Magnetic Resonance Imaging

Course Schedule: Thursdays, 2-3PM
Location: H429a

GRADING
Quizzes - 10%
Exams - 75%
Homework - 15%

Instructor:
Course Material: Textbook/ Handouts/Power Point Lecture

Topic	Date	Lecturer
Background/History of MRI, MR Basic Terminology and General Physics Principles	2/5	Virali
HW/QUIZ #1 Radiation Oncology MRI Safety and Quality Assurance	2/12	Can Wu, PhD
Imaging Basics and Formation	2/19	Eric Aliotta, PhD (or Victoria)
HW/QUIZ #2 Patient Screening and Safety, and Contrast Agents	2/26	Hanna
Exam 1	**3/5**	
Tissue Characteristics and Image Production	3/12	Shu (stella) Xing PhD
HW/QUIZ #3 Sequence Parameters and Protocol Selection	3/19	Jason
Simulation and Procedures 1	3/26	TBA
Treatment and Procedures 2	4/16	Katherine
Exam 2 @ 9:15AM	**4/23**	

Course Objectives:

- Understand magnetic resonance imaging screening and safety.
- Describe sequence parameters.
- List tissue characteristics.

Content

I. MRI Screening and Safety
- A. Patient screening and patient considerations
  - a. Detailed MRI screening form
  - b. Patient protection
    - 1) Hearing
    - 2) Padding
    - 3) Communication strategies
      - i. Call bell
      - ii. Sounds
      - iii. Sensation
  - c. Allergic reaction
- B. Safety (e.g., nonferromagnetic ancillary equipment, quenching)
  - 1. MRI safety zones
  - 2. Five Gauss line
  - 3. Identifying and screening for potential hazards
    - a. Patients
    - b. Personnel
  - 4. MRI-compatible devices and implants
    - a. Safe
    - b. Unsafe
    - c. Conditional
- C. Environment (i.e., magnetic and radiofrequency [RF] shielding)
- D. Biological considerations
  - 1. RF field
  - 2. Static and gradient magnetic fields
  - 3. Acoustic noise
- E. Equipment operation
  - 1. Safety procedures (e.g., emergency switch)
  - 2. Warm up
    - a. Quality assurance (QA)
    - b. Accepted tolerances
- F. Machine considerations
  - 1. MRI protocol selection

II. Sequence Parameters
- A. Repetition time (TR)
- B. Echo time (TE)
- C. Inversion time (TI)
- D. Field of view (FOV)

III. Tissue Characteristics
- A. T1 relaxation
- B. T2 relaxation
- C. T2 (susceptibility artifact)
- D. Proton (spin) density
- E. Flow
- F. Diffusion
- G. Perfusion

IV. Magnetic Resonance Curriculum

(Refer to the document located at https://www.asrt.org/educators/asrt-curricula/magneticresonance)