Bone Grafting

Bone grafting gives help to bone growth when needed. This happens by forming new bone through:

- Osteogenic stimulation.
- Osteoconductive stimulation.
- Osteoinductive stimulation.

These three methods are described below.

OSTEOGENIC STIMULATION

Only living cells can make new bone. So the success of any bone grafting procedure is dependent on having enough bone forming (*osteogenic*) cells in the area. In some situations, the healthy tissues around the graft site will contain enough bone-forming cells. In other situations this is not the case. There may be areas of scarring that do not have enough bone forming cells. These include:

- Areas of previous surgery or infection.
- Bone gaps.
- Areas previously treated with radiation therapy.

Bone-forming cells can be added to a graft site from 2 sources:

- Healthy bone is removed from an area where it is unlikely to cause a disability. It is then transferred into the graft site. Often bone from the pelvis is used.
- Bone forming cells from bone marrow can be used. These cells can be obtained with a needle, without an incision. Bone marrow can be injected into a graft site or mixed with other components as a composite graft.

Both transplantation of a patient's bone and transplantation of just the bone marrow are referred to as *autografts* or *autogenous bone grafts*. When bone marrow or other graft materials are delivered by injection, this method is defined as *minimally invasive bone grafting*.

OSTEOCONDUCTIVE STIMULATION

Osteoconductive materials make it easier for bone cells to fill the space between two bone ends. These materials also serve as a spacer. This means that it is more difficult for non-bone tissues around the graft site to grow into the site and cause difficulty with bone healing. Osteoconductive materials are important additions to the tools available to the orthopedic surgeon. But they do not induce healing better than transfer of the patient's own bone. In some settings they work poorly. But when used at the proper time, these materials can offer an effective choice for patients. This can save many patients from the extra surgery needed to transplant their own bone.

Many materials are available as osteoconductive materials. And more are being developed. These include:

- Processed human bone (*allograft bone*).
- Purified collagen.
- Several calcium phosphate ceramics.
- Synthetic polymers.

Choosing if and when these materials are appropriate requires both:

- Knowledge of their effects on cells.
- Knowledge of the mechanical handling methods of these materials.

The body reabsorbs some materials. But other materials may stay in the graft site for many years. A knowledgeable surgeon balances these factors.

OSTEOINDUCTIVE STIMULATION

Induction of bone formation refers to the capacity of many normal chemicals in the body to stimulate immature bone cells (*stem cells*) to grow and mature. This forms healthy bone tissue. Most of these chemicals are protein molecules. Because these chemicals are present in normal human bone, methods have been developed to prepare human bone to stimulate growth. When prepared, these chemicals retain the normal growth factors but limit or eliminate the risk of transmitting diseases or viruses. Demineralized bone matrix or DBM prepared in this way is currently the only approved way in which surgeons can use an osteoinductive stimulus.

Your surgeon will help you decide which treatment is best for you.

Document Released: 06/09/2003 Document Re-Released: 01/09/2011
ExitCare® Patient Information ©2011 ExitCare, LLC.