

## Impact of Reviewing Our Doses: Lessons Learned at the Massachusetts General Hospital

Rajiv Gupta, MD, PhD  
Neuroradiology, Massachusetts General Hospital  
Harvard Medical School







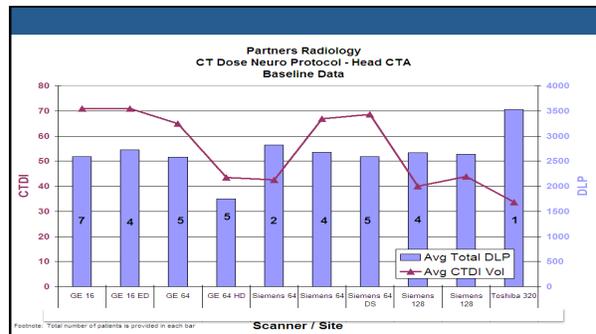
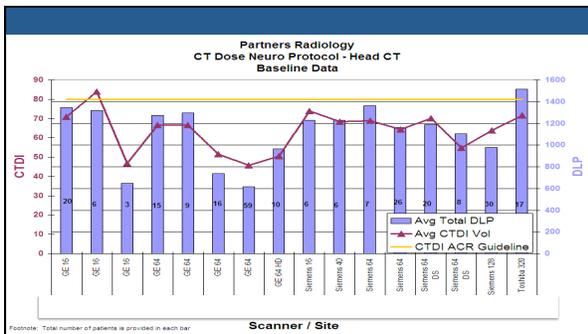
**Radiation Fallout: Which Screenings Are Safe?**  
By Dr. Mehmet Oz

High-tech screenings could be exposing you to unnecessary radiation, Mehmet Oz, MD, explains how to dial down your dose.

## Outline

- Partners Dose Survey
- Radiology Order Entry System
- Response and results

## Partners CT Dose Survey 2009

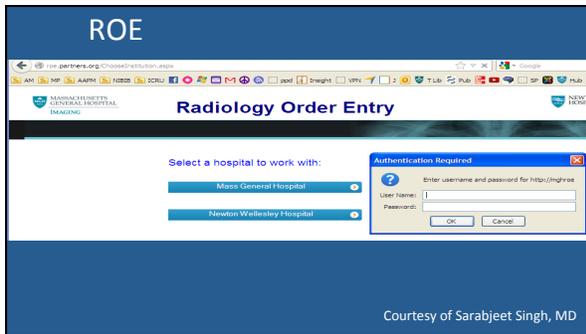


## Conclusion of the Survey

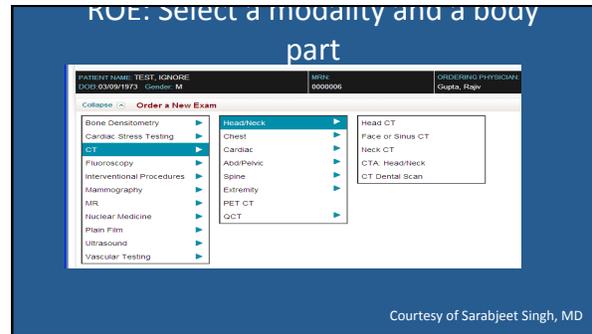
- Large variations exist among:
  - Sites
  - Scanners with in the same site
- Less used scanners and protocols are more prone to “dose” neglect
- Another finding: Many CT scans on the same patient
  - Brenner, NEJM 2008

## Make Sure each Scan is Justified

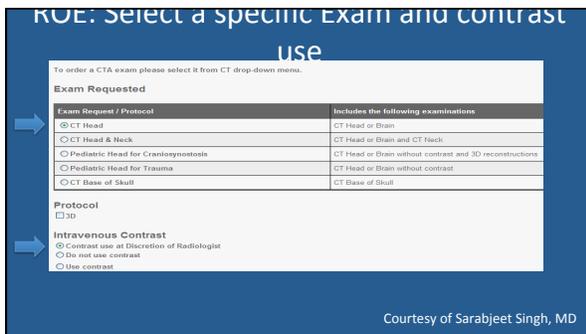
- Even a low-dose CT is too much dose when inappropriately ordered
- Check with physician if in doubt; Triage when appropriate
- About 1/3<sup>rd</sup> of CT are inappropriate!
  - Brenner, NEJM 2008



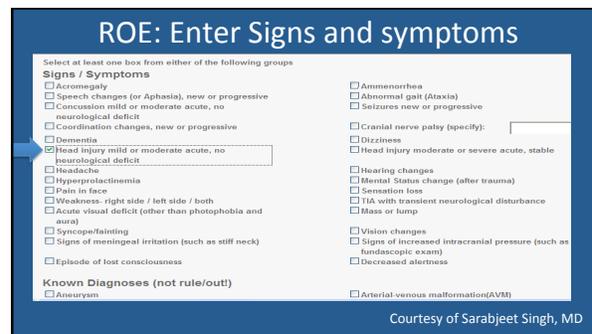
Courtesy of Sarabjeet Singh, MD



Courtesy of Sarabjeet Singh, MD



Courtesy of Sarabjeet Singh, MD



Courtesy of Sarabjeet Singh, MD

### ROE: Shows previous exams

**RADIATION ALERT!**  
The patient had **4 previous CT Scans**, (more info at Partners Imaging Centers).

Exam Description (Site)	Scheduled Date
Abdominal Contrast, ASPECT Two Contrast, (MGH)	11/20/2008
CT Bone Mineral (MGH)	01/09/2009
CT Bone Mineral (MGH)	01/19/2009
CT CHEST (MGH)	03/08/2009

Click 'OK' to proceed to order the exam or 'Cancel Exam' to cancel the exam.

Courtesy of Sarabjeet Singh, MD

### Avoid Unintentional Repeats & INFORM

**RADIATION ALERT!**  
The patient had **1** (Click the number to view) previous CT scans at Partners Imaging Centers.  
How to interpret this result:  
Click 'OK' to proceed to order the exam or 'Cancel Exam' to cancel the exam.

Exposure to X Rays may increase the risk of developing cancer. The risk is difficult to quantify (see links below for more information). Radiation-related cancers are delayed following exposure, often by many years, and therefore this risk may not be clinically important for elderly patients or those with critical illness. Children are more sensitive to radiation, and have on average longer life expectancy after exposure, so are at higher risk than adults.

Organs vary in their sensitivity. Exposure to one organ does not affect the cancer risk FOR other organs. The cancer risk is related to the cumulative dose and the amount of exposed tissue. There is no safe "threshold" below which there is no risk.

Although it is possible that several hundred cancer deaths may occur each year in the US due to exposure from CT scans, this number is a very fraction of total cancer deaths. The risk of radiation-induced cancer must be balanced against health benefits of the scan.

Risks from radiation exposure can be limited by:

- 1) Performing a CT scan only when essential
- 2) Limiting the exposed area to the minimum required for diagnosis
- 3) Performing studies with the lowest dose achievable

MGH and Partners radiology departments use protocols to minimize the exposed field and use the lowest effective amount of radiation.

Click 'OK' to proceed to order the exam or 'Cancel Exam' to cancel the exam.

### ROE: evidence-based appropriateness

**Head CT is indicated for the clinical indications provided**

Options:

- Proceed with exam
- Cancel or adjust exam
- Change indications and reschedule

Alternate procedures to consider:

Patient Name: TEST, IGNORE  
DOB: 03/09/1973 Gender: M  
MRN: 0000006  
Ordering Physician: Gupta, Rajiv

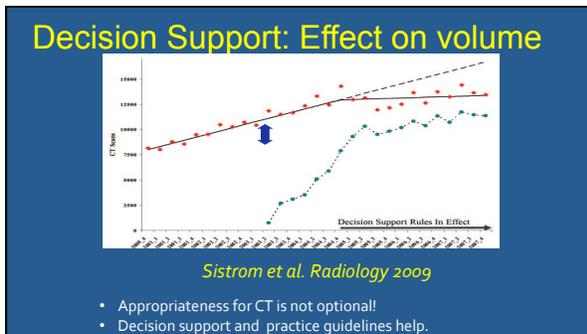
Courtesy of Sarabjeet Singh, MD

**Select Site and Schedule Exam**

Location	Search Calendar	First Available
Boston Logan Campus		Thu 3/7/2013 5:03 PM
Boston Valley Center		Fri 3/1/2013 4:00 PM
Chelsea		Tue 2/26/2013 1:00 PM
Danvers (MGH/MS)		Wed 2/27/2013 3:00 PM
Waltham		Tue 2/26/2013 1:45 PM
Worcester		Tue 2/26/2013 1:15 PM
Norfolk College Hospital		Tue 2/26/2013 2:00 PM

Buttons: Cancel, Edit, Reschedule, Print Instructions For All Scheduled Exams

Courtesy of Sarabjeet Singh, MD

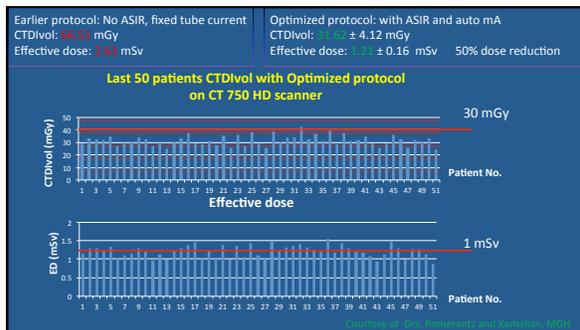


### Insight

*"It's not the science, it's the process"*

## Changes

- Decision support via ROE:
  - Justify each scan
- Pay attention to the mechanics
- Minimize mA; use mA modulation
- Use Auto-kV when available
- Avoid protocol clutter
- Tailor protocol to clinical situation
- Special attention to pediatric scans
- Only one person in each division allowed to make changes to the protocol
- Minimize variability



## Summary

- Science of radiation dose is important
- Process of how protocols are designed, instituted, and managed is equally important