The Department of Surgery is pleased to offer the following research project for the summer of 2016. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

PROJECT TITLE: Distribution of Cortical and Trabecular Bone in the Swine Craniofacial Skeleton

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Project Description

I investigate questions regarding the determinants of bone development, function and shape. In particular, I focus on the influences of ontogeny, function and evolution on craniofacial morphology. It is my goal to apply the outcomes of this research directly to clinicians, assisting them in treating children with craniofacial abnormalities, either congenital or acquired, through translational and laboratory-based research endeavors. Recently, our lab has collaborated with the lab of Dr. John van Aalst who is researching better ways to fill critical size bone defects using bone tissue engineering.

Bone cells are biomechanically responsive: they can increase or decrease a variety of cellular activities dependent upon mechanical stimulation provided either in vivo or in vitro. To better understand how these mechanics influence bone tissue engineering, strain maps (provided through finite element analyses) will geographically represent the types of forces encountered during healing. An essential component of finite element analyses involves having reliable material properties in the structure. Since cortical and trabecular bone have different mechanical properties, it is necessary to document the anatomic distribution of these two bone types.

For the course of the summer project, the student will be assisting with reviewing microCT scans of bones to collect these essential data. Training for each of these will be provided.