“Embryonic stem cells are formed after a few divisions of cells from a fertilized egg. Adult stem cells come from organs or tissues,” Phillips says. “Embryonic stem cells can turn into almost any cell in the body. Adult stem cells can turn into different cell types, but are more limited than embryonic. That’s why embryonic stem cells are preferred for cell therapy of many diseases.” But adult stem cells are useful, too.

“The cells used in bone marrow transplants for leukemia come from adult stem cells,” Phillips says. Researchers in various locations are working with adult stem cells to tweak them so they offer the same or similar properties as embryonic stem cells.

“If that’s successful, it will eliminate the religious or ethical concerns people have about using stem cells from embryos because it won’t be necessary,” Phillips says. Because stem cells are closely linked to gene therapy, some of the work Phillips does involves both. He recently received a $1,023,000 grant from the Department of Defense to support his research into a blood clotting therapy that could save the lives of American combat troops. Phillips, who has a nephew serving in Afghanistan, has produced an automatic anti-hemorrhaging system that would allow a wounded soldier’s body to produce a blood-clotting protein.

“So many deaths are from slow hemorrhaging. Often, a soldier will suffer severe internal bleeding before a medic can get to him,” Phillips says. The anti-hemorrhaging system, known as the Automatic Hemostat Vector, could buy some time for wounded soldiers. They would be injected with it before going into battle. If wounded, a specific molecule would “switch on” a gene that produces a blood clotting protein. If not wounded, the “vaccine” would dissipate after a few days.

Phillips hopes to take his anti-hemorrhaging system one step further by adding to it a stem cell gene that would cause the wound to start healing even while the injured soldier is on the battlefield. For now, the first step is “still in the very early stages of research,” Phillips says. But the Hemostat system is scheduled for human testing at the U.S. Army Surgical Institute in San Antonio. In addition to helping soldiers, Phillips’ system could be used in civilian surgery and in cases of hemophilia and hemorrhagic stroke. But Phillips is cautious.

“I don’t think people should overpromise what stem cells can do. But they need to be investigated because there are so many diseases for which there are no drugs or inadequate drugs if they’re available,” he says. About 25 million Americans have diseases considered to be rare, and they’re often related to a genetic defect.

“Gene therapy is a bit like stem cell research—still in its infancy. We don’t yet have strong examples of gene therapy being accepted, but it’s an area that needs more work,” he says. But he believes the time is right. “We’ve had a century of developing drugs. Now in this century, we’re going to be developing cell therapies and really be able to tackle a number of diseases that we’ve never been able to before,” he says. But an obstacle might stand in the way: profitability.

Phillips has been a consultant for Merck, Squibb and Hoechst pharmaceutical companies. In the ’70s and ’80s, he helped develop what would become today’s drugs for high blood pressure. So when he mentions money, he’s being realistic, not fanciful. But he’s also hopeful. “If stem cells and gene therapies prove to be successful and truly hold the potential to end suffering for so many, someone will find a way to make it profitable,” Phillips says. In the meantime, he’s glad to be part of the landscape.