

# UCLA offers limb-sparing surgery for rare bone cancers



*Pre-surgical radiograph of right femur with a malignant bone tumor and post-surgical radiograph of femur replaced with metal endoprosthesis. Photo shows functional result, with patient working out several years after the surgery.*

**Bone cancers, or sarcomas,** are among the most common cancers in children, adolescents and young adults. These aggressive cancers arising in bone and soft tissue are typically treated with aggressive surgery to remove the cancerous bone, in addition to chemotherapy and occasionally radiation therapy.

Limb-sparing surgery avoids amputation by removing only the tumor and a small portion of the surrounding soft tissue. Over 90 percent of bone sarcoma cases can be surgically managed by limb-sparing surgery, with over 75 percent of patients becoming long-term survivors. UCLA has been a pioneer in limb-sparing surgery.

The UCLA Bone and Soft Tissue Sarcoma Program — one of the three busiest sarcoma centers in the nation — provides limb-sparing surgery for children and adults at every stage. It also treats many rare cancers that originate in the body’s connective tissues, including bone, fibrous tissue, muscle, fat and blood vessels.

## The most common bone cancers

Osteosarcoma is the most common primary bone cancer. It is usually found at the end of long bones, frequently around the knee, but can arise in any bone in the body, including those in the pelvis, shoulder and skull.

## Innovation to avoid repeated surgeries

“Over the last 40 years, UCLA has been a pioneer in developing techniques of limb-sparing surgery to avoid amputation in patients with sarcoma,” says Nicholas Bernthal, MD, chief of the Division of Musculoskeletal Oncology. “The UCLA musculoskeletal oncology team is using new techniques of ‘growing implants’ that allow a child’s replaced bone to non-invasively lengthen to match the growth of the other leg, keeping the child out of the operating room and active on the playground.

“These implants, along with our cutting-edge research in creating ‘smart’ implants that resist infection, are just the latest in UCLA’s four-decades-long commitment to being an international leader in musculoskeletal oncology.”

Approximately 800 new cases of osteosarcoma, half of which are children and adolescents, are reported each year in the United States. Ewing's sarcoma is the next most common type of bone cancer. It can arise in bone as well as the muscles and other soft tissues adjacent to and/or connected to bone. There are about 450 cases per year of Ewing's sarcoma, almost two-thirds of these patients are children and young adults.

The exact cause of these sarcomas (cancers) is unknown, but genetics and random changes in cell DNA may play important roles. Symptoms, such as swelling and soreness around the tumor area, are typically mistaken for growing pains, a sports injury or the result of everyday bumps and bruises.

## Diagnosis and treatment planning

A biopsy provides a definite diagnosis of sarcoma. Factors that determine if a patient is a candidate for limb-sparing surgery include the size of the tumor, its location and how much it has spread.

At UCLA, a weekly tumor board meeting involving bone-tumor specialists from orthopaedic oncology, surgical oncology, pediatric oncology, medical oncology, radiation oncology, pathology and musculoskeletal radiology formulates optimal treatment strategies and coordinates care for each patient. UCLA also offers a variety of ancillary support services, including physical therapy, rehabilitation, prosthetics, child-life specialists, social work, school re-integration, alternative and complementary medicine.

## Limb-sparing surgery whenever possible

UCLA physicians strive to save patients' limbs whenever possible. If even a small number of cancer cells are left behind, they might grow and multiply to make a new tumor. To lower the risk of this happening, surgeons remove the tumor and a rim of normal tissue that surrounds it. This is known as wide excision.

Once the tumor and surrounding tissue are removed, the surgeon will replace the affected part of the bone with a metal endoprosthesis. "Growing prostheses" for children can be expanded, thereby lengthening the child's leg or arm to match the growth of the healthy extremity.

Following limb-sparing surgery, patients can usually begin using affected joints almost immediately. The goal and expectation is that patients will return to an active lifestyle. In fact, a recent long-term study of our patients showed that those with endoprosthetic implants averaged more than 8,000 steps per day — well more than the average American.

## New treatments

UCLA researchers are constantly working to improve outcomes for patients with the most difficult-to-treat bone tumors. New UCLA-developed therapies and treatments include a research program funded by the National Institutes of Health to develop implants that resist infection, the leading cause of endoprosthetic failure, and a state-of-the-art gait-analysis lab to assess function after surgery, allowing rehabilitation protocols to be tailored to each patient.

## Participating Physicians

### Nicholas Bernthal, MD

Assistant Professor  
Chief, Division of Musculoskeletal Oncology

### Noah Federman, MD

Associate Professor  
Director, Pediatric Bone and Soft Tissue Sarcoma Program

### Orthopaedic Oncology

### Jeffrey Eckardt, MD

Professor  
Chair, Department of Orthopaedic Surgery

### Susan Bukata, MD

Associate Professor

### Francis Cyran, MD

Associate Professor

### Surgical Oncology

### Fritz Eilber, MD

Professor

### Medical Oncology

### Bartosz Chmielowski, MD

Associate Professor

### Arun Singh, MD

Assistant Professor

### Pathology

### Scott Nelson, MD

Professor

### Sarah Dry, MD

Professor

### Radiology

### Leanne Seeger, MD

Professor

### Kambiz Motamedi, MD

Professor

### Benjamin Levine, MD

Associate Professor

### Benjamin Plotkin, MD

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### Radiation Therapy

### Anusha Kalbasi, MD

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