

1

---

---

---

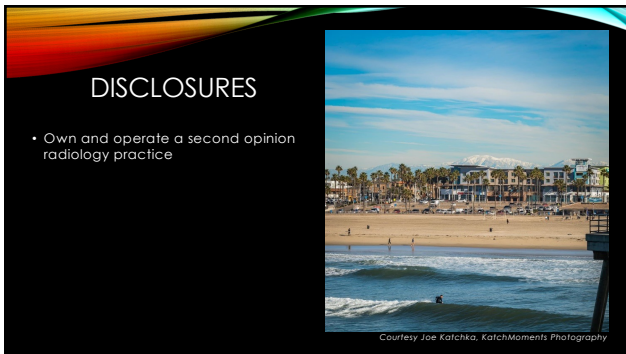
---

---

---

---

---



2

---

---

---

---

---

---

---

---



3

---

---

---

---

---

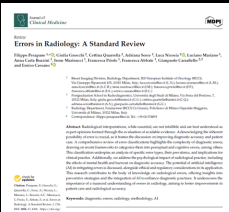
---

---

---

## ERROR IN RADIOLOGY

- Errors or delays in accurate diagnoses can impact patient care
- Overall prevalence of radiology errors is 3-4%, unchanged since 1940's
- Chiropractors may share responsibility for at least the professional components of the exam
  - In house, vs outside imaging



4

---

---

---

---

---

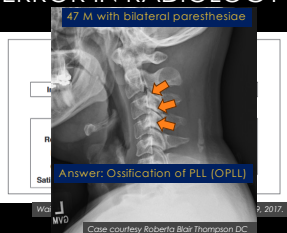
---

---

---

## ERROR IN RADIOLOGY

- Most common in musculoskeletal and spine radiography
- Most errors are due to the person interpreting
- Many factors influence interpretation



5

---

---

---

---

---

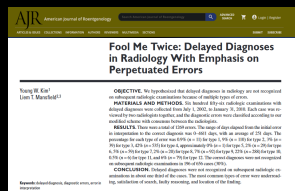
---

---

---

## ERROR IN RADIOLOGY

- Sources and causes of errors
- Most common types of diagnostic error
  - 71% are "missed"
    - Under-reading 42%
    - Satisfaction of search 22%
    - Location 7%
  - 9% faulty reasoning
    - Not missed
    - Misinterpretation



6

---

---

---

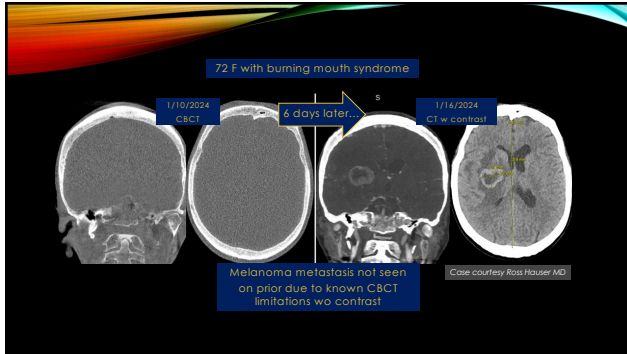
---

---

---

---

---



7

---

---

---

---

---

---

---

---



8

---

---

---

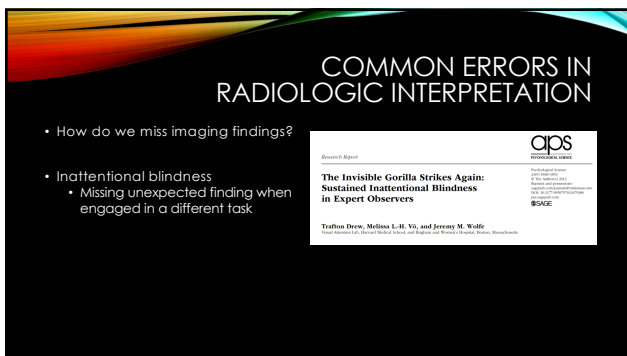
---

---

---

---

---



9

---

---

---

---

---

---

---

---

### COMMON ERRORS IN RADIOLOGIC INTERPRETATION

- 24 radiologists looked for nodules (lung cancer screening) in 5 CTs
  - 3 min / CT!
  - Eye position tracked
- 20 of 24 radiologists failed to report seeing a gorilla
  - 5.8 secs viewing 5 slices with gorilla
  - Eye tracking showed 12 looked at the location of gorilla

10

---

---

---

---

---

---

---

---

---

---

### COMMON ERRORS IN RADIOLOGIC INTERPRETATION

- Naïve observers (no training) vs radiologists
- None reported

11

---

---

---

---

---

---

---

---

---

---

### COMMON ERRORS IN RADIOLOGIC INTERPRETATION

- Cognitive biases

**65 F right hip pain**  
**17 year breast cancer remission**

*everybody*

*look again!*

*colleague*

*colleague*

**TABLE I: Cognitive Biases Relevant to Radiology and Corrective Strategies**

Cognitive Bias	Description	Corrective Strategies
Anchoring	Failing to adjust initial impression in light of contrary information. Associated with confirmation bias in which clinicians modify interpretation of subsequent information to suit initial predictions to support their hypothesis (Fig. 4).	Seek to disprove initial diagnosis rather than to confirm it. Avoid early guesses and reconsider diagnosis with worsening symptoms.
Framing	Diagnoses are influenced by the way a problem is worded or framed. The diagnostic possibilities are mentally restricted by the referral situation (Figs. 4 and 5).	Initially read study objectively without reviewing clinical history. Remember that clinicians may have biases and that even a strongly held clinical interpretation may be incorrect.
Availability	The tendency to consider some diagnoses to be more likely if they readily come to mind. This bias may be especially frequent after a known diagnostic miss (Fig. 6).	Be aware of the tendency to overestimate the frequency of previously missed or memorable cases. Objective information of the true base rate of diseases should be used when possible.
Alliterative	Results from the influence of <i>colleague</i> have on each other. Previous interpretations (even from the same reader) influence the interpretation of the current examination (Figs. 7 and 8).	Attempt to increase diagnostic possibilities to break tendency to simply repeat what was previously reported. When possible, read old reports after new interpretation.

Note—These errors occur secondary to mental shortcuts inherent in the heuristic intuitive method of diagnosis. Because these biases are unconscious, they are notoriously difficult to recognize and avoid; however, awareness may decrease susceptibility.

White et al. Interpretive Error in Radiology. AJR 2004; 173:49-2012. | Last modified: Timothy Cowan, DC

12

---

---

---

---

---

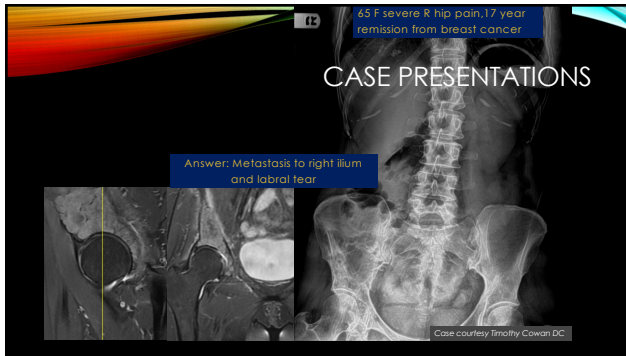
---

---

---

---

---



13

---

---

---

---

---

---

---

---



14

---

---

---

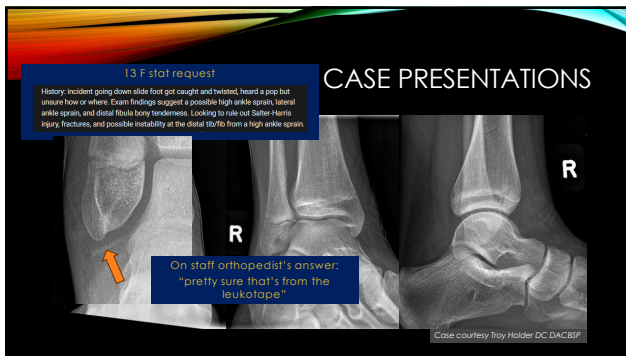
---

---

---

---

---



15

---

---

---

---

---

---

---

---



16

---

---

---

---

---

---

---

---

**CASE PRESENTATIONS**

- Time management
  - Most errors occur when fatigued, near the end of the day
- Workflow balance
  - Dedicated time for reviewing imaging

Mid 30's man with elbow pain seeking 3<sup>rd</sup> opinion.

1<sup>st</sup> opinion: tumor, surgery recommended

2<sup>nd</sup> opinion: benign cyst, no surgery

Answer: No tumor or cyst.

Dorsal olecranon spur.

Case courtesy Tony Brinker DC, DACBSP

17

---

---

---

---

---

---

---

---

**CASE PRESENTATIONS**

- Minimizing error
  - Checklists
    - ABCs for spine
  - Second opinion
  - Computer-aided
- Technological progress
  - Viewing software

55 F with chronic neck pain

Case courtesy Elizabeth Hoefler DC, DCCJP

18

---

---

---

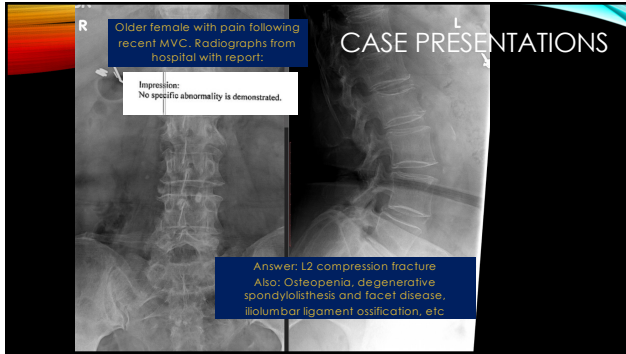
---

---

---

---

---



19

---

---

---

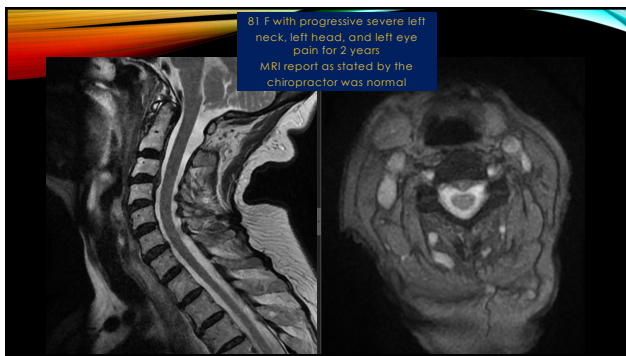
---

---

---

---

---



20

---

---

---

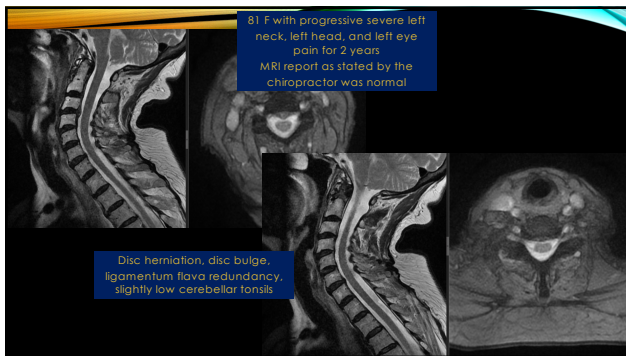
---

---

---

---

---



21

---

---

---

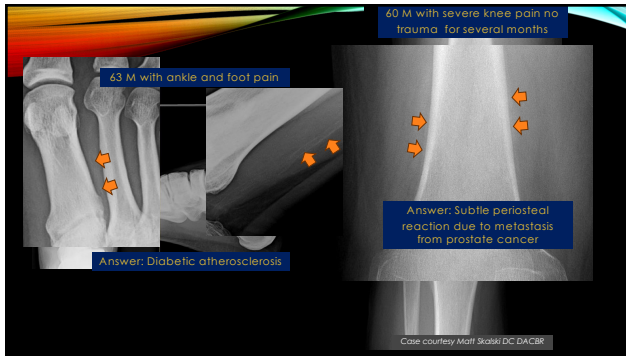
---

---

---

---

---



22

---

---

---

---

---

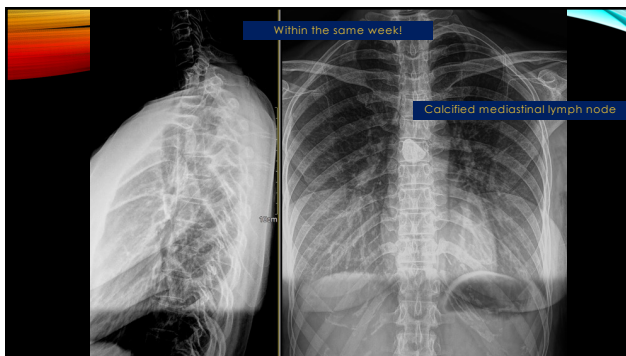
---

---

---

---

---



23

---

---

---

---

---

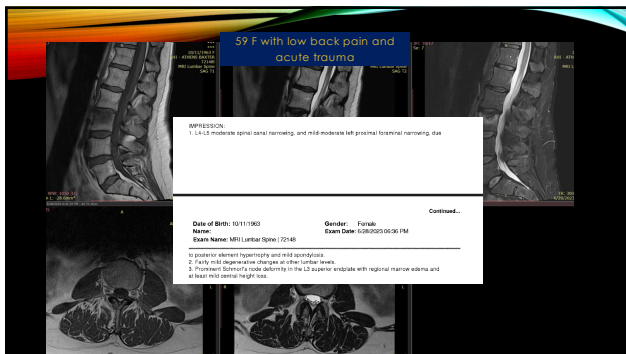
---

---

---

---

---



24

---

---

---

---

---

---

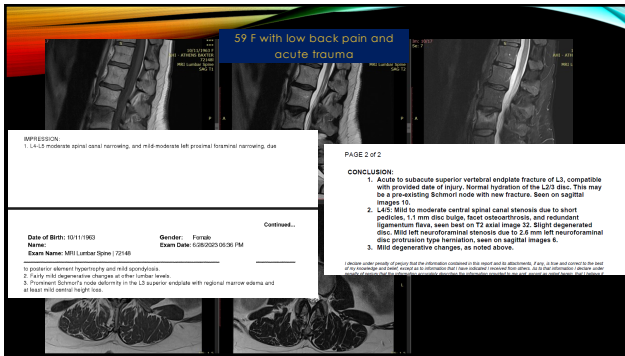
---

---

---

---





25

---

---

---

---

---

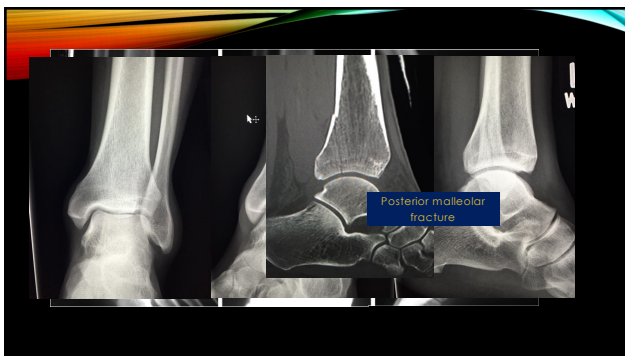
---

---

---

---

---



26

---

---

---

---

---

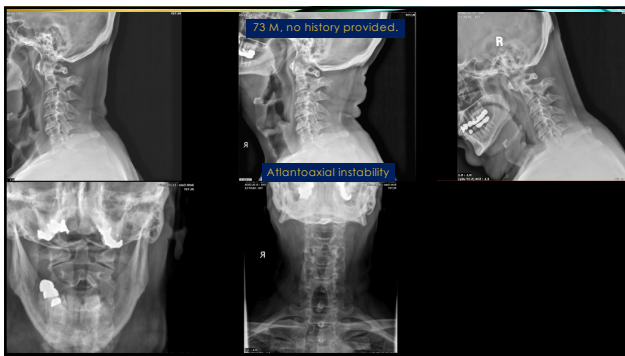
---

---

---

---

---



27

---

---

---

---

---

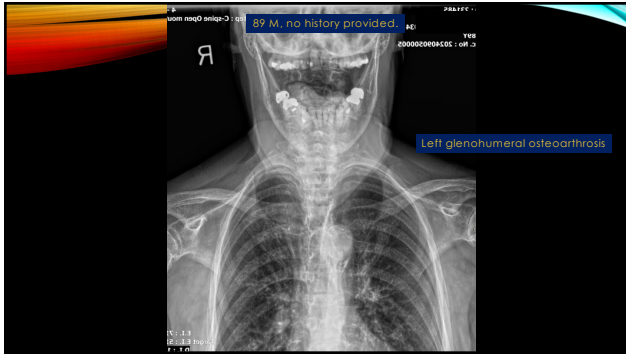
---

---

---

---

---



28

---

---

---

---

---

---

---

---

## CONCLUSIONS

- Dedicate ample time
- Checklists: ABCs
- Be aware of various biases
  - Keep looking, and look again
- Have someone else look
  - Colleague and/or DACBR
  - AI/CAD

29

---

---

---

---

---

---

---

---

## REFERENCES

Bruno MA, Walker EA, Abujudeh HH. Understanding and confronting our mistakes: the epidemiology of error in radiology and strategies for error reduction *RadioGraphics*. 35(6):1468-76, 2015

Bruno MA, Waite SA. Learning from our mistakes (Opinion) *J Am Coll Radiol* 2020

Drew T, Vo MLH, Wolfe JM. The invisible gorilla strikes again: Sustained inattention blindness in expert observers. *Psychol Sci* Sept 24(9):1848-53, 2013

James JT. A new, evidence-based estimate of patient harms associated with hospital care *J Patient Safety* 9(3):122-8, 2013

Kim YW, Mansfield LT. Fool me twice: Delayed diagnoses in radiology with emphasis on perpetuated errors *Am J Radiol* 202;465-70, 2014

Kahn LT, Corrigan JM, Donaldson MS (eds). *To err is human: building a safer health system*. Washington DC: National Academy Press, 2000

Makary MA, Daniel M. Medical error: the third leading cause of death in the US. *BMJ* 353:2139, 2016

Pesapane F et al. Errors in radiology: a standard review. *J Clin Med* 13:1-12, 2024

Simons DJ, Chabris CF. Gorillas in our midst: sustained inattention blindness for dynamic events. *Perception* 28(9):1059-74, 1999

Waite S et al. Interpretive error in radiology. *Am J Roent* 208(4):711-939, 2017

30

---

---

---

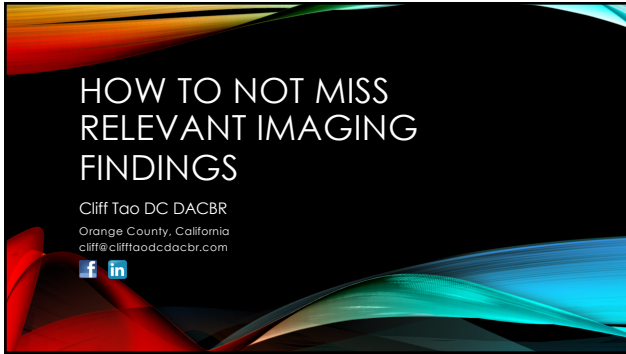
---

---

---

---

---



---

---

---

---

---

---

---

---

31