Animals are frequently used as models in clinical studies or experiments in the development of surgical procedures & drugs (that may currently be common veterinary practice) for use in human medicine. For example, early developments for hip replacement surgery were developed in military dogs (German Shepherds have a genetic problem with the hip joint being misaligned).

**NIH Research**

Researchers have developed a method of modifying injectable anti-arthritis drugs that should provide for sustained presence of the medication in the joint space. It is known that injecting anti-inflammatory drugs into arthritic joints reduces inflammation and pain, but the drug effect doesn’t last because the drug diffuses out of the joint. As the effect would last longer if the drug were held in the joint, researchers developed a protein to inject along with the drug. Tests of this protein in rat knee joints showed that the affect of the injection lasted 25 times longer than without the protein.

**The Veterinary Black Bag Program**

**Project Goals:**
- Develop Veterinarian’s Black Bags (VBBs) of instructional items and pamphlets for middle school teachers to support classroom visits by local veterinarians.
- Provide professional development for veterinarians and teachers on how to use items in the VBBs.
- Promote inquiry-based thinking about health-related subjects while emphasizing the value of biomedical research and promoting careers in science.

**PEER**

**PARTNERSHIP FOR ENVIRONMENTAL EDUCATION AND RURAL HEALTH**

Dr. Larry Johnson  
Principal Investigator, PEER  
979-845-9279  
ljohnson@cvm.tamu.edu

Dr. William Klemm  
Director, Peer  
979-845-4201  
wklemm@cvm.tamu.edu

Department of Veterinary Integrative Biosciences  
College of Veterinary Medicine & Biomedical Sciences  
Texas A&M University, College Station, Tx 77843  
MS#4458  
http://peer.tamu.edu/VBB/Summary.asp
**Bones and Associated Structures**

Bones consist of two layers: a dense, strong, heavy outer layer called Compact Bone and an inner layer that self-organizes in response to the weight applied to it called Spongy Bone.

Joints, joint cartilage, tendons and ligaments are all structures associated with bones. Bones can be classified as long bones, found in limbs; short bones, found in hands or toes; flat bones, found in the skull; sesamoid bones, like the kneecap; and irregular bones, such as vertebra.

**Natural Bone Re-Modeling**

Your bones are living tissue. Cells called osteoclasts break down old bone and cells called osteoblasts replace them with new tissue. Osteoblasts secrete a matrix made up of calcium phosphate crystals. Retired osteoblasts are called osteocytes, and are found within the bony wall that they deposit around themselves. Osteoclasts break down bone by releasing acids to dissolve crystals and enzymes to break down the matrix. Bone remodeling is an ongoing process throughout the life of an animal. For example, one fifth of young adult bone is re-built every year, the femur is completely rebuilt every 6 months, and bones in the skull may take 10 years to re-build.

**Fractures and Treatment Options**

Bone fractures can be classified as Open, Closed, or Complete. Without the proper care, fractures can heal improperly in a variety of ways, such as:

- **Mal-union** – a fracture that heals with abnormal alignment
- **Non-union** – fracture healing has STOPPED before it has completely healed
- **Sequestrum** – a dead bone fragment separated from the rest of the bone
- **Osteomyelitis** – infection of bone

Fractures have the best chance to heal correctly when the bones are aligned properly and are in close proximity to each other. It is also important to take significant measures to avoid any additional trauma to the fracture, such as infection or further fracture. Ask your veterinarian about the following fracture treatment options:

- Open Fracture Reduction
- Closed Fracture Reduction
- Intramedullary Fixation
- Cerclage
- External Fixation Devices