

ANSWER KEY

PRESENTATION 1: White Spots and Black Dots in the Brain, Part 1

QUESTION 1

All of the following can cause "white spots" (T1 shortening) on MR brain scans except?

- a. Mineral deposition
- b. Air
- c. Melanin
- d. Fat

DISCUSSION RE: ANSWER OPTIONS

The correct answer is (b).

Mineral deposition, melanin, fat, subacute hemorrhage, and protein all may cause foci of T1 shortening on T1WIs. Air is black on T1WIs.

REFERENCE FOR QUESTIONS 1

Cakirer S et al: Spontaneously T1-hyperintense lesions of the brain on MRI: a pictorial review. *Curr Probl Diagn Radiol* 2003; 32: 194-217.

QUESTION 2

The best sequence for detecting cerebral microbleeds on MR scans is?

- a. Susceptibility-weighted imaging (SWI)
- b. Gradient-refocussed imaging (GRE)
- c. Standard T2-weighted spin echo
- d. Fast spine echo T2-weighted (FSET2)

DISCUSSION RE: ANSWER OPTIONS

The correct answer is (a).

The most sensitive is SWI; the least sensitive sequence is standard T2-weighted spin echo imaging.

REFERENCE FOR QUESTIONS 2

Cheng AL et al: Susceptibility-weighted imaging is more reliable than T2*-weighted gradient-recalled echo MRI for detecting microbleeds. *Stroke* 2013; 44: 2782-6.

QUESTION 3

All of the following can cause "black dots" ("blooming" foci) on SWI/T2* scans except?

- a. Air
- b. Amyloid angiopathy
- c. Fat emboli
- d. Oxyhemoglobin

DISCUSSION RE: ANSWER OPTIONS

The correct answer is (d).

Oxyhemoglobin is diamagnetic and does not cause field inhomogeneities. Deoxyhemoglobin is paramagnetic and can be normally seen in intracranial veins on SWI sequences.

REFERENCE FOR QUESTIONS 3

Bosemani T et al: Pitfalls in susceptibility-weighted imaging of the pediatric brain. *J Neuroimaging* 2013; Sep 9 (epub ahead of print).

PRESENTATION 2: White Spots and Black Dots in the Brain, Part 2

QUESTION 4

The most important clinical information in determining whether multifocal T2/FLAIR hyperintensities in the brain are normal or abnormal is?

- a. Patient age
- b. History of demyelinating disease
- c. Presence of contrast enhancement
- d. Lesion suppression on FLAIR

DISCUSSION RE: ANSWER OPTIONS

While all are helpful, the correct answer is (a). White matter hyperintensities (WMHs) are common in older patients. While many investigators cite a rough prevalence of one "white spot" per decade up to 50 years as normal, the Rotterdam Scan Study showed the magnitude of change accelerates in the fifth and sixth decades. WMHs in health elderly patients increase with age independent of hypertension or systemic atherosclerotic vascular disease.

ORGANIZATION: Los Angeles Radiological Society
VENUE: 66th Annual Midwinter Radiology Conference
DATE: February 22-23, 2014
TITLE: Neuroimaging: "White Spots" and "Black Dots" in the Brain

Presenter:

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REFERENCE FOR QUESTION 4

Ikram MA et al: The Rotterdam Scan Study: design and update up to 2012. *Eur J Epidemiol* 2011; 26: 811-24.

QUESTION 5

The most common cause of multifocal T2/FLAIR hyperintensities in the brain is?

- a. Lacunar infarcts
- b. Perivascular spaces
- c. Arteriolosclerosis
- d. Demyelinating disease

DISCUSSION RE: ANSWER OPTIONS

The correct answer is (b).

Perivascular (Virchow-Robin) spaces occur in all patients at all ages, although they tend to become more prominent with age. Perivascular spaces are found in typical locations (most commonly in the inferior third of the basal ganglia, around the anterior commissure) and suppress on FLAIR.

REFERENCE FOR QUESTION 5

Martinez-Ramirez S: Topography of dilated perivascular spaces. *Neurology* 2013; 80: 1441-6.

QUESTION 6

If you identify multifocal hyperintensities forming a line in the deep cerebral white matter on axial T2/FLAIR scans you should look for?

- a. High-grade ipsilateral carotid stenosis
- b. Imaging findings of multiple sclerosis
- c. Enhancement following contrast administration
- d. Evidence for systemic malignancy

DISCUSSION RE: ANSWER OPTIONS

The correct answer is (a). The lesions are along the deep white matter watershed ("borderzone") and are ischemic in origin, typically from stenosis of the cervical or cavernous internal carotid artery.

REFERENCE FOR QUESTIONS 6

Mangla R et al: Border zone infarcts: pathophysiologic and imaging characteristics. *RadioGraphics* 2011; 31: 1201-14.