Teacher Tune-up

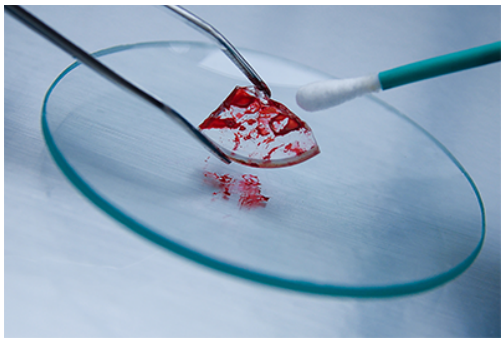
Quick Content Refresher for Busy Professionals

What are some practical consequences of the fact that every cell in a human being shares the same DNA?

The fact that all the cells of a multicellular organism have the same DNA is part of what makes that multicellular community an individual—a person, in the case of a human being. A person's DNA is like his or her cellular ID card. You can take a DNA sample from any part of a person, and you've got something that identifies that person as a unique individual. (For more about the shared DNA of the cells in a multicellular organism, see Tune-up L6t2, "How do cells with the same DNA become different?")

In the following practical areas, the fact that each person has his or her own unique DNA makes a big difference.

Forensics



Forensic science applies scientific information and techniques to solving crimes. DNA evidence can be very useful in identifying murder victims, figuring out who was at a crime scene, and (just as importantly) proving the innocence of some suspects. A little saliva on the edge of a glass, a fallen hair, a bit of skin under the fingernail of an assault victim who fought an attacker, a drop of blood—tiny traces left by a human body can contain cells carrying DNA that indicate their owner. (For better or for worse, however, this technology is not always as reliable in real life as shown on TV shows and in movies.)

Genealogy

Comparing the DNA of individual people can give us information about how closely related they are. This information can clarify family relationships or, more broadly, reveal information about the migrations of early humans beginning in Africa and spreading around the world. Going beyond the human family, comparing the DNA of different species can give us information about how closely related different animals and plants are on an evolutionary scale.

Guarding Against Invasion

White blood cells working for the immune system can check the surface of other cells and determine which cells have "self" DNA and which have "other" DNA. Through this process, a white blood cell can recognize that cells as different as your skin cells, muscle cells, liver cells, etc. all belong, but that a disease-causing bacteria is an invader that needs to be destroyed.

Note that white blood cells are not inspecting DNA directly; rather, they check for telltale chemicals on the membranes of other cells, chemicals whose production and transport to the surface depends on the DNA within.