Plain abdominal X-ray

Indications:

- Obstruction
- Perforation/ Peritonitis
- Renal colic
- Ascites- we can some times see dilated bowel loops.

WHAT IS DIFFERENT ABOUT A RADIOLOGIST'S BRAIN?

Published in Radiology 2005;236:983-989

Orna Katz

Internal Medicine B

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PURPOSE OF THE STUDY

To investigate neuronal activation during processing of *radiologic* and *control images* by experienced radiologists and nonradiologists subjects, by using event-related functional MRI

(does learning and experience modify neuronal Representations?)

Materials and methods - subjects

- 12 experienced radiologists (mean age 35.8y+3.6 ,10M 2 F)

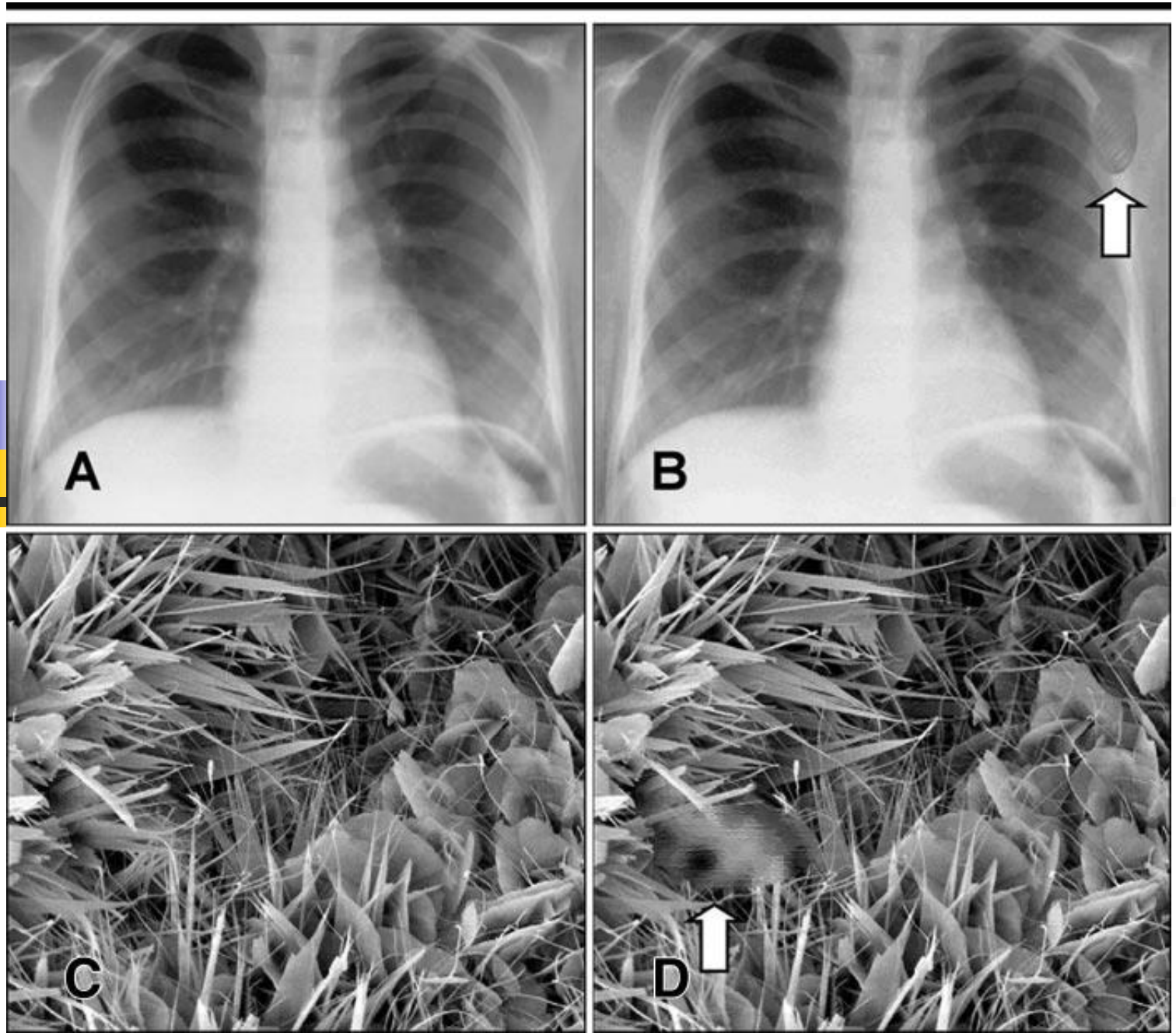
- 12 nonradiologists subjects (mean age 33_+6.9, 8M 4F academic background economy ,physics ,law)

Materials and methods – stimuli

20 radiologic images –radiographic,CT,MRI,US

20 electron microscopic images –as control images completely artificial not occurring in everyday life.-not evoking emotions or memories

Artificial modifications were introduced in small varying parts of all images (exp.motion.mosaic,glass filter)


A
B
C
D

Materials and methods – task

- All modification were made subtle since a challenging task was reqiuerd so that the subjects will actively scan the images for few sec.
- Each image existed in 2 variants- original and manipulated , subjects were instructed to decide whether the image is original or manipulated -2 response buttons were available.
- The radiologic dg –wasn't the focus of this investigation ,but the processing of trained stimuli.

Results-correct response

Mean accuracy

- Radiologists

radiologic image:

58.3%_+16.7%

control image:

55.3%_+15.9%

- Non radiologic subjects

Radiologic image:

58.9%_+8.5%

Control image:

52.8%_+12.5%

Results-Mean response latency

- Radiologists

Radiologic image:

4.96sec_+0.96sec

Control image:

4.99sec_+0.85sec

- Nonradiologists

Radiologic image:

5.33sec_+0.92sec

Control image:

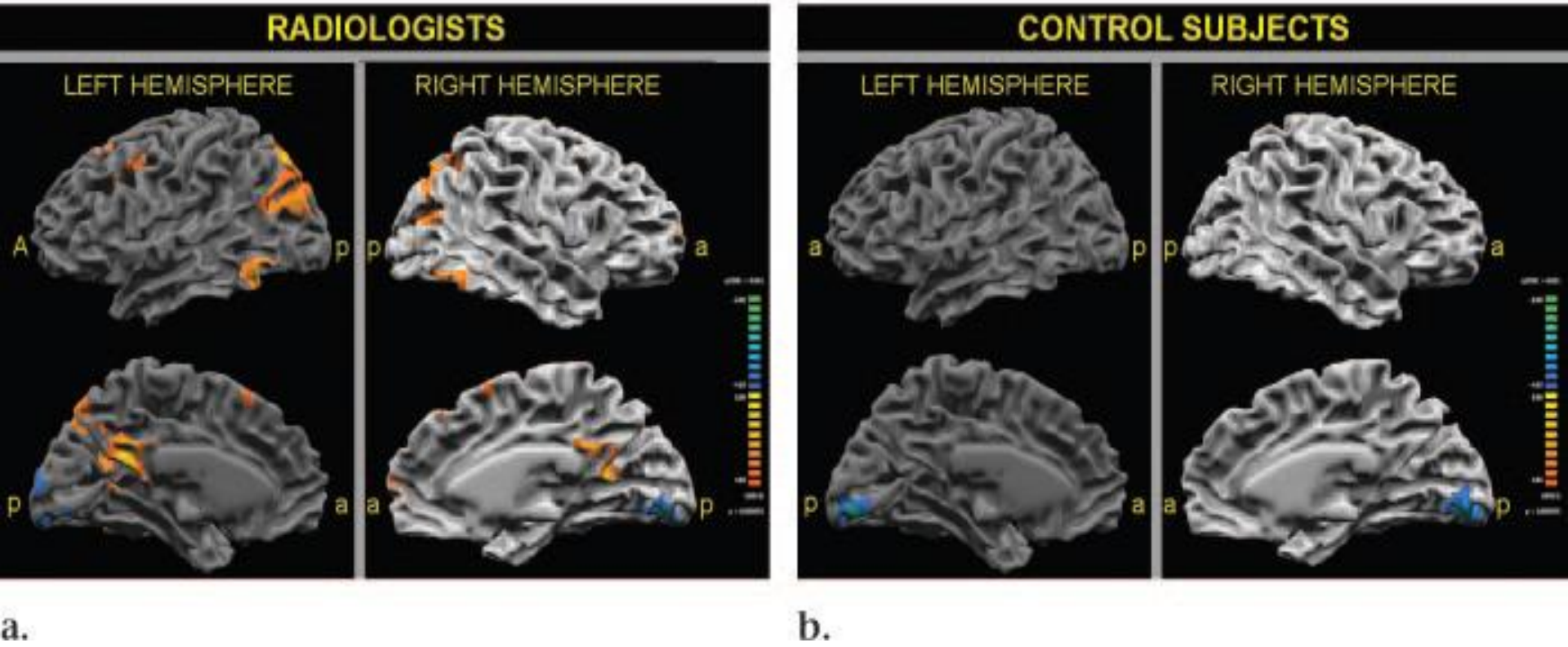
5.43sec_+1.09sec

- On average, radiologists responded 0.404 seconds faster than the control subjects

Results - Comparison between images activation

- Stronger activation for radiologists images were present exclusively in the radiologists – at the following areas:
- bilateral middle ,inferior *temporal gyrus*
- Bilateral medial ,middle *frontal gyrus*
- *Left superior* ,inferior frontal gyrus

Results- Comparison between images activation

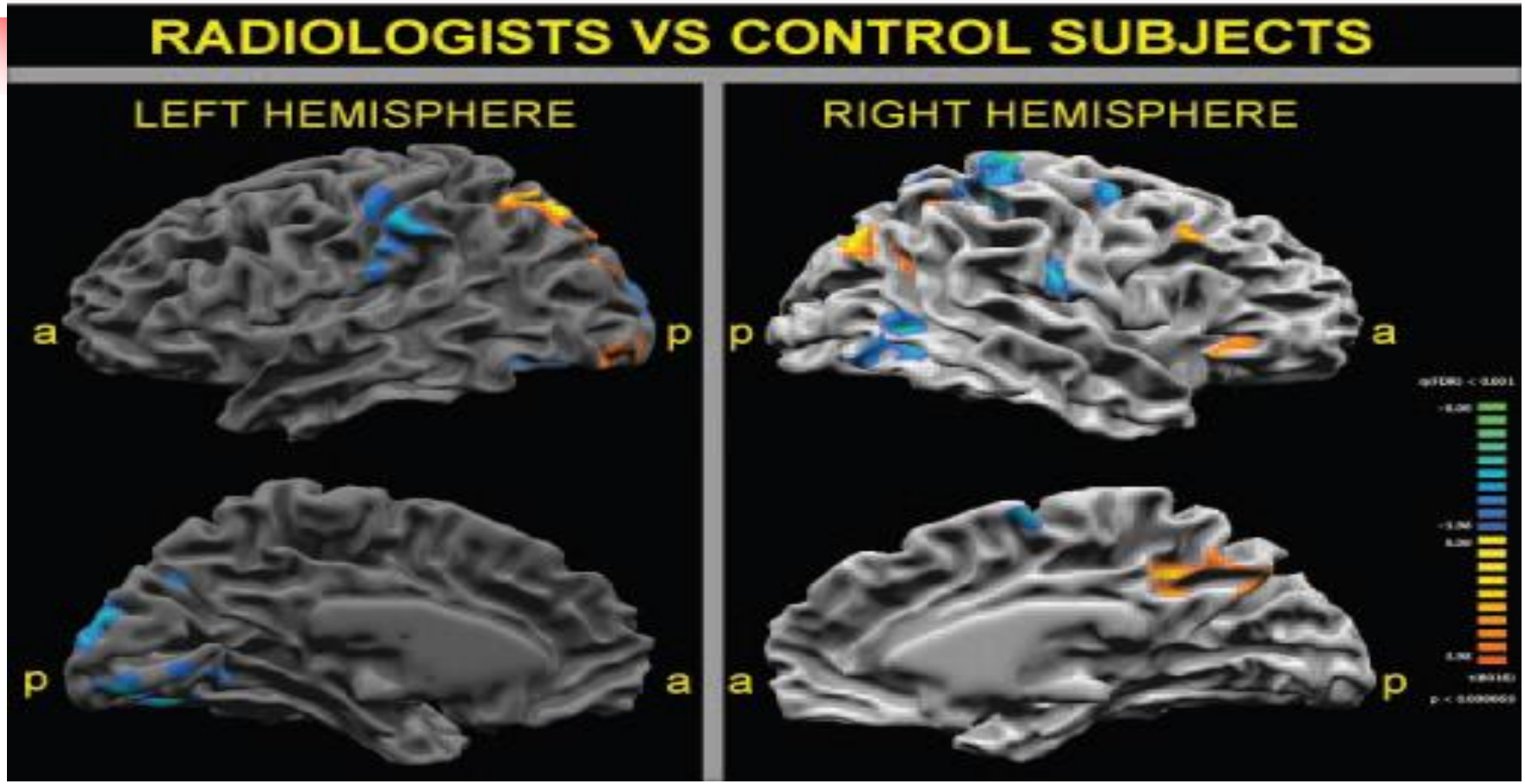


a. b.

Radiologic image activators- yellow,red

Control image activators- blue, green

Comparession between the subjects in control image



- Stronger activation in radiologists- yellow,red –left dominant posterior superior and inferior parietal lobule
- Stronger activation nonradiologists- blue.green- right dominant anterior superior and inferior parietal lobule and postcentral gyrus

Interpretation

Radiologists:

- left dominant- mental rotation of more complex stimuli
- posterior superior and inferior parietal lobule-attention and spatial working memory

Nonradiologists:

- right hemisphere - tactile discrimination of objects ,so they Imagine how the presented stimulus feels.
- The anterior superior parietal lobule has been shown to be critical For tactile discrimination
- the tactile representation might be a part of the object recognition process

Interpretation

- These observations are consistent with the view that the adult brain has capacity for functional and structural neuroplasticity—that is, the modification of neuronal representation in response to training and experience.

Similar studies…

- equivalent interaction of expertise and neuronal activation has been shown in professional musicians.
- Professional piano players, when compared with control subjects, show smaller motor activation clusters during an over trained complex finger movement task

Similar studies …

- structural changes due to extensive experience have been documented .

Licensed London taxi drivers, known for extensive navigation experience, show a significantly larger volume of the *posterior hippocampus* when compared with control subjects who did not drive taxis

Conclusion

- With radiologic experience there is selective enhancement of brain activation with *radiologic images* and the visual system is modified in general.