PROJECT TITLE: Biomechanics of pediatric orthopaedic implants

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Project Description

The purpose of the Orthopaedic Research Laboratory at Cincinnati Children’s is to improve the treatment, diagnosis, and prevention of musculoskeletal disorders of childhood and adolescence. Particular interests include the effects of mechanical forces on skeletal growth and medical device development and analysis. The student project will involve computer aided design, engineering analysis, test design, fabrication, and/or biomechanical testing of implants. One of two projects may be pursued.

The first focuses on young patients with severe spine deformities. These children require both correction of their spine curvature and preservation of spine growth to allow for continued development of their chest and lungs. Surgeons implant instrumentation, called growing rods, which both support the collapsing spine and distract through periodic interventions to match patient growth. These constructs are prone to mechanical failure. Our surgeons have been removing and replacing one type of growing rods with a later design. The purpose of this study is to determine fatigue properties of growing rod constructs explanted from patients. Results will help us to better design these constructs and develop criteria for when to remove them.

A possible second project involves mechanical testing of flexible intramedullary (IM) rods for fracture fixation of broken bones. Currently, these rods are metals which must be removed with a second surgical procedure after healing. Researchers at CCHMC and UC are working on a resorbable implant to eliminate the second surgery. The purpose of this study is to design and fabricate mechanical test methods, to evaluate prototype biodegradable IM nails, based on current national test standards.