

Oleandrin



Common Names

- Rose laurel
- Adelfa
- Rosenlorbeer
- Karavira

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For Patients & Caregivers

How It Works

Oleandrin can inhibit the growth of some cancer cells, but it has yet to be shown to be an effective cancer treatment.

Oleandrin is an extract from the plant, *Nerium oleander*, which contains substances that are similar to the active chemical found in the heart medication, digoxin. In the laboratory, Anvirzel™, a brand of oleandrin, is able to suppress growth and cause cell death in certain cancer cell lines. It also has been seen to increase the sensitivity of prostate cancer cell lines to radiation therapy. However, it is unclear whether these effects occur in the human body. Oleandrin has also been used to treat heart disease, AIDS, and hepatitis.

Purported Uses

- **To treat cancer**

Laboratory studies show some anticancer activity in cancer cell lines, but clinical trials have not evaluated the anticancer activities of oleandrin in humans.

There is no scientific evidence to support the following claims:

- **To treat congestive heart failure**
- **To treat hepatitis C**
- **To treat AIDS**

Patient Warnings

- The raw plant from which Anvirzel™ is extracted, *Nerium oleander*, is highly toxic. Consumption of only one *Nerium oleander* leaf may be fatal.
- Onset of toxicity occurs several hours after consumption and includes vomiting, abdominal pain, bluish skin discoloration, low blood pressure, low body temperature, dizziness, respiratory paralysis, and death.

Do Not Take If

- You are taking **digoxin**: Anvirzel™ contains cardiac glycosides, the same active chemical in digoxin, so the two medications may have an additive effects, causing toxicity.
- You are taking **P-glycoprotein (P-gp) substrates drugs**: Oleander leaf extract may increase the blood levels of these drugs.
- You have **high blood levels of calcium**
- You have **low blood levels of potassium**
- You have **abnormally slow heart rate**
- You have **abnormally fast ventricular heart rate**
- You have **heart failure**
Anvirzel™ contains the cardiac glycosides, the same active chemical in digoxin, and is therefore contraindicated in people with these conditions.

Side Effects

- Nausea and vomiting
- Diarrhea
- Itching
- Pain at injection site
- Tumor pain
- Breast pain
- Abnormally high white blood cell counts
- Abnormally fast heart rate
- Cardiac arrhythmias

Case Reports

- Consumption of oleander leaves resulted in the death of an adult diabetic male. Oleandrin levels in the blood were roughly 10 ng/mL.
- Daily intramuscular injections of *Nerium oleander* extract for 2 months are suspected as probable cause of death of a 43-year-old patient with metastatic synovial sarcoma of the knee. Her symptoms included nausea, vomiting, severe stomach pain, and bloating followed by a gradual reduction of liver enzymes and cardiopulmonary arrest.

Special Point

Anvirzel™ is considered an “investigational new drug” in the United States and is not available for use except under approved clinical trials. Until more test results showing this product is effective and safe are published, it should not be used outside of clinical trials.

For Healthcare Professionals

Brand Name

Anvirzel™

Scientific Name

Nerium oleander

Clinical Summary

Nerium oleander is an ornamental shrub native to northern Africa, the eastern Mediterranean basin, and Southeast Asia. It is used in traditional medicine to treat hemorrhoids, ulcers, leprosy, and as an abortifacient. The leaf is poisonous because of oleandrin, a cardiac glycoside with structure and actions similar to those of digoxin, and both exert their effects by inhibiting membrane enzyme Na⁺, K⁺ -ATPase ⁽¹⁾.

Most studies have focused on the anticancer activities of oleandrin because of its apoptotic effects in various cancer cell lines ^{(2) (3) (4) (5) (6) (7) (8)}. It also increases sensitivity of PC-3 human prostate cells to radiotherapy ⁽⁹⁾ and reduces gentamycin toxicity ⁽¹⁰⁾. In other studies oleandrin demonstrated neuroprotective activity ⁽¹¹⁾ and reduced infectivity of HIV virus ⁽²⁴⁾.

A hot water extract of the plant, known as Anvirzel™, has been developed as a treatment for cancer, AIDS, and congestive heart failure. It consists of a mixture of oleandrin and the glycone oleandrigenin. Results from an earlier study showed that it is safe in humans when injected intramuscularly although adverse effects such as injection site pain, fatigue, and other GI symptoms were reported ⁽¹²⁾.

Anvirzel™ is not an approved cancer treatment in the United States. Until more data regarding its efficacy and toxicity are available, this product should not be used outside of clinical trials.

Purported Uses

- Cancer treatment
- Congestive heart failure
- Hepatitis
- AIDS

Mechanism of Action

Oleandrin may slow tumor growth by inhibiting the membrane enzyme Na⁺, K⁺ -ATPase ⁽¹⁾, especially in cells that have higher ratio of alpha 3 to alpha 1 isoform expression ⁽¹³⁾. It improves cellular export of fibroblast growth factor-2 (FGF-2) ⁽⁴⁾. Oleandrin also induces apoptosis through Fas gene expression in tumor cells ⁽¹⁴⁾ and by suppressing NF-kB ⁽²⁾ ⁽¹⁵⁾. It was shown to selectively sensitize lung cancer cells to apoptosis-inducing ligand Apo2L/TRAIL. This was accompanied by up-regulation of death receptors 4 (DR4) and 5 (DR5) at both the RNA and protein levels ⁽¹⁶⁾.

Other proposed mechanisms include the formation of superoxide radicals that cause tumor cell injury via mitochondrial disruption ⁽⁷⁾, inhibition of interleukin-8 that mediates tumorigenesis ⁽¹⁷⁾, activation of caspase-3 ⁽⁹⁾, induction of tumor cell autophagy ⁽⁶⁾, and inhibition of P-gp ⁽⁸⁾.

In a recent study, PBI-05204, an extract of *Nerium Oleander*, inhibited the proliferation of the Panc-1 tumor cells in part, via down-regulation of PI3k/Akt and mTOR pathways ⁽²⁷⁾.

Warnings

Unprocessed leaves from the *Nerium oleander* plant are highly toxic.

Contraindications

Patients with hypercalcemia, hypokalemia, bradycardia, ventricular tachycardia, or heart failure should not use this product ⁽¹²⁾.

Adverse Reactions

- **Common (Raw botanical)**

Consumption of even one *Nerium oleander* leaf can be fatal ⁽²⁵⁾. Onset of toxicity occurs several hours following consumption. Symptoms include vomiting, abdominal pain, cyanosis, hypotension, hypothermia, vertigo, respiratory paralysis and death. These symptoms can occur at a serum oleandrin levels between 1.0 and 2.0 ng/mL ⁽¹⁹⁾.

- With Anvirzel™, pain at injection site, fatigue, transient erythema, nausea, vomiting and diarrhea.

Case Reports

- Consumption of oleander leaves resulted in the death of an adult diabetic male. The oleandrin levels in the blood were roughly 10 ng/mL ⁽²⁰⁾.
- Daily intramuscular injections of *Nerium oleander* extract for 2 months are suspected as probable cause of death of a 43-year-old patient with metastatic synovial sarcoma of the knee. Symptoms included nausea, vomiting, severe stomach pain and bloating followed by a gradual reduction in liver enzymes and cardiopulmonary arrest ⁽²¹⁾.

Herb-Drug Interactions

- **Digoxin:** Theoretically, cardiac glycosides in *Nerium oleander* may have an additive effect with digoxin, causing toxicity.

- **P-glycoprotein (P-gp) substrates:** Oleander leaf extract inhibits P-gp and may increase the blood levels of substrate drugs. ⁽⁸⁾

Herb Lab Interactions

Digoxin and digitoxin immunoassays: Oleandrin is structurally similar to digoxin and digitoxin, and is known to cross-react in various immunoassays ⁽²²⁾ ⁽²³⁾.

Literature Summary and Critique

Studies are underway to determine the anticancer effects of Oleandrin ⁽²⁸⁾.

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Last Updated

Wednesday, March 11, 2015



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