tenofovir (te-noe-fo-veer)

Viral

**Classification**
Therapeutic: antiretrovirals
Pharmacologic: nucleoside reverse transcriptase inhibitors

**Pregnancy Category B**

**Indications**
HIV infection (with other antiretrovirals). Chronic hepatitis B.

**Action**
Active drug (tenofovir) is phosphorylated intracellularly; tenofovir diphosphate inhibits HIV reverse transcriptase resulting in disruption of DNA synthesis.

**Therapeutic Effects:** Slowed progression of HIV infection and decreased occurrence of sequelae. Increased CD4 cell count and decreased viral load. Decreased progression/sequelae of chronic hepatitis B infection.

**Pharmacokinetics**
**Absorption:** Tenofovir disoproxil fumarate is a prodrug, which is split into tenofovir, the active component.

**Distribution:** Absorption is enhanced by food.

**Metabolism and Excretion:** 70–80% excreted unchanged in urine by glomerular filtration and active tubular secretion.

**Half-life:** Unknown.

**TIME/ACTION PROFILE (blood levels)**

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<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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*When taken with food

**Contraindications/Precautions**

- **Contraindicated in:** Hypersensitivity; Concurrent use of antiretroviral combination products containing tenofovir; Concurrent or recent use of NNRTIs (risk of acute renal failure)

- **Conduit drug name:**
- **Genetic Implication:**
- **OPTIS indicate hi-risk-impacting alleles indicate most frequent:**

**Use Cautiously:**

- **Concomitance with HIV and chronic hepatitis B:** Obesity, women, prolonged nucleoside exposure (may be risk factors for lactic acidosis/ hepatomegaly).
- **Renal impairment:** (dosing interval if CrCl < 50 mL/min). History of pathologic bone fractures or at risk for osteopenia. OR has been used safely. *Pediatrics:* Children <2 y (safety not established).

**Adverse Reactions/Side Effects**

- **CNS:** depression, headache, weakness.
- **GI:** abdominal pain, diarrhea, nausea, vomiting, flatulence. 
- **GU:** proximal renal tubulopathy, renal impairment.
- **F and E:** LACTIC ACIDOSIS, hypophosphatemia. 
- **Derm:** rash.
- **MS:** bone mineral density, osteomalacia.
- **Misc:** immune reconstitution syndrome.

**Interactions**

- **Drug-Drug:**
  - May **q** didanosine levels; **p** didanosine dose. Blood levels may be **q** by cidofovir, acyclovir, ganciclovir, or valganciclovir. Risk of renal toxicity **by** other nephrotoxic agents. Combination therapy with atazanavir may lead to virologic response and possible resistance to atazanavir (small amounts of ritonavir may be added to boost blood levels); may also **q** tenofovir levels. 
  - Lopinavir/ritonavir may **q** levels. Concurrent use with atazanavir may **q** risk of acute renal failure.

**Route/Dosage**

**HIV**

- **PO (Adults and Children ≥12 y and ≥35 kg):** 300 mg once daily.

**Renal Impairment**

- **PO (Adults):** CCr 30–49 mL/min — 300 mg every 48 hr; CCr 20–29 mL/min — 300 mg every 72–96 hr.

- **PO (Children ≥12 y and ≥35 kg):** Tablets: 28–34.9 kg — 300 mg once daily; 22–27.9 kg — 250 mg once daily; 17–21.9 kg — 200 mg once daily; 15–16.9 kg — 150 mg once daily.

- **PO (Children ≥2–11 y):** Oral Powder: 25–34.9 kg — 3 scoops (105 mg) once daily; 24–24.9 kg — 2 scoops (60 mg) once daily; 22–23.9 kg — 1 scoop (30 mg) once daily; 20–21.9 kg — 1 scoop (15 mg) once daily; 18–19.9 kg — 0.5 scoop (7.5 mg) once daily; 17–17.9 kg — 0.5 scoop (220 mg) once daily; 16–16.9 kg — 0.5 scoop (200 mg) once daily; 15–14.9 kg — 0.5 scoop (160 mg) once daily; 13–13.9 kg — 0.5 scoop (120 mg) once daily; 12–12.9 kg — 0.5 scoop (90 mg) once daily; 11–11.9 kg — 0.5 scoop (60 mg) once daily; 10–10.9 kg — 0.5 scoop (45 mg) once daily; 9–9.9 kg — 0.5 scoop (30 mg) once daily; 8–8.9 kg — 0.5 scoop (22 mg) once daily; 7–7.9 kg — 0.5 scoop (15 mg) once daily; 6–6.9 kg — 0.5 scoop (10 mg) once daily; 5–5.9 kg — 0.5 scoop (6 mg) once daily; 4–4.9 kg — 0.5 scoop (3 mg) once daily; 3–3.9 kg — 0.5 scoop (1.5 mg) once daily; 2–2.9 kg — 0.5 scoop (0.75 mg) once daily; 1–1.9 kg — 0.5 scoop (0.3 mg) once daily; 0.5–0.9 kg — 0.5 scoop (0.15 mg) once daily; 0–0.4 kg — 0.5 scoop (0.075 mg) once daily.
Chronic Hepatitis B

PO (Adults and Children ≥ 12 yr and ≥ 35 kg): 300 mg once daily.

Renal Impairment

PO (Adults): CCr 30–49 mL/min — 300 mg every 48 hr; CCr 10–29 mL/min — 300 mg every 72–96 hr; Hemodialysis patients — 300 mg every 7 days following dialysis.

NURSING IMPLICATIONS

Assessment

● Monitor for change in severity of HIV symptoms and for symptoms of opportunistic infections before and during therapy.

● Monitor bone mineral density in patients who have a history of pathologic bone fracture or are at risk for osteoporosis or bone loss.

● Lab Test Considerations: Monitor viral load and CD4 count before and routinely during therapy to determine response.

● Monitor liver function tests and hepatitis B virus levels throughout and following therapy. If therapy is discontinued, may cause severe exacerbation of hepatitis B.

● Monitor for evidence of lactic acidosis causing hepatic toxicity causing hepatic steatosis; may be fatal, especially in women.

● Calculate creatinine clearance prior to and periodically during therapy and when clinically indicated.

● Monitor serum phosphate periodically during therapy in patients at risk for renal impairment. May cause hypophosphatemia and, rarely, osteomalacia.

Potential Nursing Diagnoses

Risk for infection (Indications) (Side Effects)

Risk for injury (Side Effects)

Implementation

● When tenofovir is administered concomitantly with didanosine, administer tenofovir 2 hr before or 1 hr after didanosine.

● PO: Administer once daily without food.

● Patients unable to swallow tablets can use oral powder. Using only dosing scoop, mix in soft food (applesauce, baby food, yogurt). Do not mix in liquid; powder floats to top even after stirring. Ingest entire mixture immediately to avoid bitter taste.

Patient/Family Teaching

● Instruct patient on the importance of taking tenofovir as directed, even if feeling better. Do not take more than prescribed amount and do not stop taking without consulting health care professional. Discontinuing therapy may lead to severe exacerbations. Take missed doses as soon as remembered unless almost time for next dose; do not double doses. Caution patient not to share or trade this medication with others.

● Inform patient that tenofovir may cause hyperglycemia. Advise patient to notify health care professional if increased thirst or hunger; unexplained weight loss; increased urination; fatigue, or skin lesions occur.

● Inform patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and consult health care professional before taking any new medications.

● Advise patient to avoid excessive or prolonged exposure to sunlight or tanning beds.

● Advise patient to avoid crowds and persons with known infections.

● Advise patient that tenofovir does not cure AIDS and does not reduce the risk of transmission of HIV to others through sexual contact or blood contamination. Caution patient to use a condom and avoid sharing needles or donating blood to prevent spreading HIV to others.

● Advise patient to notify health care professional immediately if symptoms of lactic acidosis (nausea, vomiting, unusual or unexpected stomach discomfort, and weakness) or signs of Immune Reconstitution Syndrome (signs and symptoms of an infection) occur.

● Instruct patient that changes in body fat distribution (increased fat in upper back and neck, breasts, and hips; and loss of fat from legs, arms, and face) may occur, but may not be related to drug therapy.
Advise female patients to notify health care professional if pregnancy is planned or suspected. Breast feeding should be avoided. Pregnancy registry is available for patients taking antiretroviral medications.

Evaluation/Desired Outcomes
- Decreased incidence of opportunistic infection and slowed progression of HIV infection.
- Slowed progression of chronic hepatitis B infection.

Why was this drug prescribed for your patient?