**Educational Objectives & Course Description**

### 20 Hour Basic MR Physics: July 17-19

This three day, intensive educational conference is designed for technologists who are preparing for the advanced MR registry exam or those simply desiring to refresh/enhance their working knowledge of MR physics. All lectures will be given by Dr. Emanuel Kanal. Dr. Kanal is known for bringing the complex and often confusing world of MR physics into everyone’s reach. Dr. Kanal uses his own custom-developed interactive computerized graphic MR tutorial software to complement his non-stop, energetic, yet easy going teaching style. Problem solving approaches are incorporated throughout the meeting to demonstrate how to clinically apply the topics and knowledge being covered. You will find yourself understanding MR physics concepts clearly and in plain English - perhaps for the first time ever. Concepts covered during the 20 hour basic course include (among others):

- Static magnetic field strength
- TR, TE, TI, T2 & Proton Density
- T2*, TI
- RF excitation flip angle
- Number of excitations (NEX)
- Image Production & Acquisition
- Fat Saturation
- 2D & 3D Fourier transform techniques
- Partial saturation techniques
- Inversion recovery sequences
- Spin echo imaging sequences
- Relaxivity
- MRI and MRS Principals

The interaction of all these parameters with slice quantity, imaged volume, scan time, image signal, contrast and resolving power is stressed throughout the discussions.

### 9.5 Hour Advanced Topics & MR Safety / Intracranial Gadolinium Accumulation Update: July 19-20

This 9.5 hour optional session will be focused on more advanced topics, including MR angiography, diffusion weighted MR imaging, perfusion weighted MR imaging, and MR spectroscopy. This session will also include a special 1.5 hour presentation on MR Safety AND a special 1.5 hour presentation on the recent concerns regarding intracranial gadolinium accumulation even in patients with normal renal function. As the pre-eminent physician authority on MR safety issues, Dr. Kanal will present a custom-developed summary of the ACR Guidance Document for Safe MR Practices. He will discuss how this impacts clinical and research MR sites, their design and physical layout, their personnel, and their daily operation. Dr. Kanal is the primary author of each version of the ACR Guidelines for MR Safe Practices including the 2002, 2004, 2007, and most recently, 2013 versions.

**Attendee Comments:**

“I most enjoyed the clinical correlation and pathology slides.”

“I wish I could put this information in a bottle and pour it out again and again.”

**KANALS MR Physics and How to Clinically Apply It**

July 17 - 20, 2017

Hyatt Regency Dulles
Washington, DC

Presented by:
Emanuel Kanal, MD, FACR, FISMRM, MRMD, AANG

and:
Northwest Imaging Forums, Inc.
Hyatt Regency Dulles
2300 Dulles Corner Blvd Herndon, VA 20171

We will meet in the fabulous Hyatt Regency Dulles. Live, work and be yourself at our inviting, contemporary Herndon hotel near Washington Dulles International Airport and just a short metro ride away from all the sights and scenes our nation's capital. Enjoy door-to-door service with our complimentary airport shuttle, which also runs by the bustling Reston Town Center. Ensure your travel is relaxing and effortless with our newly renovated rooms, inviting atmosphere, and approachable staff always here to help.

29.5 Hour MR Physics Format - All lectures will be given by Dr. Kanal

Monday 7/17 (8.0 Hours)
7:00 Registration Desk Opens - Coffee, Tea & Pastries
8:00 Opening Announcements - Matt Wilson
8:10 Nuclear Magnetic Resonance
- Nuclei, hydrogen protons, magnetism, resonance, RF excitation
9:00 Basic MRI
10:00 Coffee Break
10:20 Proton Density, T1 and T2
11:10 TR and TE
12:00 Lunch on Your Own
1:15 Spin Echoes and the 180 Degree Pulse
2:05 MR Imaging Review
2:35 Soft Drink Break
3:15 Gradient Echo Imaging - Part I
- Underlying concepts (how it is similar & different from spin echo)
4:05 Gradient Echo Imaging - Part II
- Flip Angle (Ernst angle & relationship between TR and flip angle)
5:00 End of Session

Tuesday 7/18 (7.0 Hours)
7:30 Registration Desk Opens - Coffee, Tea & Pastries
8:00 Announcements - Matt Wilson
8:05 Gradient Echo Imaging: Part III - TE versus T2*
8:55 Review of Image Production & Acquisition: Part I
- Gradients, spatial localization, slice selection, phase encoding, and frequency encoding part I
9:45 Coffee Break
10:05 Review of Image Production & Acquisition: Part II
- Phase encoding part II, frequency encoding part II, echo sampling / readout
10:55 Review of Image Production & Acquisition: Part III
- Fourier transform, spatial resolution / temporal dependencies
11:45 Lunch on Your Own
1:00 Fast Imaging Techniques - Playing with k-space
- Partial echo, partial NEX, introducing fast spin echo imaging
1:50 Fast, or Turbo, Spin Echo - Part I
- Underlying concepts, role of echo train length, effective TE, limitations
2:40 Fast, or Turbo, Spin Echo - Part II - Echo Planar Imaging
- Clinical application, EPI utilization, and limitations
3:30 End of Session (topics & format subject to change)

Wednesday 7/19 (5.0 Hours)
7:30 Registration Desk Opens - Coffee, Tea & Pastries
8:00 Announcements - Matt Wilson
8:05 Fat Saturation and the Chemical Shift Artifact
8:55 Inversion Recovery - Part I - Underlying concepts, role of TI, TE, & TR
9:45 Coffee Break
10:05 Case Review
10:55 MR Contrast Agents - Mechanism of action, distribution, T2* shortening, time & concentration considerations, pulse sequence design
12:10 Interactive Session with Dr. Kanal
12:40 End of "Basic MR Physics" Program (topics & format subject to change)

Wednesday 7/19 (4.5 Hours)
1:45 MR Angiography
- Flow & time of flight effect
- Affects of: TR, TE, flip angle, slice thickness, slab thickness

2:35 High Relaxivity Contrast Agents
- How are they different and how do we use them?

3:50 Coffee Break
4:10 Sequence Optimization with High Relaxivity
4:40 Intracraniocerebral gadolinium accumulation and GBCA: 2017 update
5:55 End of Session

Thursday 7/20 (5.0 Hours)
7:30 Registration Desk Opens - Coffee, Tea & Pastries
8:00 Announcements - Matt Wilson
8:05 The ARM95 - What it means for you
8:35 Diffusion Weighted Imaging - What is it, how it works, how do we use it
9:50 Coffee Break
10:10 Perfusion Weighted Imaging - What is it, how it works, how do we use it; putting DW/PWI together clinically; DW/PWI matches & mismatches
11:25 Magnetic Resonance Spectroscopy - Basic concepts, clinical applications & case studies
12:40 End of Conference

9.5 Hour Advanced Topics & MR Safety / Intracraniocerebral Gadolinium Accumulation Update

Written Comments from Previous Attendees

"MRI made easy and fun!"
"Dr. Kanal has an excellent way of making the hardest topics understandable."
"I have learned more in four days than in 2.5 years!"
"Now I finally understand K-space!"
"The use of analogies was powerful, even artful."
"Every question was addressed thoroughly and completely."

Registration Form (Please Print - this form may be copied)

Please Note:
• "Basic MR Physics" only: July 17-19
• "Advanced Topics & MR Safety / Intracraniocerebral Gadolinium Accumulation Update" only: July 19-20

All Attendees: Early Fee $680* Standard Fee $780* Late Fee $720* 
** "Advanced Topics & MR Safety / Intracraniocerebral Gadolinium Accumulation Update" only: July 17-20
All Attendees: Early Fee $355* Standard Fee $375* Late Fee $395* 

Best Value - Attend Both Programs: July 17-20
All Attendees: Early Fee $795* Standard Fee $815* Late Fee $835*