

# Medicinal Plant Brainteaser Challenge

## Teacher Answer Sheet

- (Vincristine): A powerful cancer remedy  
Researchers discovered that vincristine reduces large cancerous tumors, which can only grow if cancer cells divide. It provides more than 90% remission in childhood leukemia cases.
- (Taxol): A powerful cancer remedy  
Paclitaxel, a semi-synthetic version, is now used for patients suffering ovarian, lung, and breast cancer, as well as Kaposi's sarcoma.
- (Atropine): Used to open patients' pupils during eye exams
- (Diosgenin): Used in birth control pills  
Mexican yams grow large in a short amount of time, providing large amounts of the compound compared to other species. This gave birth to the contraceptive pill industry. (Today, contraceptive pills in the U.S. are totally synthetic, but use compounds similar to the compound found in yams.)
- (Menthol): Used as a local anesthetic and to treat sore throats  
Menthol is used to relieve localized pain in such products as Solarcaine® and Ben-Gay®. It is found in many lip-protection products. Menthol is also a popular ingredient in cough drops used to treat sore throats.
- (Digoxin and Digitoxin): Used to treat heart problems  
The compounds found in the leaves of this plant have saved the lives of millions of heart patients. They help patients suffering from congestive heart failure and irregular heart beats, especially atrial fibrillation in those with heart valve disease.
- (Artemisinin): Used to treat malaria, which is caused by protozoan parasites infesting human blood  
Artemisinin kills the parasite Plasmodium that causes malaria. The Plasmodium parasite lives inside human red blood cells and is transmitted by mosquitoes. Artemisinin is one of two active ingredients in Coartem®, a highly effective anti-malarial drug. Coartem® is known to work on the most dangerous form of malaria, falciparum malaria.
- (Colchicine): Used to treat a painful type of arthritis (joint disease) known as gout

Colchicine relieves a very painful form of arthritis known as gout. The joint pain is caused by tiny needle-shaped uric acid crystals accumulating on joints, causing them to become red, swollen, and inflamed.

- (Cocaine): Used as a local anesthetic during surgery  
Though best known as an illegal, addictive drug when taken recreationally, it is also used as a local anesthetic during surgery to the mouth, nose, or throat where pain relief and open airways for breathing are essential.
- (Morphine): Considered the most effective pain reliever of all  
Morphine continues to be the standard against which other painkillers are judged, and it is used in extreme medical cases. It relieves pain, allows patients to sleep, and calms anxiety when patient would typically be in extreme pain. Unfortunately, it is also very addictive, so must be applied very carefully. Used recreationally in the form of heroin, it causes a serious problem in the United States by making thousands of people drug addicts. Morphine and cocaine are classic cases of compounds that can be both valued medicines and serious toxins, depending on how they're used.
- (Tubocurarine): Used to relax muscles during surgery  
In surgery, tubocurarine is combined with anesthesia. Because of its role as a muscle relaxer, it allows surgeons to use less anesthesia than they would have to use otherwise. Machines control the patient's breathing in these situations.
- (Podophyllotoxin): Used to treat warts and some cancers  
Podophyllotoxin is used as a treatment for genital warts, which are caused by the human papillomavirus (HPV). This virus is also associated with cancers of the genitals. The mayapple has several other compounds which are used to treat a wide variety of cancers.
- (Galanthamine): Used to treat Alzheimer's disease, a brain disorder that mainly affects older people  
Used to treat Alzheimer's disease, it is most effective in early stages and can improve behavioral symptoms as well as cognition.
- (Physostigmine): Used to treat an eye disease called glaucoma  
Glaucoma is a leading cause of blindness and visual impairment that results in visual field loss. Open-angle glaucoma is often associated with high pressure in the eye which physostigmine reduces.
- (Quinine): Used to treat malaria, which is caused by protozoan parasites infesting human blood

Quinine kills the Plasmodium parasite that causes malaria (see artemisinin above) and is still the most effective treatment of malaria. Malaria is spread by infected mosquitoes, and still sickens hundreds of millions of people annually.

- (Camptothecin): A powerful cancer remedy  
Camptothecin and synthetic derivatives are used to treat many kinds of cancer including breast, colon, some forms of lung cancer, and leukemia, which is cancer of the blood.
- (Theophylline): Used to treat asthma and emphysema, diseases of the respiratory system that affect how people breathe  
Theophylline is used to treat and/or prevent the symptoms of asthma, chronic bronchitis, and emphysema. It relieves coughing, wheezing, shortness of breath, and troubled breathing. Extracted from the tea plant in 1888, it is now synthesized.
- (Reserpine): Used to treat high blood pressure
- (Dicumarol): Used to remove blood clots  
Dicumarol was discovered in spoiled sweet clover. Scientists discovered it when trying to determine why cattle that had eaten this clover in their hay bled to death!
- (Sennoids): Used as a laxative to relieve constipation
- (Thiarubrine): A promising treatment for bacterial and fungal infections  
Thiarubrine shows great promise as a remedy for fungal and bacterial infections, though it is not yet widely used medicinally. It is particularly interesting because it comes from a very common, indeed despised, North American plant, yet has only recently been extracted and tested. We still have a great deal to discover from the plant kingdom!