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INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Název: **Carbon nanotubes for etoposide target transport**

Etoposide and its clinical applications

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Datum: 23. 1. 2014

Reg.č.projektu: CZ.1.07/2.4.00/31.0023

Název projektu: Partnerská síť centra excelentního bionanotechnologického výzkumu

NanoBioMetalNet

Etoposide

Commercial names: Toposar®, VePesid®, Etopophos®

Other names: VP-16, Etoposide phosphate

Characteristic

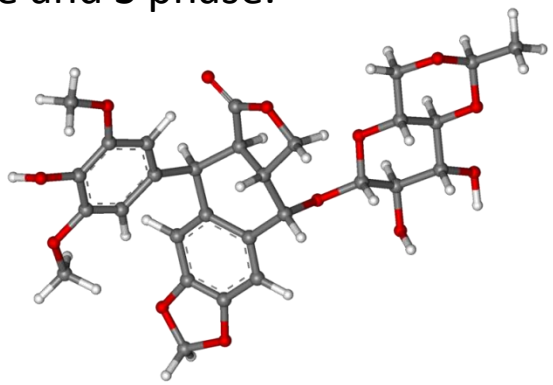
Etoposide was first synthesised in 1966, and U.S. Food and Drug Administration approval was granted in 1983. Its chemical make-up derives from podophyllotoxin, a toxin found in the American May apple (*Podophyllum peltatum)*.

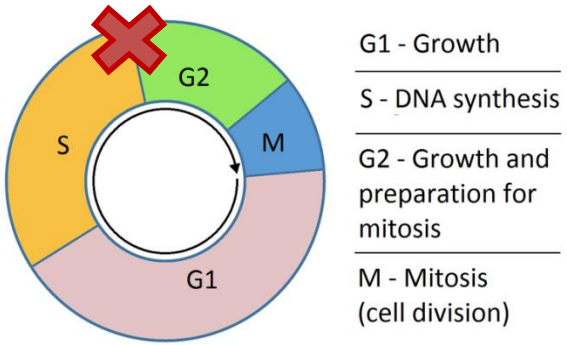
Noholist štítnatý
May apple

Etoposide

Drug type: Etoposide is an anti-cancer ("antineoplastic" or "cytotoxic") chemotherapy drug.

- Etoposide is a semisynthetic derivative of podophyllotoxin.
- Cytostatic effect is given by preventing cell mitosis or direct destruction of cells in premitotic phase.
- The exact mechanism of action of etoposide is not known, but the cytotoxic effect of substances is explained by destruction of DNA, leading to inhibition or alteration of DNA synthesis.
- The effect of etoposide is dependent on the cell cycle phases.
- The cytostatic effect in terminating of the G2 phase, and inducing cell death in G2 phase and S phase.





Etoposide

Mutagenicity

- evidence of mutagenic and genotoxic effects to mammalian cells
- induces aberrations of chromosome structure in the embryonic cells of rodents and human cells of the hematopoietic system
- mutations in Chinese hamster ovary cells and destruction of fibers with the formation of bonds between DNA and proteins in murine leukemic cells, leading to the destruction of DNA

Carcinogenicity

- It is considered to be potentially carcinogenic for people (experimental data are not available)

Teratogenicity

- embryotoxic and teratogenic in rats and mice at doses up to 1-3% of the recommended clinical doses adjusted for body surface

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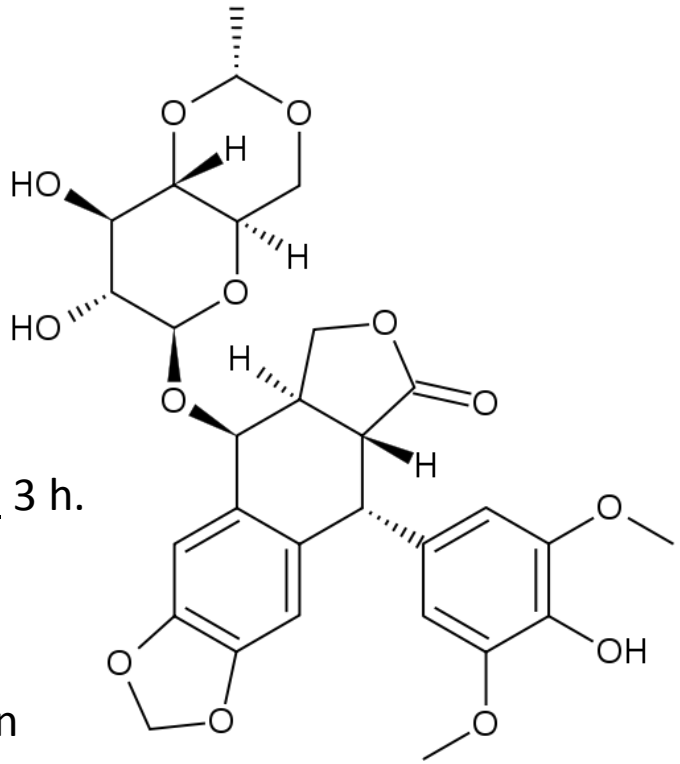
Etoposide



Pharmacokinetic data:

Bioavailability	highly variable, 25 to 75%
Protein binding	97%
Metabolism	Hepatic (CYP3A4 involved)
Distrib. half –life	1.5 h
Elimin. half-life	Oral: 6 h., i.v: 6-12 h., i.v. in children: 3 h.
Excretion	Renal and fecal

Method of drug administration:

- intravenous route is the most common applications in combination with other chemotherapeutic drugs

Etoposide penetrates minimally into the pleural cavity. The substance was detected in saliva, liver, spleen, kidney, myometrium, healthy brain tissue, and brain tumors. Some observation indicates minimal penetration of etoposide into the bile. The etoposide penetration into the breast milk is not clear but in the case of experimental animals, the substance penetrates through the placenta.

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Etoposide

This drug is used to treat:

- Testicular, bladder, prostate, lung, stomach, and uterine, cancers. Hodgkin's and non-Hodgkin's lymphoma, mycosis fungoides, Kaposi's sarcoma, Wilm's tumor, rhabdomyosarcoma, Ewing's sarcoma, neuroblastoma, brain tumors.

Side effects:

- Side effects are almost always reversible and will go away after treatment is complete.
- There are many options to help minimize or prevent side effects.
- The side effects of etoposide and their severity depend on how much of the drug is given. In other words, high doses may produce more severe side effects.

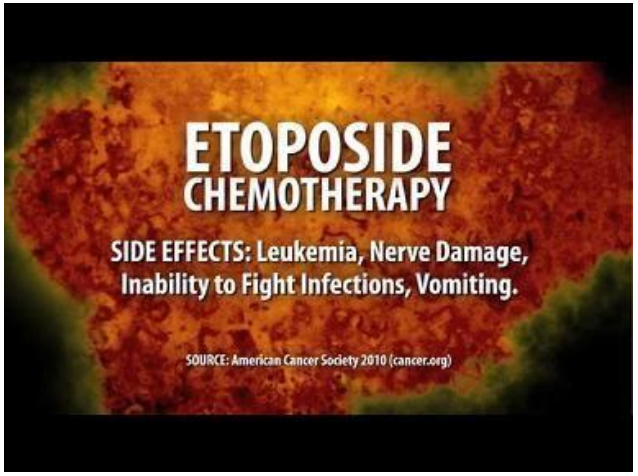
Etoposide

The following side effects are common (occurring in greater than 30%) for patients taking etoposide:

- Low white blood cell count. (This can increase your risk for infection)
- Low platelet count (This can increase your risk of bleeding)
- Hair loss
- Menopause (chemotherapy induced)
- Loss of fertility
- Nausea and vomiting (especially at high-doses)
- Low blood pressure (if the drug is infused too fast)

Delayed effects:

- There is a slight risk of developing a blood cancer such as leukemia years after taking etoposide.



Etoposide

- Chemotherapy is most effective at killing cells that are rapidly dividing. Unfortunately, chemotherapy does not know the difference between the cancerous cells and the normal cells. The "normal" cells will grow back and be healthy but in the meantime, side effects occur. The "normal" cells most commonly affected by chemotherapy are the blood cells, the cells in the mouth, stomach and bowel, and the hair follicles; resulting in low blood counts, mouth sores, nausea, diarrhea, and/or hair loss. Different drugs may affect different parts of the body.

- The observation of the influence, efficiency and the clinical use of etoposide as drug will be necessary in the future.

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THANK YOU FOR YOUR ATTENTION!

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