepatitis B vaccine and consider administration of HBIG, taking into account maternal risk factors and erring on the side of providing HBIG if there is any question of possible maternal hepatitis B infection.

- **Infants (other than newborns) younger than 12 months of age:**
  - Hepatitis B vaccine and HBIG if the mother or primary caregiver is an acute case.
  - Hepatitis B vaccine only if the caregiver or significant household contact is a chronic carrier.

Refer to: *Public Health Notifiable Disease Management Guidelines – Hepatitis B*, and *Alberta Prenatal Screening Program for Selected Communicable Diseases Public Health Guidelines – Hepatitis B*.

- **Susceptible household contacts, sexual partners and needle-sharing partners of individuals with acute or chronic hepatitis B infection:**
  - Hepatitis B vaccine. HBIG may be recommended for some individuals depending upon the time from exposure and the specifics surrounding the exposure.

Refer to: *Public Health Notifiable Disease Management Guidelines – Hepatitis B*.

- **Percutaneous (needle stick) or mucosal exposure:**
  - Post-exposure follow-up and prophylaxis should be based on the immunization history and antibody status of the exposed person and, if known, the infectious nature of the source.

Refer to: *Canadian Immunization Guide: Hepatitis B Vaccine (Figures 1 & 2)*.

- **Susceptible individuals of sexual assault:**
  - HBIG and hepatitis B vaccine should be offered.


**Hepatitis A and B Combined Vaccine:**

Hepatitis A and B Combined Vaccine may be considered for individuals eligible for both pre-exposure hepatitis A and hepatitis B vaccines. See Biologicals – *Hepatitis A and B Combined Vaccine: TWINRIX®*.

**Pre-immunization Serology**

Pre-immunization Serology (HBsAg and anti-HBs) is recommended for the following individuals:

- Individuals with high probability of past infection.
- Spouse or sexual partners and needle sharing partners of a hepatitis B case or chronic carrier.
- Household contacts (12 months of age and older) of a hepatitis B case or chronic carrier including those previously immunized through a universal or endemic hepatitis B immunization program.\textsuperscript{5,6}
- Individuals who have emigrated from a country where hepatitis B is endemic.

**Not recommended for:**
- Individuals receiving hepatitis B immunization through universal immunization programs.
- Newborns born to hepatitis B positive mothers and infants younger than 12 months of age.
- Children younger than 7 years eligible through the hepatitis B endemic program.

### Dose

<table>
<thead>
<tr>
<th>ENGERIX®-B</th>
<th>RECOMBIVAX HB®</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthy individuals:</strong></td>
<td><strong>RECOMBIVAX HB® (10 µg/1.0 mL)</strong></td>
</tr>
</tbody>
</table>
| ➢ 0 – 19 years of age inclusive | Healthy individuals  
0.5 mL dose (10 µg)  
20 years of age and older.  
1.0 mL dose (20 µg)  
| Hyporesponsive individuals: | Hyporesponsive individuals (see Indications section above)  
0 – 15 years of age inclusive  
1.0 mL dose (20 µg)  
16 years of age and older  
2.0 mL dose (40 µg)  
| ➢ 0 – 19 years of age inclusive | 0 – 10 years of age inclusive  
0.5 mL (5.0 µg)  
11 – 19 years of age inclusive:  
1.0 mL (10 µg)  
| RECOMBIVAX HB® Adult Dialysis (40µg/1.0 mL) | Hyporesponsive individuals 20 years of age and older (see Indications section)  
1 mL (40 µg)  
| Note: Do not use this formulation for individuals younger than 20 years of age.\textsuperscript{1} |

### Route
- Intramuscular injection

### Schedule
- Infant born to hepatitis B infected mother:
  - Dose 1: at birth
  - Dose 2: two months of age
  - Dose 3: six months of age

**Notes:**
- The response to hepatitis B vaccine may be diminished in infants with a birth weight below 2,000 grams.\textsuperscript{3}
- Neonates weighing less than 2,000 grams born to infected mothers require four doses of vaccine administered at birth, 1, 2, and 6 months of age, followed by serologic testing one month after completion of the series.\textsuperscript{3,4}
- The final (third/fourth) dose in the series should not be administered to infants before 24 weeks (168 days) of age.\textsuperscript{3}
Other infants younger than 12 months of age:

- Dose 1: two months of age
- Dose 2: four months of age
- Dose 3: twelve months of age

Notes:

- Neonates weighing less than 2,000 grams who received their first dose of hepatitis B vaccine at birth should receive three additional doses of vaccine administered at 1, 2, and 6 months of age.

INFANRIX hexa® may be considered for infants eligible for both DTaP-IPV-Hib and Hepatitis B vaccines. See Biologicals – DTaP-IPV-Hib: INFANRIX hexa® for indications.

Grade 5 students:

- Dose 1: day 0
- Dose 2: one month after dose 1
- Dose 3: four to six months after dose 1

Note: Minimal acceptable schedule/condensed school schedule is 0, 1, and 4 months, with one month (28 days) between the first and second dose, at least two months (56 days) between the second and third dose and at least four months (112 days) between the first and third dose.

Children 12 months of age and older, and adults (excluding students receiving vaccine in a school setting):

- Dose 1: day 0
- Dose 2: one month after dose 1
- Dose 3: six months after dose 1

ENGERIX®-B

Hyporesponsive individuals 15 years of age and younger:

- Dose 1: day 0
- Dose 2: one month after dose 1
- Dose 3: two months after dose 1
- Dose 4: twelve months after dose 1

Hyporesponsive individuals 16 years of age and older:

- Dose 1: day 0
- Dose 2: one month after dose 1
- Dose 3: two months after dose 1
- Dose 4: six months after dose 1

Note: Those initiating a four dose schedule with ENGERIX®-B should complete the series using the same vaccine whenever possible.

RECOMBIVAX HB®

Hyporesponsive individuals of any age and regardless of formulation:

- Dose 1: day 0
- Dose 2: one month after dose 1
- Dose 3: six months after dose 1

Note: Interruption of the hepatitis B vaccines series does not require that any dose be repeated if the minimum intervals between doses are respected. If years have elapsed between the first and second dose, it may be prudent to assess antibody response when the series is complete, especially if the individual is at significant risk.
**Post-immunization Serology and Follow-up**  
*(see Post Immunization Serology and Follow-up algorithm)*

<table>
<thead>
<tr>
<th>of infection.</th>
<th>Post-immunization testing (anti-HBs) and follow-up is recommended as outlined below:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants born to infected mothers.</td>
<td>• Serology is recommended 1 – 6 months following the primary series of hepatitis B vaccine. Both anti-HBs and HBsAg should be done.</td>
</tr>
<tr>
<td></td>
<td>• If the individual is negative for antibody after the first series, an extra dose of vaccine should be administered, with repeat serology testing one month later. If the serology testing remains negative after an extra dose of vaccine, two additional doses of vaccine to complete the second vaccine series should be administered followed by serology one month later.</td>
</tr>
<tr>
<td>Individuals with repeated potential and known exposure to hepatitis B (sexual partners, needle sharing partners and household contacts of cases or chronic carriers).</td>
<td>• Serology should be done 1 – 6 months following the primary series of hepatitis B vaccine.</td>
</tr>
<tr>
<td></td>
<td>• If the individual is negative for antibody after the first series, an extra dose of vaccine should be administered, with repeat serology testing one month later. If the serology testing remains negative after an extra dose of vaccine, two additional doses of vaccine to complete the second vaccine series should be administered followed by serology one month later.</td>
</tr>
<tr>
<td>Individuals who are hyporesponsive due to immune compromising conditions (includes those with congenital immunodeficiencies, HSCT, SOT, HIV infected) often respond suboptimally to hepatitis B vaccine and may need additional antigen to mount a response. If protection is achieved and then wanes, subsequent exposure may result in acute disease or carrier state.</td>
<td>• Individuals who are immune compromised and are negative for antibody after the first series, <strong>should receive a second series</strong>, followed by serology one month later.</td>
</tr>
<tr>
<td></td>
<td>• Periodic monitoring (by attending physician) for the presence of anti-HBs should be considered for immunocompromised individuals, taking into account the severity of the compromised state and whether or not the risk for hepatitis B infection is still present. Should antibody testing show suboptimal protection, a booster dose of vaccine and retesting should be undertaken.</td>
</tr>
<tr>
<td>Individuals who are hyporesponsive due to renal disease (hemodialysis, peritoneal dialysis and pre-dialysis) often respond suboptimally to hepatitis B vaccine and may need additional antigen to mount a response. If protection is achieved and then wanes, subsequent exposure may result in acute disease or carrier state.</td>
<td>• Individuals who have renal disease (hemodialysis, peritoneal dialysis and pre-dialysis) and are negative for antibody after the first series, <strong>should receive a second series</strong>, followed by serology one month later.</td>
</tr>
<tr>
<td></td>
<td>• Persons with chronic renal disease or on dialysis should be evaluated yearly for anti-HBs. Should antibody testing show suboptimal protection, a booster dose of vaccine and retesting should be undertaken.</td>
</tr>
<tr>
<td>Individuals with advanced liver disease including disease caused by hepatitis C conversion.</td>
<td>• If they have not responded to the first hepatitis B vaccine series, offer a second series but consider using higher dose vaccine schedule for</td>
</tr>
</tbody>
</table>
• Occupational: All health care workers/students in health-related disciplines who qualify for hepatitis B immunization.

  ➢ Serology should be done to determine their antibody status 1 – 6 months following their primary series of hepatitis B vaccine.
  
  ➢ If the individual is negative for antibody after the first series, an extra dose of vaccine should be administered, with repeat serology testing one month later. If the serology testing remains negative after an extra dose of vaccine, two additional doses of vaccine to complete the second vaccine series should be administered followed by serology one month later.
  
  ➢ If immunization was completed more than six months previously and post-immunization screening was not done, testing should be done as part of a routine assessment.
  
  ➢ Once a positive result is recorded, no further serology is recommended.

Any individual who fails to respond to the second series of vaccine are unlikely to benefit from further doses. Therefore, if protective levels are not achieved, the individual should be considered a non-responder and susceptible.

### Contraindications

- Known severe hypersensitivity to any component of the vaccine.
- Anaphylactic reactions to a previous dose of vaccine containing hepatitis B antigen.

For Recombivax HB® only:

- Anaphylactic reactions to latex

### Precautions

Should not be administered in the gluteal area or intradermally, as this may result in lower immune response.¹,³

### Possible reactions

#### Local reactions:

- Injection site redness, pain, swelling and induration.¹

#### Systemic reactions:

- Irritability, headache, fatigue, appetite loss, drowsiness, gastrointestinal symptoms, malaise, fever, dizziness, myalgia, lymphadenopathy, paraesthesia, arthralgia, rash, pruritus and urticaria.¹

For Engerix®-B only:

- The following additional reactions have been reported from post-market surveillance: meningitis, thrombocytopenia, anaphylaxis, allergic reactions, nervous system disorders e. g. encephalopathy, encephalitis, neuritis, neuropathy, convulsions, hypoesthesia, multiple sclerosis, optic neuritis, Guillain-Barré (GBS), vasculitis, erythema multiforme, angioneurotic edema, lichen planus, muscular weakness, abnormal liver function tests and bronchospasm.¹

For Recombivax HB® only:

- The following additional adverse events have been reported through post-marketing surveillance: anaphylaxis, vasculitis, polyarteritis nodosa, alopecia, eczema, arthritis, pain in the extremity, tinnitus, uveitis and nerve disorders including Bell’s palsy, Guillain-Barré syndrome (GBS), febrile seizures, exacerbation of multiple sclerosis, optic neuritis and encephalitis.¹

**Note:** A number of studies have been unable to demonstrate any evidence of a causal association following hepatitis B vaccine and the following chronic illnesses: chronic fatigue syndrome, multiple sclerosis, Guillain-Barré syndrome (GBS) or...
rheumatoid arthritis.\textsuperscript{3}

Refer to: Adverse Events Following Immunization (AEFI), Policy for Alberta Immunization Providers.\textsuperscript{9}

| Pregnancy | Hepatitis B vaccine should be administered to pregnant women when indicated.\textsuperscript{3} Data is not available on the effect of hepatitis B vaccine on fetal development;\textsuperscript{1} however, the risk is expected to be negligible as the vaccine consists of non-infectious subunits.  
Pregnant women at high risk of hepatitis B infection, should be tested for antibody response following the receipt of hepatitis B vaccine series.\textsuperscript{3} |

| Lactation | Hepatitis B vaccine should be administered to breastfeeding women when indicated. It is not known whether hepatitis B vaccine is excreted in human milk.\textsuperscript{1} |

References

\textsuperscript{1} GlaxoSmithKline Inc. (2013, August 9). ENGERIX®-B: Hepatitis B vaccine (recombinant). \textit{Product Monograph}.


\textsuperscript{6} Alberta Health and Wellness. Public Health Notifiable Disease Management Guidelines - Hepatitis B (Chronic Carrier).  


Post-immunization Serology and Follow-up

Infants/Infected Mothers

Infants born to Hepatitis B Infected Mothers.

- Test for antiHBs and HBsAg 1 to 6 months after primary series of hepatitis B vaccine.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
    - Follow-up as per ND Guidelines
    - Administer 4th dose.
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP No further follow-up indicated.
        - Complete second series of hepatitis B vaccine
        - Retest antiHBs 1 month later
          - AntiHBs Positive
            - STOP No further follow-up indicated.
            - STOP Non-responder
          - AntiHBs Negative
            - Complete second series of hepatitis B vaccine
            - Retest antiHBs 1 month later
              - AntiHBs Positive
                - STOP No further follow-up indicated.
                - STOP Non-responder
              - AntiHBs Negative
                - STOP No further follow-up indicated.
                - STOP Non-responder

  - HBsAg Positive
    - AntiHBs Negative
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP No further follow-up indicated.
        - Complete second series of hepatitis B vaccine
        - Retest antiHBs 1 month later
          - AntiHBs Positive
            - STOP No further follow-up indicated.
            - STOP Non-responder
          - AntiHBs Negative
            - STOP No further follow-up indicated.
            - STOP Non-responder

  - AntiHBs negative
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP No further follow-up indicated.
        - Complete second series of hepatitis B vaccine
        - Retest antiHBs 1 month later
          - AntiHBs Positive
            - STOP No further follow-up indicated.
            - STOP Non-responder
          - AntiHBs Negative
            - STOP No further follow-up indicated.
            - STOP Non-responder

Repeated Exposure

Individuals with repeated potential and known exposure to hepatitis B (sexual partners, needle sharing partners and household contacts of cases or chronic carriers).

- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
    - Administer 4th dose.
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP No further follow-up indicated.
        - Complete second series of hepatitis B vaccine
        - Retest antiHBs 1 month later
          - AntiHBs Positive
            - STOP No further follow-up indicated.
            - STOP Non-responder
          - AntiHBs Negative
            - STOP No further follow-up indicated.
            - STOP Non-responder

  - AntiHBs negative
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP No further follow-up indicated.
        - Complete second series of hepatitis B vaccine
        - Retest antiHBs 1 month later
          - AntiHBs Positive
            - STOP No further follow-up indicated.
            - STOP Non-responder
          - AntiHBs Negative
            - STOP No further follow-up indicated.
            - STOP Non-responder

Advanced Liver Disease

Individuals with advanced liver disease including disease caused by hepatitis C conversion.

- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - Complete second series of hepatitis B vaccine

  - STOP No further follow-up indicated.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - STOP No further follow-up indicated.

  - STOP Non-responder

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - STOP No further follow-up indicated.

  - STOP Non-responder

Repeat Exposure

Individuals with advanced liver disease including disease caused by hepatitis C conversion.

- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - Complete second series of hepatitis B vaccine

  - STOP No further follow-up indicated.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - Complete second series of hepatitis B vaccine

  - STOP No further follow-up indicated.

  - AntiHBs Positive
    - STOP No further follow-up indicated.
  - AntiHBs Negative
    - Complete second series of hepatitis B vaccine

  - STOP No further follow-up indicated.
Post-immunization Serology and Follow-up

**Renal Disease**

- Individuals with renal disease (hemodialysis, peritoneal dialysis and pre-dialysis)
- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.
  - AntiHBs Positive
    - Retest annually. Offer booster as indicated.
  - AntiHBs Negative
    - Offer second series
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - Retest annually. Offer booster as indicated.
      - AntiHBs Negative
        - STOP Non-responder

**Immune Compromised**

- Immune compromised individuals (includes those with congenital immunodeficiencies, HSCT, SOT, HIV infected)
- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.
  - AntiHBs Positive
    - Offer second series
    - Periodic monitoring of antiHBs should be considered. Offer booster dose as indicated.
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - STOP Non-responder
      - AntiHBs Negative
        - Periodic monitoring of antiHBs should be considered. Offer booster dose as indicated.

**Occupational**

- Occupational: All health care workers/students in health-related disciplines who qualify for hepatitis B immunization.
- Test for antiHBs 1 to 6 months after primary series of hepatitis B vaccine.
  - AntiHBs Positive
    - STOP
  - AntiHBs Negative
    - Offer second series
    - Periodic monitoring of antiHBs should be considered. Offer booster dose as indicated.
    - Retest antiHBs 1 month later
      - AntiHBs Positive
        - Complete second series of hepatitis B vaccine
        - STOP
      - AntiHBs Negative
        - STOP Non-responder
    - STOP No further follow-up indicated.