Radiology Student Projects Catalog

Below you will find Radiology research and Scholarly Activity project opportunities in:

- Clinical Research
- Medical Education
- Quality Improvement

For more information regarding a specific project, please reach out to the Medical Student Coordinator.

Once you select a project, please complete the Request a Research Mentor form.
**Department of Radiology**  
**Clinical Research Scholarly Activity Projects**

**Project Title:** Breast Imaging in Granulomatous Mastitis: building a predictive and prognostic model

**Project Description:** The primary objective of this project is to determine the value of imaging in differentiating granulomatous mastitis (IGM) from breast cancer and infectious mastitis. A predictive model based on patient demographics, clinical presentation and imaging findings is important, because while tissue biopsy can be performed, it can worsen IGM—which is a chronic, relapsing disease- and infectious mastitis, while it is essential to establish diagnosis early in breast cancer. Project outcomes are highly relevant to guide clinicians.

**Description of student involvement:** Students participating in this project will be involved in data collection and analysis. Parkland breast center is one of the centers with the highest population of IGM nationwide, and will likely provide the best yield to develop a clinically relevant and robust model for disease prognosis. Study PIs highly encourage first author publication and presentations in national meetings by the students selected for this project, and will provide mentorship to achieve these goals.

**Project Mentor:** Dr. Basak Dogan

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Project Title: Outcome analysis of Probably Benign (BIRADS 3) breast lesions

Project Description: The purpose of this study is to determine if all the follow up imaging intervals are necessary by performing a retrospective review of all lesions that were determined to be probably benign. This project is a retrospective review of breast imaging for all patients with breast lesions that were placed in a “probably benign” (Breast Imaging-Reporting and Data System 3) category. This includes a review of diagnostic breast ultrasound, digital mammograms, and breast MRI. We will determine whether any lesions revealed malignancy at the end of the follow up period, and the time point at which they became evident.

Description of student involvement: The students will help conduct a reader study to compare the clinical presentation baseline imaging features of lesions that remained stable to those that progressed. Lastly, we will determine the imaging interval when (both benign and malignant) lesion progression was detected and was instrumental in guiding further patient care. Students participating in this project will be involved in data collection and analysis. Study PIs highly encourage first author publication and presentations in national meetings by the students selected for this project, and will provide mentorship to achieve these goals.

Project Mentor: Dr. Basak Dogan

Contact: Radiology Education Office; RADEducation@UTSouthwestern.edu
**Department of Radiology**  
**Clinical Research Scholarly Activity Projects**

**Project Title**: Genomic and Biomarker Predictors of Acute Kidney Injury and Other Post-Procedural Outcomes following Transcatheter Aortic Valve Replacement

**Project Description**: This study is a retrospective CT Angiogram review (retrospective cohort study) designed to identify imaging biomarkers for development of acute kidney injury following Transcatheter Aortic Valve Replacement (TAVR).

CT angiograms in patients who had undergone TAVR will be uploaded on the TeraRecon postprocessing workstation to generate multiplanar images, including true axial and true sagittal views from double oblique projections. Potential biomarkers to be interrogated include renal length, renal area, true short axis diameter of the aorta at multiple levels, renal artery stenosis and degree of aortic and iliac artery calcification.

Statistical analysis will be conducted using multivariate logistic regression analyses to identify potential risk factors for post-procedure acute kidney injury in TAVR patients. P values ≤ 0.05 will be considered statistically significant.

**Description of student involvement**: TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor**: Dr. Asha Kandathil

**Contact**: Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Clinical Research Scholarly Activity Projects

Project Title: Retrospective and Prospective cross-sectional imaging evaluation of musculoskeletal diseases

Project Description: DWI in MSK infections- Establish ADC values of reactive edema, cellulitis, reactive bone marrow edema, Osteomyelitis and abscess

Description of student involvement: Collecting data, DWI measurements, Preparing for Stats, and Write up.

Project Mentor: Dr. Avneesh Chhabra

Contact: Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Clinical Research Scholarly Activity Projects

**Project Title:** Retrospective and Prospective cross-sectional imaging evaluation of musculoskeletal diseases

**Project Description:** 3D imaging of knee menisci- Establishing the length of the meniscus tears and arthroscopy correlation

**Description of student involvement:** Collecting data, 3D image reconstructions and meniscus length measurements, Preparing for Stats, and Write up

**Project Mentor:** Dr. Avneesh Chhabra

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
**Department of Radiology**
**Clinical Research Scholarly Activity Projects**

**Project Title:** Baseline and Post-Concussion Testing in Young Athletes Diagnosed with a Sports Related Concussion

**Project Description:** iTAKL-UTSW Data Processing and Collection: The Imaging Telemetry and Kinematic modeling (iTAKL) projects are a series of projects focused on studying the effects of subconcussive impacts in youth and high school contact sports. These studies use biomechanical sensors placed in the helmets and/or mouthguards to measure head impacts. To measure the effect of these head impacts, MRI and MEG as well as detailed cognitive testing is obtained pre- and post-season. Medical students will be provided with data from UTSW’s pilot season of football data collection. Data from our collaborators at Wake Forest University will also be available. Data analysis could include cognitive function compared to head impact exposure, imaging metrics compared to head impact exposure, or cognitive function compared to imaging metrics. A background in basic statistics is required. Experience with matlab would be helpful. Additionally, medical students will be asked to help with on-field data collection (e.g., local high school boys football and/or girls’ soccer team). On-field data collection will include ensuring electronic mouthguards sync properly with the iPad app, and detailed documentation. This work will be outdoors. Reliable transportation will be required.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Elizabeth Davenport

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Clinical Research Scholarly Activity Projects

**Project Title:** PET/CT: Patient Outcomes and Health Economics and Policy - Value of PET, SPECT, CT, MRI in human solid tumors, cardiac, neurological diseases and infection / inflammation

**Project Description:** The overarching objective of this project is to establish the value of PET/CT in oncologic patients as an enrichment, therapy assessment and outcome prediction imaging biomarker and its appropriate clinical. Further, we focus on establishing the impact on patient management and patient outcomes in evolving health care context and reform. Students will be immersed in rich data collection, data analysis (including univariate, multivariate, Cox regression analysis), manuscript writing (research and review manuscripts) and presenting abstracts in national meetings such as in the Radiological Society of North America, Society of Nuclear Medicine and Molecular Imaging, American Roentgen Ray Society and American College of Radiology. Students will be focusing on establishing the appropriate timing, sequencing of imaging tests, impact on patient management change and patient survival outcomes. In addition, active career & residency application mentoring is provided to students selected for this project.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Rathan Subramaniam

**Contact:** Radiology Education Office; Rade@UTSouthwestern.edu
Department of Radiology
Clinical Research Scholarly Activity Projects

**Project Title:** A Retrospective Magnetic Resonance Image Analysis of the Human Placenta in the Gravid Female

**Project Description:** Our goal is to leverage this existing MR fetal imaging database to provide insights into normal placental development and function, indicate the range of variability across the population, and allow identification of key gestational age signatures. The human placenta is a complex structure with unique capabilities. It has a 40-week average life span, during which it facilitates the exchange between the maternal and fetal cardiovascular systems. It undergoes extensive growth through trophotrophism and maturation of the maternal-fetal units within the intervillous spaces of the cotyledons. These events have been extensively studied through in-vitro assessments and pathologic evaluation. However, there is little known about the development and maturation of the placenta during the pregnancy throughout the gestational period.

Magnetic resonance (MR) imaging studies performed across pregnancy for fetal indications provide a potentially rich and untapped dataset of placental structure and function. Over the years, the MR imaging techniques and protocols have matured to generate fetal images with unprecedented image quality [4, 5]. At our institution, we perform an average of 5 to 10 MR fetal imaging studies per week to evaluate suspected fetal abnormalities. Over the past decade, we have generated a database of approximately 1000 fetal MR imaging studies performed on fetuses between 14- and 41-week gestations with suspected central nervous system (CNS) abnormalities.

The existing database includes T2-, T1-, and diffusion-weighted images in matching locations and T2- and T1-weighted images throughout the fetus including the placenta. Additionally, of the nearly 1000 fetal MR imaging studies, approximately 200 cases were found to be normal, 200 cases had mild to moderate ventriculomegaly, and the remaining cases had underlying fetal CNS abnormalities. Our goal is to leverage this existing MR fetal imaging database to provide insights into normal placental development and function, indicate the range of variability across the population, and allow identification of key gestational age signatures.

We will apply existing and develop new segmentation algorithms to analyze placenta in 1000 MR fetal imaging studies from 14- to 41-week gestation and validate against manual segmentation in 70 studies. We will evaluate the heterogeneity of placenta as a function of gestation and identify ranges of variability and key gestational age specific signatures of normal placental function. Lastly, we will test the null hypothesis that studies with isolated fetal ventriculomegaly and other CNS abnormalities have placental characteristics that are indistinguishable from fetuses with normal MR findings. We will compare these three groups
with the underlying assumption that fetal brain dysmorphology is independent of placental development. If validated, then a significant portion of the retrospective MR image database can be used to describe the normal placenta.

This project will utilize existing images and records from the original Radiologist’s report. The retrospective image data base extends from 1 January 2006 to the present (submittal date of this IRB application). The study, as described in pending NIH grant applications, is slated to last 4 years.

As this is a retrospective image analysis study, issues such as non-compliance, safety, subject withdrawal of consent, and dissent progression are not relevant.

Description of student involvement: TBD between Project mentor and student based on needs of project and student interest.

Project Mentor: Dr. Diane Twickler

Contact: Radiology Education Office; RADeducation@UTSouthwestern.edu
Department of Radiology
Clinical Research Scholarly Activity Projects

**Project Title:** Determining the MRI Features and Diffusion Characteristics of Normal Placenta and Placental invasion

**Project Description:**
1. Determine MRI signal and features associated with morbidly adherent placenta/ Placenta accreta.
2. Determine Diffusion characteristics and ADC values in normal placenta with respect to Gestational age.
3. Determine Diffusion characteristics and ADC values in morbidly adherent placenta/ areas of placental invasion and comparison to normal placenta / normal non-invading portion of placenta.

**Study Design:**

The study will involve retrospective review of all fetal or Placental MRI performed in the last 15 years. There will also be need to review the clinical history and post-operative pathology reports on all patients who were evaluated for abnormal placentation on imaging and those of the normal cohort. The ordering clinicians and/or the primary care clinician would be contacted for patients that did not deliver within our institution(s). There may be minimal involvement (brief phone call) with patient if information about delivery is not available from the ordering clinician and/or primary care clinician. There will be no intervention or prospective component to this study.

**Criteria for inclusion of subjects:**

1. All patients within last 15 years who had Fetal or Placenta MRI.

A member of the study will identify patients who had Fetal or Placenta MRI scans performed that included DWI images, selecting these cases from PACS. The researchers anticipate that approximately 50 patient records will be required to obtain study outcomes. In order to obtain this number of subjects, approximately 100 patients that have been clinically treated by the PI or CO-Is of this study in the past will be contacted in order to request study participation.

Morbidly adherent placenta is a significant diagnostic challenge and is a potentially life threatening condition. Sonographic literature has extensive description of different findings associated with abnormal placentation. Despite advances in magnetic resonance imaging, MRI
diagnosis of placental invasion remains difficult (2)(3). There is inherent bias in patients
selected for MR evaluation of the placenta. MRI interpretation of abnormal placenta strongly
depends on physician experience with no easy imaging tool that can be readily applied to
differentiate the histologic degrees of invasive depth or extent. Ultrasound literature describes
abnormal and disorganized intra-placental vascularity including arterial supply and venous
drainage. There are descriptive MR imaging findings commonly associated with placental
invasion, including but not limited to: dark linear bands, focal bulging, disruption of the
retroplacental-myometrial interface, venous lakes and lacunae. However, these findings are
described in a subset of patients already selected for MRI given an abnormal placenta on
ultrasound. Comparison to a normal population, referred for a non-placental, fetal indication
will be of value to determine the true sensitivity of the described characteristics. Diffusion
Weighted imaging (DWI) is widely used for determining cellularity and vascularity in different
parts of the body. So far there is no solid data describing the Diffusion imaging
characteristics/changes of normal placenta with respect to gestational age. DWI could add to
the imaging armamentarium for assessing abnormal placentation, architecture as well as
vascularity and cellularity. Similarly, where available, alternative noninvasive tools to assess
tissue perfusion (arterial spin labeling, ASL) and oxygenation (blood oxygenation level
dependent, BOLD) can also be incorporated in evaluation of the placenta. This retrospective
review of all MR studies of and including the placenta will enable clear definition of features
predictive of the presence of invasion, and also work toward quantification of the depth and
extent of invasion as it applies to extirpation of the placenta or the need for cesarean
hysterectomy. In this setting, both the ultimate pathologic specimen reports as well as the
surgeon’s perspective to the degree of placental invasion are pertinent.

Description of student involvement: TBD between Project mentor and student based on needs of
project and student interest.

Project Mentor: Dr. Diane Twickler

Contact: Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Community Health Scholarly Activity Projects

**Project Title:** ACR RadiologyTEACHES

**Project Description:** Radiology-TEACHES is an online portal that uses case vignettes in ACR's Radiology Curriculum Management SystemTM (RCMS) integrated with the ACR SelectTM clinical decision support (CDS) to simulate the process of ordering imaging studies via integrated CDS.

**Description of student involvement:** Students will be responsible with the aiding of building and uploading cases to the online portal. Students may be asked to maintain the analytics.

**Project Mentor:** Dr. Cecelia Brewington

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Medical Education Scholarly Activity Projects

**Project Title:** Online Radiology Elective

**Project Description:** Create a curriculum for an online radiology elective where students can access web-based material remotely for "learning on the go." Elective material must be rigorous enough to replace current traditional on-site radiology elective during the months that students are away for interviews and still be able to obtain elective credit.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Kristen Bishop

**Contact:** Radiology Education Office; RAEducation@UTSouthwestern.edu
Department of Radiology
Medical Education Scholarly Activity Projects

**Project Title:** Simulation Project

**Project Description:** Develop a simulation module (with pre and post simulation review material and test questions) to educate radiology residents, fellows, and faculty about acute contrast reactions.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Kristen Bishop

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology  
Medical Education Scholarly Activity Projects

**Project Title:** Teaching File Project

**Project Description:** Collect teaching files from each radiology division using Horizon Study Share or other database and organize into cohesive teaching supplementary material to be studied by radiology elective students.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Kristen Bishop

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Medical Education Scholarly Activity Projects

Project Title: Team Based Learning Project

Project Description: Incorporate team based learning into the traditional didactic lectures for the radiology electives by developing teaching modules which can be added or supplemented to the curriculum.

Description of student involvement: TBD between Project mentor and student based on needs of project and student interest.

Project Mentor: Dr. Kristen Bishop

Contact: Radiology Education Office; RADERecruitment@UTSouthwestern.edu
Department of Radiology
Medical Education Scholarly Activity Projects

**Project Title:** Video Learning Project

**Project Description:** Explore available video learning programs (Camtasia, etc.) and choose a program to use for radiology elective video learning. Work with faculty to convert some traditional on-site lectures into video lectures to be viewed online.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Kristen Bishop

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
**Project Title:** Anatomy Labeling of Structures Project

**Project Description:** Contribute web based material for the preclinical anatomy course by selecting cross sectional images, labeling anatomic structures, and developing the interactive website for preclinical student education. Create test questions for preclinical students using this material.

**Description of student involvement:** TBD between Project mentor and student based on needs of project and student interest.

**Project Mentor:** Dr. Julie Champine

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Quality Improvement Scholarly Activity Projects

**Project Title:** CT Lung Screening Program

**Project Description:** Reviewing/analyzing the lung cancer screening data to study if we’re above/below the national cancer development outcomes standard

**Description of student involvement:** Researching/studying of data from the patient biopsies

**Project Mentor:** Dr. Asha Kandathil

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Quality Improvement Scholarly Activity Projects

Project Title: PE study

Project Description: Reviewing/analyzing the outcomes for the BPA firing

Description of student involvement: Researching/studying of data

Project Mentor: Dr. Cecelia Brewington

Contact: Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology  
Quality Improvement Scholarly Activity Projects

**Project Title:** CT Colonoscopy Screening

**Project Description:** Reviewing/analyzing the CT colonoscopy screening data to study if we’re above/below the national cancer development outcomes standard

**Description of student involvement:** Researching/studying of data from the patient biopsies

**Project Mentor:** Dr. Vasantha Vasan

**Contact:** Radiology Education Office; RADEducation@UTSouthwestern.edu
Department of Radiology
Quality Improvement Scholarly Activity Projects

Project Title: Feasibility of CT Perfusion (CTP) as a noninvasive method for characterizing pulmonary lesions as benign or malignant: Comparison of CTP findings with histopathology and other imaging results

Project Description: This study is an original investigation in order to assess the ability of CT perfusion to categorize pulmonary nodules as malignant or benign as compared to excisional biopsy analysis.

The National Lung Cancer Screening Trial has shown a decrease in the mortality rate due to lung cancer through early detection. Computed Tomography Perfusion imaging has potential use as a diagnostic tool in the assessment of these pulmonary lesions. Given neoplasm characteristics, our hypothesis is that malignant lesions will demonstrate an enhancement/perfusion pattern different from benign etiologies. Thus creating a potential cost effective, non-invasive, diagnostic tool in the assessment of pulmonary nodules that reduces patient anxiety.

Imaging results are compared to the pathology of biopsy tissue samples and additional genetic testing is performed to analyze the presence of mutations in malignant lesions. Recent investigation found that two genetic mutations were particularly prevalent in malignant etiologies. Further perfusion comparisons will be conducted on these malignancies with and without mutations.

Description of student involvement: Students will actively contact, schedule, consent, and enroll potential participants for CT Perfusion scans, anonymize CT Studies for analysis, and submit necessary genetic mutation testing information. Students will be asked to maintain radiologists’ findings and pathology results. (Already have a student for this project).

Project Mentor: Dr. Cecelia Brewington

Contact: Radiology Education Office; RADeducation@UTSouthwestern.edu