4. Medicines and Society: Paclitaxel

After lunch, you go to the nurse's office to take a multivitamin pill. As you do so, you wonder if the multivitamin is a natural resource or a synthetic material. Are medicines synthetic materials or are they natural resources?

Many medicines people use today were first discovered in nature or are made from substances found in nature. So, researchers often first look to nature for substances that can cure diseases before attempting to develop new ones. Aspirin, which people take to relieve pain, is one. Recall that this medicine is made from a substance found in certain species of plants such as willow trees. The antibiotic penicillin, which is used to treat some kinds of bacterial infections, is another example. Penicillin is produced by a green mold called penicillium.

Creating Paclitaxel from Pacific Yew Bark In the 1960s and 1970s, scientists conducted a survey of plants in the United States in search for anti-cancer medication. From that survey, scientists found that a substance called paclitaxel could treat some kinds of cancer like breast cancer. The synthetic material can be made from substances found naturally in the bark of the Pacific yew, an evergreen tree found in the western United States. Paclitaxel helps treat cancer by preventing cancer cells from reproducing.

Many medicines come from natural resources. The cancer-fighting drug paclitaxel was first discovered in the bark of the Pacific yew tree.





Creating Paclitaxel from European Yew Needles The discovery of paclitaxel as a treatment for cancer brought forth a problem; many people were concerned that the great need for the successful drug could threaten the Pacific yew population. Creating paclitaxel from Pacific yew bark takes the bark from as many as six mature trees to make enough paclitaxel to treat one person with cancer. The trees can take 100 years to mature and only grow along the Pacific coast. To meet the high demand for the drug, manufacturers would have to strip the bark of many trees. That much harvesting would kill the trees more quickly than they could naturally be replaced. The tree bark would be a nonrenewable resource just as petroleum is.

To protect the Pacific yew and to ensure that paclitaxel would be available for future cancer patients, scientists needed a new solution. They searched for alternative ways to make the drug. One way they discovered used the needle-like leaves of a related tree, the European yew, instead of the bark of the Pacific yew. Tree leaves are a renewable resource, since they could be replaced much more quickly than the bark of a tree. By engineering a process to make the drug from a renewable resource, scientists had found an even better way to treat cancer. This way of making the drug is better for society and has less of an impact on the environment.

An alternative natural resource that drug manufacturers can use to make paclitaxel is the needles of the European yew tree. It is easier to grow enough of this kind of tree than a Pacific yew tree. Additionally, scientists can harvest the needles without killing the trees, as opposed to trying to harvest the bark of the Pacific yew.