Radiology On Call

A Primer for New Residents

Jon Chung, MD FRCPC
Goals

1. “Put a face to a name”
2. Provide a resident’s point of view
3. Offer a basic framework of issues to consider when ordering imaging
Outline

- Introduction to the Radiology Residents - AKA “The Outsiders”
- Getting what you need on call - AKA “Mission: Impossible”
- Radiation – AKA “Risky Business”
- Contrast Reactions - AKA “Cocktail”
Western Radiology Residents

- 22 Residents
- PGY1 – rotating internship
Western Radiology Residents

- PGY's
  - Mike Roth
    - Alberta
  - Jon Chung
    - Dalhousie
  - Derek Cool
    - Western
  - Pavlo Ohorodnyk
    - Queens
Western Radiology Residents

- PGY5s

Peter Yang Toronto
Kari Visscher Toronto
Matt Rochon Western
Brandon Nadeau Alberta
Ben Kwan Ottawa
Western Radiology Residents

- PGY4s

Fateme Salehi
Queens

Euan Zhang
Alberta

Joel Mercer
MUN

Eugenia Khorachkov
MUN

Stacey Speer
McMaster
Western Radiology Residents

- PGY3s

Sohaib Munir
Queens

Harry Marshall
Western
Klaudia Jumma
Queens

Vinod Ramlal
McMaster
Western Radiology Residents

- PGY2s

David Wang
UofT

Andrea Para
UofT

Caitlyn Ward
Western

Peter Lynch
UofT
Getting What You Need On Call

▪ Basics
  – Weekdays 5pm – 8am
  – Weekends & Holidays
  – Typically 1 resident on call, 1 on backup
  – When in doubt: page the radiology resident on call for that hospital

▪ Work Load
  – Average approximately 30 cross-sectional studies/night
  – Turn around time < 1 hour
  – Strokes/traumas subject to even stricter timelines
Getting What You Need On Call

- So, you’re ready to order a study.
  - What is the clinical question I am trying to answer?
  - Is the study indicated?
    - Do the potential benefits outweigh costs/risks?
    - Will this study change management overnight/over the weekend?
  - Is this the right test?
Getting What You Need On Call

- The Menu
  - CT, MR, US, interventional radiology, fluoroscopy
  - Radiography
  - IV Contrast
    - Yes or No?
    - Timing
    - Number of phases
  - Oral Contrast
    - Yes or No?
Getting What You Need On Call

- Oral Contrast

Extravasated Oral Contrast

Oral Contrast in Bowel
Getting What You Need On Call

- Ordering
Getting What You Need On Call

- The Importance of a Good History

Hyperdense Dot

“R/O Bleed”

“Left-sided symptoms”

“Right MCA stroke”
Getting What You Need On Call
Getting What You Need On Call

- Tips (take them for what they’re worth)
  - Approach every study as a consult, not an order
  - Provide an accurate and succinct history (HMHY)
  - Page, don’t call
  - We love guests
Radiation

- Ionizing Radiation $\rightarrow$ Nuclear DNA damage
  - Unrepaired or misrepaired DNA can cause mutations and carcinogenesis

- How bad is it?
  - We’re not quite sure
  - Much less than 1% but not zero
We Are Giving Ourselves Cancer

By RITA F. REDBERG and REBECCA SMITH-BINDMAN  JAN. 30, 2014

DESPITE great strides in prevention and treatment, cancer rates remain stubbornly high and may soon surpass heart disease as the leading cause of death in the United States. Increasingly, we and many other experts believe that an important culprit may be our own medical practices: We are silently irradiating ourselves to death.

The use of medical imaging with high-dose radiation — CT scans in particular — has soared in the last 20 years. Our resulting exposure to medical radiation has increased more than sixfold between the 1980s and 2006, according to the National Council on Radiation Protection & Measurements. The radiation doses of CT scans (a series of X-ray images from multiple angles) are 100 to 1,000 times higher than conventional X-rays.

Of course, early diagnosis thanks to medical imaging can be lifesaving. But there is distressingly little evidence of...
Radiation – Risky Business

- Additional Considerations
  - Pediatric Patients
    - Risks are magnified
    - Mortality risk for abdominal CT
      - 15 year-old 1/1400
      - 5 year-old 1/1100
      - Toddler 1/700
  - Pregnancy
  - High-risk for further imaging

Debriefing the Brief: It is Time for the Provision of Informed Consent before Pediatric CT¹

Dana M. Amos, MD
J. Keith Smith, MD, PhD
Richard C. Samuels, MD

In the wake of controversy surrounding the statistical risk projection models of radiation-induced cancer from medical imaging, two recent seminal studies that used direct epidemiologic data from large cohorts of children have emerged and confirmed that the use of computed tomography (CT) small prescrip. It is an example of right conduct in habit.
Radiation – Risky Business

Imaging overutilisation: Is enough being done globally?

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The discovery of X-rays by Roentgen in 1895 was one of the greatest discoveries with historical impact on each and every one of us. The ability to view anatomy and infer function of inner organs and tissues of human body has provided immense potential that have led imaging to therapeutic arena through interventions and follow-up. How much imaging is appropriate is a legitimate question to ask. This stems from recent emphasis on overutilization of medical imaging [1–2]. Overutilization of imaging has been defined as any application where imaging is unlikely to improve patient outcome. Being a probabilistic situation the uncertainties

What has not been commented on is the difference between developed and developing countries. While overutilization is becoming a problem for developed countries, lack of access remains an issue in a large part of the third world, despite the fact that there has been an increase in the rate of growth and unnecessary radiation dose to patients, in a number of developing countries, undergoing computed tomography (CT) and interventional procedures [3–10]. Even though access is limited in developing countries, inappropriate utilization of imaging modalities still exists. While defensive medicine and self-federal are relatively minor or

“...a significant fraction (perhaps 20 to 50 percent in some areas) of radiological examinations may be inappropriate.”
Radiation – Risky Business
Contrast Reactions

Consensus Guidelines for the Prevention of Contrast Induced Nephropathy

AKA Contrast-Associated Acute Kidney Injury
Contrast Reactions

- **Acute Contrast Reactions**
  - For low osmolar contrast media
    - Overall prevalence - 3.13%
    - Severe reactions - 0.04%
  - Pre-medication regimens available for those with a history of previous reactions

- **How to treat?**
Contrast Reactions

- Nephrogenic Systemic Fibrosis (NSF)
  - Rare manifestation of gadolinium administration
  - Irreversible fibrosis of the skin and organs
  - Generally, not concerned unless eGFR < 30 mL/min/1.73m²

NSF involving the skin of the forearm
Contrast Reactions

Intracranial Gadolinium Deposition after Contrast-enhanced MR Imaging

Purpose: To determine if repeated intravenous exposures to gadolinium-based contrast agents (GBCAs) are associated with neuronal tissue deposition.

Materials and Methods: In this institutional review board-approved single-center study, signal intensities from T1-weighted magnetic resonance (MR) images and postmortem neuronal tissue samples from 13 patients who underwent at least four GBCA administrations were evaluated.

“...intravenous administration of GBCA is associated with dose-dependent deposition in neuronal tissues that is unrelated to renal function, age, or interval between exposure and death.”
Take Home Points

▪ Imaging utilization is a complex issue deserving of continuous consideration of the potential benefits, harms and costs.

▪ We are all here to help patients. Radiology exists to help you. Let’s be good to each other.
References

- Brenner DJ. What we know and what we don’t know about cancer risks associated with radiation doses from radiological imaging. Br J Radiol 2014;87(1035):20130629.


Questions?