INTERFERONS, ALPHA

 Peginterferon alpha-2a
 Peginterferon alpha-2b (pegylated)
 Peginterferon alpha-2b (recombinant)
 Peginterferon alpha-2b (human)
 Peginterferon alpha-n3

 Peginterferon alpha-2a: Treatment of: Chronic hepatitis C (alone or with ribavirin), Malignant melanoma, Multifocal renal carcinoma, dermatomyositis, pseudolobular cirrhosis secondary to alcoholic liver disease.
 Peginterferon alpha-2b: Treatment of: Chronic hepatitis C (with oral ribavirin), Chronic hepatitis B. Peginterferon alpha–2b (Pegintron): Treatment of: Chronic hepatitis C in patients 18 yr who have compensated liver disease and HCV genotype 1 infection (in combination with ribavirin and approved hepatitis C virus [HCV] NS3/4A protease inhibitor), Chronic hepatitis C in patients with compensated liver disease who have HCV genotypes 2 or 3, are < 17 years old, or have HCV genotype 1 and are unable to take a HCV NS3/4A protease inhibitor (in combination with ribavirin), Chronic hepatitis C in previously untreated patients who have compensated liver disease and contraindication to or significant intolerance to ribavirin (as monotherapy). Peginterferon alpha–2b (Sylatron): Adjunctive treatment of melanoma with microscopic or gross nodal involvement within 84 days of definitive surgical resection including complete lymphadenectomy.
 Peginterferon alpha-n3: Treatment of: Condylomata acuminata (intralesional).

 Action
 Interferons are protein capable of modifying the immune response and have antiproliferative action against tumor cells. Interferon alpha-2b is produced by recombinant DNA techniques, peginterferon is a "pegylated" formulation of interferon alpha-2b formulated to have a longer duration of action; interferon alpha-n3 is from pooled human leukocytes. Interferons also have antiviral activity. Unknown mechanism for melanoma. Therapeutic Effects: Antineoplastic, antiviral, and antiproliferative activity. Decreased progression of hepatic damage (for patients with hepatitis). Improved relapse-free survival (for melanoma).

 Pharmacokinetics
 Absorption: Not absorbed orally. Well absorbed (~80%) following IM and subcutaneous administration. Minimal systemic absorption follows intralesional administration.
 Distribution: Unknown.
 Metabolism and Excretion: Filtered by the kidneys and subsequently degraded in the renal tubule; peginterferon alpha-2b — 30% renally excreted.
 Half-life: Peginterferon alpha-2b — 30–60 hr, interferon alpha-2b — 2–3 hr, peginterferon alpha-n3 — 40 hr.

 TIME/ACTION PROFILE (clinical effects)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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</thead>
<tbody>
<tr>
<td>Interferon alpha-2b IM, subcut</td>
<td>1–3 mo</td>
<td>unknown</td>
<td>unknown (CR)</td>
</tr>
<tr>
<td>Interferon alpha-2b IM, subcut</td>
<td>unknown</td>
<td>3–5 days</td>
<td>3–5 days (BC)</td>
</tr>
<tr>
<td>Interferon alpha-2b IM, subcut</td>
<td>2 wk</td>
<td>unknown</td>
<td>unknown (LFT)</td>
</tr>
<tr>
<td>Peginterferon alpha-2b IM, subcut</td>
<td>unknown</td>
<td>6 mos or more</td>
<td>unknown (IL)</td>
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</tbody>
</table>

CR = clinical response; IL = immune response; LFT = effects on liver function in patients with hepatitis.

Contraindications/Precautions
 Contraindicated: Hypersensitivity to alpha interferons or human serum albumin. Autoimmune hepatitis, hepatic decompensation (Child-Pugh class B and C) hepatic decompensation, thrombocytopenia indicate most frequent discontinuation.

**G** = General Implication. **CD** indicates discontinuation. **O** = Circumstantial evidence. **G** = General Implication.
Route/Dosage

**PEGinterferon Alpha-2a**

**Subcut (Adults):** Chronic hepatitis C—180 mcg once weekly for 48 wk for Genotypes 1, 4 (24 wk for Genotypes 2,3). Patients with chronic hepatitis C co-infected with HIV—180 mcg once weekly for 48 wk. Chronic hepatitis B—180 mcg once weekly for 48 wk.

**Subcut (Children 5–17 yr):** Chronic hepatitis C (Genotype 1 or 4)—180 mcg/m² once weekly (not to exceed 180 mcg) (with PO ribavirin) for 48 wk.

**Subcut (Children 3–12 yr):** Chronic hepatitis C (Genotype 1 or 4)—180 mcg/m² once weekly (not to exceed 180 mcg) (with PO ribavirin) for 24 wk.

**Renal Impairment**

**Subcut (Adults):** CCr 30–50 mL/min—180 mcg once weekly (with PO ribavirin 200 mg alternating with 400 mg every other day) CCr <30 mL/min (including hemodialysis)—115 mcg once weekly (with PO ribavirin 200 mg once daily).

**Interferon Alpha-2b**

**IFN (Adults):** Malignant melanoma (induction)—20 million units/day for 5 days of each week for 4 wk initially, followed by subcut maintenance dosing.

**IM (Adults):** Chronic hepatitis B—2 million units/m² 3 times weekly for up to 6 mo. Malignant melanoma (maintenance)—10 million units/m² 3 times weekly for 6 wk, following initial 9 days. 4000–related Kaposi's sarcoma—50 million units/m² 3 times weekly until disease progression or maintenance response has been achieved after 10 wk. Chronic hepatitis C—3 million units/m² 3 times weekly. If normalization of ALT occurs after 16 wk of therapy, continue treatment for total of 16–24 wk. If normalization of ALT does not occur after 16 wk of therapy, may consider discontinuing treatment. Chronic hepatitis B—5 million units/m² 3 times weekly for 48 wk (may be used following completion of an inactivated vaccine-containing therapeutic).

**INH (Adults):** Hairy cell leukemia—5 million units/m² 3 times weekly for the first 2 weeks of therapy, then 1 million units/m² 3 times weekly for 30–54 weeks.

II (Adults): Condylomata acuminata—1 million units/four times weekly for 3 wk, treat only 5 lesions per course. An additional course of treatment may be initiated at 6–12 wk.

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**INTERFERONS, ALPHA**

**Peginterferon Alpha-2b**

**Monotherapy**

**Subcut (Adults):** 137–160 kg—150 mcg once weekly for 1 yr. 107–136 kg—120 mcg once weekly for 1 yr. 89–106 kg—96 mcg once weekly for 1 yr. 73–88 kg—80 mcg once weekly for 1 yr. 57–72 kg—64 mcg once weekly for 1 yr. 46–56 kg—50 mcg once weekly for 1 yr. 37–45 kg—40 mcg once weekly for 1 yr.

**Combination Therapy (Duration of therapy is 48 wk for viral genotype 1 or if previously failed therapy; 24 wk for viral genotypes 2 and 3)**

Subcut (Adults): peginterferon alpha 2b—0.55 mcg/kg once weekly based on actual body weight. 46–55 kg—35 mcg once weekly. 35–45 kg—30 mcg once weekly. 25–34 kg—25 mcg once weekly. 15–24 kg—20 mcg once weekly.

**Subcut (Children 3–17 yr):** 60 mcg/m2 once weekly.

**Melanoma**

Subcut (Adults): 6 mcg/kg/week for 8 doses, then 3 mcg/kg/week for up to 5 yr.

**Interferon Alpha-n3**

**IL (Adults):** 250,000 units/lesion twice weekly for up to 8 wk; for large lesions, divide dose and inject at several sites.

**NURSING IMPLICATIONS**

**Assessment**

- **Assess for signs of neuropsychiatric disorders (irritability, anxiety, depression, suicidal ideation, aggressive behavior).** For patients taking interferon alfa 2a or peginterferon alpha 2b, if depression is mild, visit weekly by phone or in person. If depression is moderate, decrease interferon alfa 2a dose to 355 mcg once weekly or peginterferon alfa 2b to 40 mcg/m2 once weekly. If depression is severe, see in office at least every other week. Consider psychiatric counseling. If symptoms improve and are stable for 6 wk, may return to regular visit schedule and may increase dose. If depression is severe, obtain psychiatric consultation and discontinue interferon alfa 2a or peginterferon alpha 2b permanently.
- **Monitor for signs of infection (vital signs, WBC) during therapy. Discontinue therapy if signs of infection and antibiotic therapy instituted.**
- **Assess for cardiovascular disorders (pulmonary, BP, chest pain).** An ECG should be performed before and periodically during the course of therapy in patients with a history of cardiovascular disease.
- **Assess for signs of colitis (abdominal pain, bloody diarrhea, fever) and pancreatitis (nausea, vomiting, abdominal pain) during therapy. Discontinue therapy if these occur, may be fatal. Colitis usually resolves within 1–3 wk of discontinuation.**
- **Assess for development of flu-like syndrome (fever, chills, myalgia, headache). Symptoms often appear within 1–6 hr after therapy.** Symptoms tend to decrease, even with continued therapy. Antipyretic may be used for control of these symptoms.
- **Monitor for bone marrow depression.** Assess for bleeding (bleeding gums, bruising, petechiae; guaiac stools, urine, emesis) and chronic myelocytic leukemia (signs of platelet count is low. Apply pressure to temperature sites for 15 min. Assess for signs of infection during neutropenia, anemia occurs. Monitor for increased fatigue, drowsiness, and enthusiasm hypophosphatemia.**
- **May cause nausea and vomiting.** Antiemetics may be used prophylactically. Monitor intake and output, daily weight, and appetite. Adjust diet as tolerated for anorexia. Decrease fluid intake of lean protein. 2 L/day.
- **Assess pulmonary status (lung sounds, respirations) periodically during therapy.**
- **Perform a baseline eye exam in all patients prior to initiation of therapy.**
- **Assess for signs of thyroid dysfunction, as hypothyroidism or hyperthyroidism may occur.**
- **Kaposi’s Sarcoma:** Monitor number, size, and character of lesions prior to and throughout therapy.

**Lab Test Considerations:**

**Interferon for CRC and differential priority and periodically during therapy.** May cause leukopenia, neutropenia, ...
Interferon Alpha-2b

Solution should be prepared in a Biologic cabinet. Wear gloves, gown, and mask.

Implementation

Risk for infection (Side Effects)

Risk for injury (Side Effects)

Potential Nursing Diagnoses

Hairy Cell Leukemia: Monitor number of peripheral blood hairy cells and bone marrow hairy cells prior to and during therapy.

Potential Nursing Diagnoses

Monitor liver function tests (AST, ALT, LDH, bilirubin, alkaline phosphatase), triglycerides, and renal function tests (BUN, creatinine, uric acid, urinalysis) prior to initiation of Peginterferon therapy. Peginterferon alpha-2a should be discontinued if liver function diminishes.

Monitor TSH at baseline and if patients develop symptoms consistent with hypothyroidism or hyperthyroidism.

Hairy Cell Leukemia: Monitor number of peripheral blood hairy cells and bone marrow hairy cells prior to and during therapy.

Interferon Alpha-2b

IM: Interferon Alpha-2b

Subcut: The solution for injection vials do not require reconstitution prior to use and may be used for IM, subcut, or intradermal administration.

The solution for injection vials are for subcut use only. Only the needles provided in the package should be used with the pens. A new needle should be used with each dose. Follow instructions in Medication Guide for use of multidose pens.

IL: For Malignant Melanoma. Diluent: Add 1 mL of diluent provided by manufacturer (sterile water for injection). Administer immediately. Further dilute appropriate dose in 100 mL of 0.9% NaCl. Solution should be used immediately; stable for 24 hr if refrigerated. The solution for injection vials are not recommended for IV administration.

Concentration: Final concentration of infusion should not be less than 10 million units/100 mL. Rate: Infuse over 20 min.

Peginterferon Alpha–2a

IV Administration

Intermittent Infusion: (For Malignant Melanoma). Diluent: Add 1 mL of diluent provided by manufacturer (sterile water for injection) to vial. Further dilute appropriate dose in 100 mL of 0.9% NaCl. Solution should be used immediately; stable for 24 hr if refrigerated. The solution for injection vials are not recommended for IV administration.

Concentration: Final concentration of infusion should not be less than 10 million units/100 mL. Rate: Infuse over 20 min.

Peginterferon Alpha–2b

IV Administration

Intermittent Infusion: (For Malignant Melanoma). Diluent: Add 1 mL of diluent provided by manufacturer (sterile water for injection). Administer immediately. Further dilute appropriate dose in 100 mL of 0.9% NaCl. Solution should be used immediately; stable for 24 hr if refrigerated. The solution for injection vials are not recommended for IV administration.

Concentration: Final concentration of infusion should not be less than 10 million units/100 mL. Rate: Infuse over 20 min.

Peginterferon Alpha–2a

Peginterferon Alpha–2b

Reconstitute 10-, 18-, and 50-million-unit vials with 1 mL of diluent provided by the manufacturer (sterile water for injection). Agitate gently. Solution may be cloudy or light yellow. Solution should be used immediately; stable for up to 4 hr if refrigerated.

The solution for injection vials do not require reconstitution prior to use and may be used for IM, subcut, or intradermal administration.

The solution for injection vials following the intradermal injection approach. As many as 5 lesions can be treated at one time.

Peginterferon Alpha–2a

Vials and pre-diluted syringes should be stored in refrigerator. Do not administer solution du to cloudy or contains a precipitate.

Follow instructions in Medication Guide for use of pre-diluted syringes.

Peginterferon Alpha–2b

Vials and pre-diluted syringes should be stored in refrigerator. Do not administer solution due to cloudy or contains a precipitate.

Follow instructions in Medication Guide for use of pre-diluted syringes.

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INTERFERONS, ALPHA

Interferon Alpha-n3

- Vials should be refrigerated.

Patient/Family Teaching

- Advise patient to take medication as directed. If a dose is missed, omit dose and return to the regular schedule. Notify health care professional if more than 1 dose is missed.

- Home care issues: Instruct patient and family on preparation and correct technique for administration of injection and care and disposal of equipment. Advise patient to read Medication Guide prior to administration and with each prescription refill to check for changes. Explain to patient that brand names should not be switched without consulting health care professional; may result in a change of dose.

- Review side effects with patient. Interferon may be temporarily discontinued or dose decreased by 50% if serious side effects occur.

- Instruct patient to notify health care professional promptly if fever; chills; cough; hoarseness; sore throat; signs of infection; lower back or side pain; painful or difficult urination; bleeding gums; petechiae; blood in stools, urine, or emesis; increased fatigue; dyspnea; or orthostatic hypotension occurs. Caution patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor and to avoid falls. Caution patient not to drink alcoholic beverages or take medication containing aspirin or NSAIDs; may precipitate gastric bleeding.

- Advise patient and family to notify health care professional if thoughts about suicide or dying, attempts to commit suicide, new or worse depression; new or worse anxiety; feeling very agitated or restless; panic attacks; trouble sleeping; new or worse irritability; acting aggressive; being angry or violent; acting on dangerous impulses; an extreme increase in activity and talking, other unusual changes in behavior or mood occur.

- Discuss with patient the possibility of hair loss. Explain coping strategies.

- Advise patient that fertility may be impaired and that contraception is needed during treatment to prevent potential harm to the fetus.

- Instruct patient not to receive any vaccinations without consulting health care professional.

- Emphasize need for periodic lab tests to monitor for side effects.

- Instruct patient that peginterferon alfa-2a may not reduce the risk of transmission of HCV to others or prevent cirrhosis, liver failure, or liver cancer.

Evaluation/Desired Outcomes

- Normalized blood parameters (hemoglobin, neutrophils, platelets, monocytes, and bone marrow and peripheral hairy cells) in hairy cell leukemia. Response may not be seen for 6 mo with interferon alpha-2b.

- Decrease in the size and number of lesions in Kaposi’s sarcoma. Therapy may be required for 6 mo before full response is seen. Therapy is continued until disease progresses or a maximum response has been achieved after 6 mo of therapy.

- Increase in time to relapse and overall survival in patients with malignant melanoma.

- Disappearance of or decrease in size and number of genital warts. Condylomata acuminata usually respond in 4–8 wk. A second course of therapy may be required if genital warts persist and laboratory values remain in acceptable limits.

- Decrease in symptoms and improvement in liver function tests and progression of hepatic damage associated with hepatitis B or hepatitis C infection. Discontinue Peginterferon alfa-2a therapy if patient fails to demonstrate at least a log 1 reduction from baseline in HCV RNA titers by 12 weeks of therapy or undetectable HCV RNA after 24 weeks of therapy.

Why was this drug prescribed for your patient?