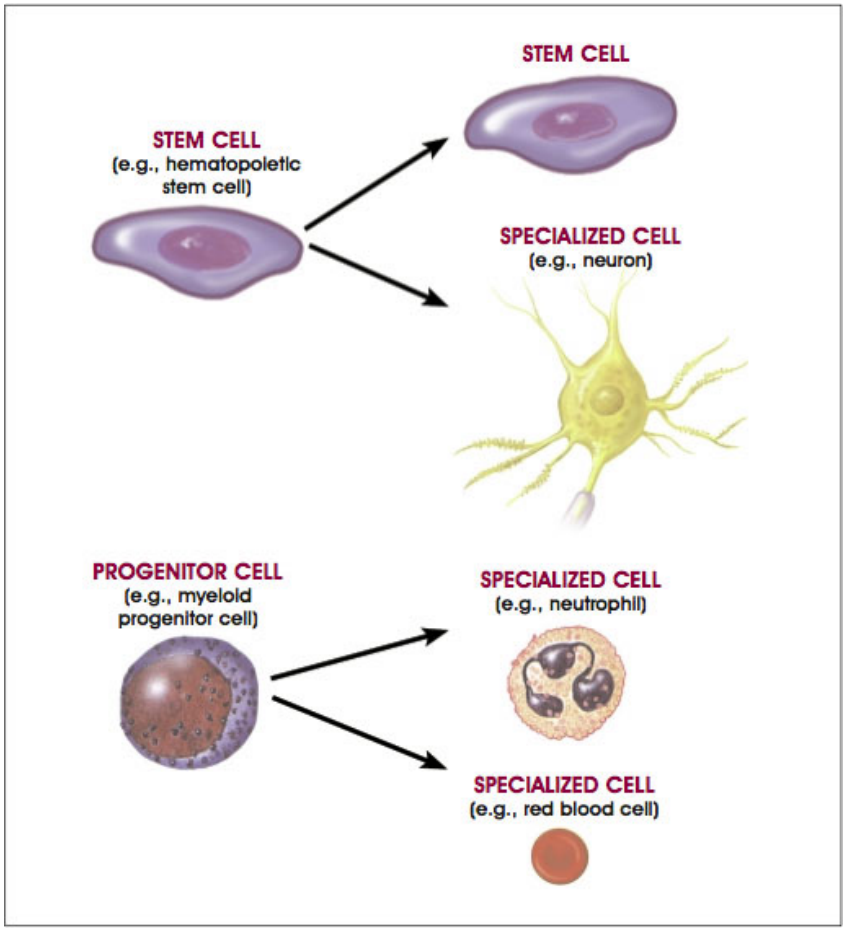
The Catholic Church has long supported research using stem cells from adult tissue and umbilical cord blood, which poses no moral problem. Catholic institutions at times have taken the lead in promoting such constructive research, which is already providing cures and treatments for suffering patients.

What Is an Adult Stem Cell?

Adult stem cells, like all stem cells, share at least two characteristics. First, they can make identical copies of themselves for long periods of time; this ability to proliferate is referred to as long-term self-renewal. Second, they can give rise to mature cell types that have characteristic morphologies (shapes) and specialized functions. Typically, stem cells generate an intermediate cell type or types before they achieve their fully differentiated state. The intermediate cell is called a precursor or progenitor cell. Progenitor or precursor cells in fetal or adult tissues are partially differentiated cells that divide and give rise to fully differentiated cells. Such cells are usually regarded as "committed" to differentiating along a particular cellular development pathway, although this characteristic may not be as definitive as once thought.



Unlike embryonic stem cells, which are defined by their origin (the inner cell mass of the blastocyst), adult stem cells share no such definitive means of characterization. In fact, no one knows the origin of adult stem cells in any mature tissue. Some have proposed that stem cells are somehow set aside during fetal development and restrained from differentiating. Definitions of adult stem cells in scientific literature range from a simple description of the cells to a rigorous set of experimental criteria that must be met before characterizing a particular cell as an adult stem cell. Most of the information about adult stem cells comes from studies of mice. The list of adult tissues reported to contain stem cells is growing and includes bone marrow, peripheral blood, brain, spinal cord, dental pulp, blood vessels, skeletal muscle, epithelia of the skin and digestive system, cornea, retina, liver, and pancreas.

In order to be classified as an adult stem cell, the cell should be capable of self-renewal for the lifetime of the organism. This criterion, although fundamental to the nature of a stem cell, is difficult to prove *in vivo*. It is nearly impossible, in an organism as complex as a human, to design an experiment that will allow the fate of candidate adult stem cells to be identified *in vivo* and tracked over an individual's entire lifetime.

Ideally, adult stem cells should also be clonogenic. In other words, a single adult stem cell should be able to generate a line of genetically identical cells, which then gives rise to all the appropriate, differentiated cell types of the tissue in which it resides. Again, this property is difficult to demonstrate *in vivo*; in practice, scientists show either that a stem cell is clonogenic *in vitro*, or that a purified population of candidate stem cells can repopulate the tissue.

The majority of researchers who lay claim to having identified adult stem cells rely on two of these characteristics—appropriate cell shape, and the demonstration that the resulting, differentiated cell types display surface markers that identify them as belonging to the tissue. Some studies demonstrate that the differentiated cells that are derived from adult stem cells are truly functional, and a few studies show that cells are integrated into the differentiated tissue in vivo and that they interact appropriately with neighboring cells. At present, there is, however, a paucity of research, with a few notable exceptions, in which researchers were able to conduct studies of genetically identical (clonal) stem cells. In order to fully characterize the regenerating and self-renewal capabilities of the adult stem cell, and therefore to truly harness its potential, it will be important to demonstrate that a single adult stem cell can, indeed, generate a line of genetically identical cells, which then gives rise to all the appropriate, differentiated cell types of the tissue in which it resides.

Position of the Catholic Church on Adult Stem Cell Research:
http://www.usccb.org/prolife/issues/bioethic/stemcell/stemcath.shtml

For information on those diseases currently being treated successfully by adult stem cells look at this link: http://www.stemcellresearch.org/facts/CheckTheScore.pdf

Go to the Family Research Council website to view this video focused on adult stem cell research:
http://www.frc.org/get.cfm?c=VIEW_MEDIA&ef=EF06I45&format=asx&vidWidth=320&vidHeight=300

For government analysis of adult stem cells, read this paper released by the President's Domestic Policy Council: http://www.whitehouse.gov/dpc/stemcell/2007/stemcell_010907.pdf

What is cord blood?

Cord blood, which is also called "placental blood," is the blood that remains in the umbilical cord and placenta following birth and after the cord is cut. Cord blood is routinely discarded with the placenta and umbilical cord. Your baby's umbilical cord blood is a valuable source of stem cells, which are genetically unique to your baby and family.

What are stem cells and how are they used?

Stem cells are the body's "master" cells because they create all other tissues, organs, and systems in the body. The stem cells found in cord blood are the building blocks of your blood and immune system and most readily replicate into:

Red Blood Cells - which carry oxygen to all the cells in the body,

White Blood Cells - which fight infection, and

Platelets - which aid in clotting in the event of injury.

There are three sources where stem cells are commonly found, they are:

Bone Marrow,
Peripheral Blood (the blood that circulates through your body), and
Umbilical Cord Blood.

The ability of cord blood stem cells to differentiate, or change into other types of cells in the body is a new discovery that holds significant promise for improving the treatment of some of the most common diseases such as heart disease, stroke, and Alzheimer's.

Currently, stem cells are primarily used in transplant medicine to regenerate a patient's blood and immune system after they have been treated with chemotherapy and/or radiation to destroy cancer cells.

At the same time the chemotherapy and radiation destroys the cancer cells in a patient, they also destroy stem cells. Therefore, an infusion of stem cells or a stem cell transplant is performed after the chemotherapy and/or radiation treatment. The stem cells then migrate to the patient's bone marrow where they multiply and regenerate all of the cells to create a new blood and immune system for the patient.

The promise of using stem cells for medical treatments has been the focus of research projects that are showing encouraging results.

- Cord blood stem cells have been "triggered" to differentiate into neural cells, which could lead to treatments for diseases such as Alzheimer's and Parkinson's.
- They have also proven their ability to turn into blood vessel cells, which could some day benefit treatments for heart disease, allowing patients to essentially "grow their own bypass."

Are cord blood stem cells different than other types of stem cells?

Yes. Umbilical cord blood stem cells are the "youngest," safely available stem cells and they are the product of another miracle - a live birth. Freezing these cells essentially stops the clock and prevents aging and damage that may occur to the cells later in life. Another source of stem cells, embryonic stem cells, has been at the heart of heated debate. Currently, embryonic stem cells are not being used to treat humans. A third category of stem cells is adult stem cells, such as those found in bone marrow. Adult stem cells serve very specialized roles in children and adults and are not as proliferative as those found in cord blood.

What is proposed in terms of cord blood transplants in the future?

To date, umbilical cord blood has been used in more than 8,000 transplants for children and adults. In many cases, the cord blood was used by the baby's sibling. Other transplants have occurred for the newborn himself, the newborn's mother, father, and the newborn's cousin.

In the past two years alone, research has demonstrated that cord blood stem cells can differentiate into other types of cells in the body. The regenerative qualities of stem cells have been brought to the forefront in the field of cellular repair. Stem cells have been labeled an important biological resource and researchers are conducting more and more studies to unlock the potential of umbilical cord blood stem cells in future applications for diseases like Alzheimer's, diabetes, heart and liver disease, muscular dystrophy, Parkinson's disease, spinal cord injury, and stroke

What is graft vs. host disease (GVHD)?

GVHD is one of the most common and life threatening side effects of a stem cell/bone marrow transplant. GVHD occurs when the transplanted stem cells recognize the recipient's body as foreign, and "reject" it. Cord blood transplants have had a noticeable lack of GVHD because the stem cells from the donor do not need to match the recipient as closely as with bone marrow.

Why do families choose to collect and store their baby's cord blood?

A- Tens of thousands of families have chosen to save their baby's cord blood stem cells with Cord Blood Registry. Most of CBR's clients have no family history of disease, but see the current and future potential of their newborn's cord blood stem cells as a biological resource.

Once-in-a-Lifetime Opportunity - Only at Birth

At an increasing rate, expectant parents are storing cord blood for their families, not only as a potential life-saving resource for current uses of stem cells, but also for their future potential. Some families have more defined risk factors, but most often, parents bank for the security in knowing the health benefits stem cells may someday offer their children, themselves, or other family members.

Recent clinical studies support the unique suitability of cord blood stem cells for a number of developing technologies. Doctors are especially enthusiastic about the potential use of cord blood stem cells in the emerging fields of gene therapy and cellular repair. When you bank your baby's cord blood stem cells, you are saving what may be a key component to potential future medical treatments and cures.

When and how is the cord blood collected?

Cord blood is collected from the umbilical cord immediately after the birth of the baby and after the cord has been cut. This blood is routinely discarded and collecting it does not alter normal birthing procedures. The collection can only take place at the time of delivery and is normally performed by your caregiver.

Are umbilical cord blood cells the same as embryonic stem cells?

No, umbilical cord blood cells are taken from the baby's umbilical cord and placenta after the baby is born, and not from an embryo.

Who can use donated cord blood?

On any given day, more than 6,000 patients, their families and friends around the world are searching the National Marrow Donor Program (NMDP) Registry for a matching bone marrow donor or cord blood unit. These patients have leukemia, lymphoma and other life-threatening diseases that can be treated by a bone marrow or cord blood transplant.

If you donate cord blood to a public bank, the cord blood can be transplanted into any patient whose doctor selects the cord blood unit as the best match for that patient. The donated cord blood is not reserved for your family.

Adapted from www.cordblood.com