CURING Cancer

Franklin Kroh was interested in science at an early age. Growing up in Hiawatha, Kansas, he remembers studying things like bugs, rocks, flowers or trees and afternoons spent lying in the grass gazing up at clouds.

His teachers encouraged him. "I was blessed with excellent science teachers, especially Robert Hankins at Robinson Junior High and Delbert Larson at Hiawatha High School; they helped me to find ways to study details, and learn how everything works together," says Kroh.

Kroh earned degrees in chemistry from Kansas State University and inorganic chemistry from the University of South Carolina.

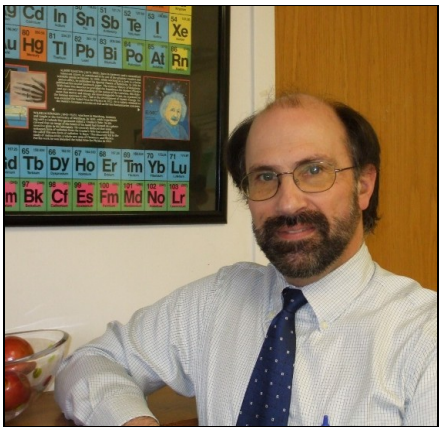

Photo courtesy of Franklin Kroh

Chemistry studies matter and the changes that take place during chemical reactions. A chemical change results in something that is new and also not easy to reverse. A hard-boiled egg is the result of a chemical change. An ice cube is not. A biochemist must understand both the chemical world (like how rust forms) and the living world, whether animal or plant (like photosynthesis.)

Today, as a senior scientist at NanoScale Corporation in Manhattan, Kansas, Dr. Kroh is helping develop a new cancer treatment.

Dr. Kroh says, "In principle, killing cancer cells, like killing weeds, is easy. Poison, radiation, a knife or fire can kill them. A doctor's concern is the patient's health, and the farmer's interest is the health of his wheat. And cancer cells and healthy cells share a lot of biochemistry, just as weeds and wheat have similar biochemistry."

One way to kill cancer cells is to find things that cause great damage to a tumor, but little damage to healthy tissue. Such a treatment can be given to the whole body. For example, taking radiation treatments for cancer or spraying a crop with weed killer. Another way is to find a method that kills everything it comes in contact with, but be delivered with pinpoint accuracy to the tumor ONLY. The use of nanoparticles that respond to magnetism can do this.

NanoScale can make metal nanoparticles with a radius of about 10 nanometers; a human cell has about a thousand times larger diameter. Comparing a ten-nanometer metal nanoparticle to a basketball is like comparing a basketball to the Earth. Applying an alternating magnetic field causes the nanoparticles to produce friction heat; a sort of nanosized torch that can be turned on and off by touching a switch. (The production of heat is one sign of a chemical change.)

Ways have been developed to attach these nanoparticles to molecules that cancer cells attract. Once the cancer cells have taken in enough nanoparticles, the magnetic field is turned on. The nanosized torch burns the cancer cells, while the patient stays comfortable.

Dr. Kroh has advice for students. "Everything you learn now can be a piece of a puzzle years later in life, so pay attention to everything around you."

Math and science are important, but English class is also very important. "There's not much benefit in having a good idea (in science or otherwise) if you can't explain it," says Dr. Kroh. He says learning other languages is also useful because it trains the mind to find different ways to think about things.

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