

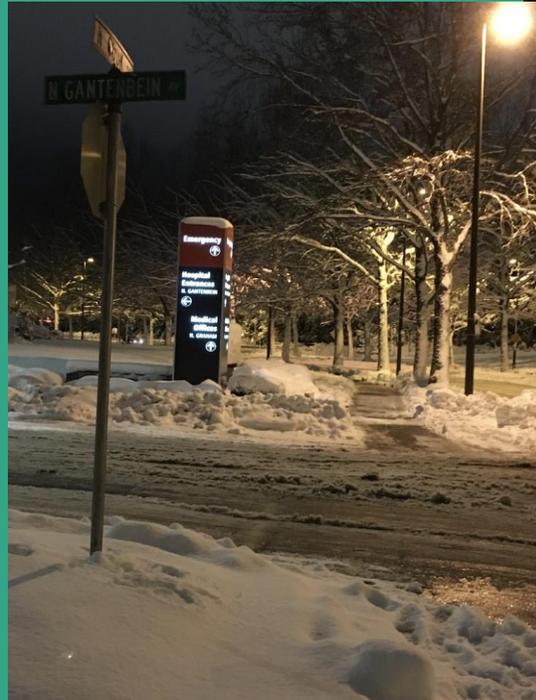
# **COGNITIVE DYSFUNCTION IN THE ELDERLY PATIENT QUIZ #34**

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**THIS QUIZ IS PUBLISHED ON BEHALF OF THE EDUCATION COMMITTEE OF SNACC**



# *1. All of the following are true regarding delirium in the elderly EXCEPT:*

- a. Dopamine, GABA and Acetylcholine are thought to be involved in the pathophysiology of delirium
- b. Delirium in the elderly is associated with an increased length of hospital stay
- c. Delirium occurs in 60-80% of patients in the intensive care unit
- d. Post-operative delirium (POD) is synonymous with post-operative cognitive dysfunction



*a. Dopamine, GABA and Acetylcholine are thought to be involved in the pathophysiology of delirium*

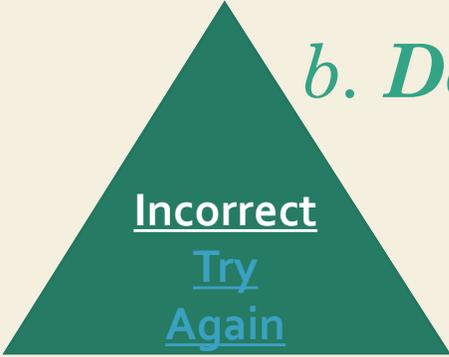
Incorrect

Try

Again

This is true. The occurrence of delirium is thought to involve excess dopamine and depletion of acetylcholine. Excess dopamine causing increased neuronal excitability and GABA and acetylcholine effecting a decrease in neuronal excitability leads to neuronal instability and unpredictable neurotransmission. Other apparent factors contributing to delirium include inflammatory mediators like cytokines which may alter neuronal activity, metabolic derangements, sedatives and analgesics.

*Pandharipande et al, Delirium: acute cognitive dysfunction in the critically ill, Curr Opin Crit Care, 2005;11:360-8*



Incorrect

Try  
Again

*b. Delirium in the elderly is associated with an increased length of hospital stay*

This is true. In hospitalized elderly, the development of delirium is associated with a prolonged hospital stay, increased nursing home placement at discharge and an in-hospital mortality of 25-33%.

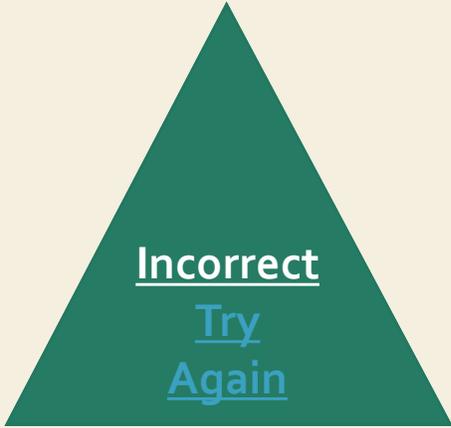
*Inouye et al, Delirium: a symptom of how hospital care is failing older persons and a window to improve quality of hospital care. Am J Med 1999;106:656-573*

*Pandharipande et al, Delirium: acute cognitive dysfunction in the critically ill, Curr Opin Crit Care, 2005;11:360-8*

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## *c. Delirium occurs in 60-80% of patients in the intensive care unit*



Incorrect  
Try  
Again

This is true. The prevalence of delirium in intensive care unit research may range from 20-80% depending on the patient population and how POCD is defined. As more and more elderly require ICU care, this incidence will increase. In a large prospective trial in mechanically ventilated critically ill patients, delirium was found to be an independent predictor of prolonged mechanical ventilation, and these patients had a three-fold increased risk of death at 6 months.

The cost of care in regards to these 2-3 million older patients who develop delirium in the hospital accounts for 4 billion dollars in medicare spending.

*Ely et al, Delirium as a predictor of mortality in mechanically ventilated patients in the intensive care unit. JAMA, 2004;291:1753-1762*

*Pandharipande et al, Delirium: acute cognitive dysfunction in the critically ill, Curr Opin Crit Care, 2005;11:360-8*

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## *d. Post-operative delirium (POD) is synonymous with post-operative cognitive dysfunction*



This statement is false. In DSM-IV, "The essential feature of delirium is a disturbance in consciousness that is accompanied by a change in cognition that cannot be ...accounted for by a preexisting ..dementia" This disturbance typically lasts a few days. The Confusion Assessment Method (CAM) is a bedside rating scale to help clinicians diagnose POD. Elderly men with preoperative cognitive dysfunction are at increased risk for POD.

POCD is characterized by a decline in a variety of Neuropsychological domains like memory, executive functioning, and speed of processing. This disturbance may last weeks, months, or longer and the most important risk factor is increasing age. POCD in most patients improves, however for 1% POCD becomes chronic and in this group there is associated increased mortality.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*



## 2. Which of the following is **TRUE** regarding dementia?

- a. Vascular dementia is the most common type of dementia
- b. Delayed emergence is not a problem in these patients
- c. Dementia may alter baseline BIS values
- d. Postoperative delirium in patients with dementia occurs with similar frequency as patients without pre-existing dementia



## *a. Vascular dementia is the most common type of dementia*

Incorrect  
try again

This statement is false. Vascular dementia or multi-infarct dementia is the second most common cause of dementia (20% of cases). It is caused by atherosclerosis compromising CBF. Associated co-morbidities include hypertension, hypercholesterolemia, CAD, and DM. Alzheimer's disease is responsible for most cases of dementia (50%-70%). This irreversible cause of dementia is caused by abnormal deposits of protein in the brain destroying cells. Dementia is notable in our elderly population with increasing frequency as patients age beginning at 65 years. By age 90, >50% of persons are affected.

*Cottrell and Young's Neuroanesthesia 2010, Mosby Elsevier, PA Ch21*

*Lemolo et al, Pathophysiology of vascular dementia. Immunity and ageing;2009 6(13):1-9*

## *b. Delayed emergence is not a problem in these patients*

Incorrect  
try again

This statement is false because delayed emergence is a problem for these patients. Secondary symptoms of Alzheimer's disease like depression, anxiety, agitation, hallucinations, and sleep disorders can be especially troublesome for this population. It is imperative that anesthesiologists be aware of the various treatment remedies included in patients' medical therapy like clonazepam (for anxiety), Zolpidem (Ambien) or Eszopiclone (Lunesta) for sleep which may contribute to delayed emergence from anesthesia.

*Eckel, et al Anesthesia management of the patient with dementia. In Sieber Geriatric anesthesia. 2007 McGraw-Hill New York. 337-349*

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## *c. Dementia may alter baseline BIS values*



This is true. Renna et al studied 72 patients aged 75 years old assessed with a Mini-Mental State Test: 36 with Alzheimer's or multi-infarct dementia and 36 controls. BIS was recorded from the Aspect A-2000 EEG monitor. Fourteen of 36 (38%) dementia patients and 4 of 36 (11%) controls had mean baseline BIS < 93 (P 0.006) with normal awake BIS baseline values considered to be 96-99. Larger studies will be helpful in providing additional clarification of the significance and utility of these findings. Nevertheless the authors do recommend that when BIS is used as a cerebral monitor in the elderly, baseline recording be taken before induction to alert the provider to the possibility of low initial values.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*

*Renna et al, Low baseline bispectral index of the electroencephalogram in patients with dementia, Anesth Analg, 2003;96:1380-5*



Incorrect  
try again

## *d. Postoperative delirium in patients with dementia occurs with similar frequency as patients without pre-existing dementia*

This statement is false. Lee et al evaluated 425 patients (average age 80 years) with acute hip fracture for surgery with and without dementia preoperatively for cognitive problems postoperatively using the confusion assessment method (CAM) before surgery and on post-operative day 2.

While the accuracy of pre-operative dementia determination in this patient population is unclear, the authors found a higher incidence of delirium in the group of patients with dementia (56%) than in the group without dementia (26%) ( $p < 0.001$ )

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*

*Lee et al, Predisposing factors for postoperative delirium after hip fracture repair in individuals with and without dementia, J Am Geriatr Soc, 2011;59(12)2306-13*

*3. A 75 year-old patient with an 8<sup>th</sup> grade education and history of cerebral vascular accident who has some memory impairment is coming to the operating room for repair of a hip fracture.*

*Which of the following is TRUE regarding this patient's preoperative anesthetic plan/discussion?*

- a. It is good idea to administer benzodiazepines for preoperative sedation.
  - b. Suggest general anesthesia as this will decrease the risk of POCD in this patient
  - c. If asked, assure this patient that he is not at risk for POCD
  - d. Preoperative screening and timely antibiotic administration will be important in helping to prevent postoperative infectious complications
-



Incorrect  
try again

*a. It is good idea to administer benzodiazepines for preoperative sedation.*

This is false. Benzodiazepines in this elderly gentleman with memory impairment should probably be avoided. Clegg et al in a systemic review of medications to avoid in patients at risk for delirium considered fourteen studies mostly elderly medicine and surgical patients and concluded that delirium risk appears to be increased with opioids (odds ratio [OR] 2.5, 95% CI 1.2–5.2), benzodiazepines (3.0, 1.3–6.8), dihydropyridines (2.4, 1.0–5.8) and possibly antihistamines (1.8, 0.7–4.5).

*Clegg et al, Which medications to avoid in people at risk of delirium: a systematic review. Age and Ageing, 2011;40:23-29*

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Incorrect  
try again

*b. Suggest general anesthesia as this will decrease the risk of POCD in this patient.*

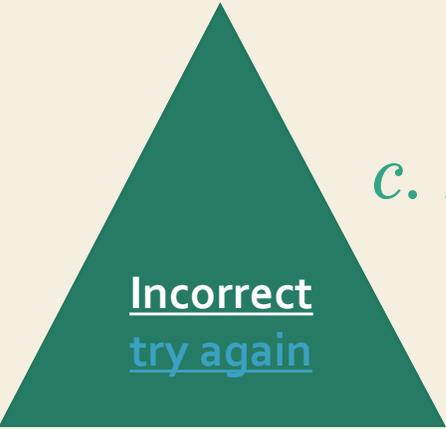
This statement is false. Thus far, research has not identified a clear benefit of the type of anesthesia (regional or general) for reducing POCD. A meta-analysis of 21 studies by Mason et al identified no differences in the incidence of POCD between general and regional anesthesia.

Regarding single center studies, there are a few studies which have demonstrated some benefit of regional anesthesia over general anesthesia with less POCD in elderly patients, however many other studies show no difference. More importantly, we should remain mindful of the benefits of regional anesthesia for this patient namely: decreased deep venous thrombosis after THA, decreased blood loss in pelvic and lower extremity surgery, avoidance of airway instrumentation, and the opiate sparing effect in THA.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*

*Mason et al, The impact of general and regional anesthesia on the incidence of postoperative cognitive dysfunction and postoperative delirium: a systematic review with meta-analysis, J of Alzh. Dis., 2010:S67-69*

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Incorrect  
try again

*c. If asked, assure this patient that he is not  
at risk for POCD*

This statement is false. While it is unclear today if anesthesia increases the risk of POCD, this patient's age places him at risk for long term POCD which may increase his 1 year mortality. Furthermore, his preoperative memory problems could be a risk factor for postoperative cognitive difficulties.

It is probably better to inform this patient that while he is at risk for POCD after surgery in most cases this will improve. The incidence of cognitive dysfunction after major non-cardiac surgery in pts > 65 years is 26% at 1 week and 1% at 3 months.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*

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*d. Preoperative screening and timely antibiotic administration will be important in helping to prevent postoperative infectious complications*



In addition to age, and POCD at 1 week postoperatively, results of the IPOCDS identified infectious complications in the first 3 months postoperatively as a risk factor for long term POCD after non-cardiac surgery.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 80*



*4. The patient mentioned in the aforementioned question (A 75 year-old patient with an 8<sup>th</sup> grade education and history of cerebral vascular accident who has some memory impairment) undergoes a 7 hour total hip arthroplasty revision for his hip fracture and during surgery as well as his first post-operative day, the patient experiences significant hypotension (>40% decrease from baseline). All of the aforementioned problems are risk factors for the development of POCD in this patient EXCEPT:*

- a. Patient's Age
  - b. History of cerebrovascular accident
  - c. Perioperative hypotension
  - d. Revision of total hip arthroplasty
-



Incorrect  
try again

## *a. Patient's Age*

This is true. In a prospective longitudinal study Monk et al evaluated 1064 patients aged 18 years and older having non-cardiac surgery after neuropsychological testing preoperatively, again at discharge, and at 3 months after surgery. At 3 months after surgery, cognitive deficits occurred in 12.7% of the elderly ( $\geq 60$ y) which was significantly greater than in the young: 18-39 y (5.7%) and middle-aged: 40-59 y (5.6%).  $P=0.001$ .

*Monk et al, Predictors of cognitive dysfunction after major non-cardiac surgery, Anesthesiology, 2008;108:18-30*



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Incorrect  
try again

## *b. History of cerebrovascular accident*

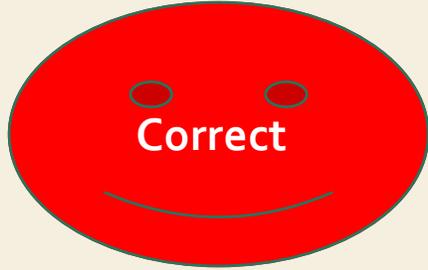
This is true. Independent predictors of cognitive decline at 3 months in Monk's study also included history of cerebral vascular accident with no residual impairment. Monk et al explains that these patients may have less cognitive reserve courtesy of lost neural mass from their stroke. Patient's for CABG with multiple cerebral infarctions on MRI despite being asymptomatic were more likely to experience early post operative decline compared to patients without infarctions.

*Monk et al, Predictors of cognitive dysfunction after major non-cardiac surgery, Anesthesiology, 2008;108:18-30*

*Goto, et al, Magnetic resonance imaging findings and postoperative neurologic dysfunction in elderly patients undergoing coronary artery bypass grafting. Ann Thorac Surg, 2001;72:137-42*

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## *c. Perioperative hypotension*

In Moller's group of patients in the IPOCDS study, 23% of patients experienced significant drops in MAP (60% lower than baseline) during or after surgery with no apparent increased risk of POCD.

*Moller et al, Long-term postoperative cognitive dysfunction in the elderly:ISPOCD<sub>1</sub> study, Lancet, 1998;351:857-861*



## *d. Revision of total hip arthroplasty*

Incorrect  
try again

This is true. Another risk factor for POCD found in the ISPOCD study was increasing duration of anesthesia as in this patient having a “redo THA” which will be undoubtedly longer than his first THA. Thirty-three percent of patients who underwent surgery with anesthesia duration of  $\geq 241$  minutes had POCD compared to 18% of patients who had anesthesia lasting  $\leq 2$  hours. Other risk factors noted in this study were postoperative infectious complications, and respiratory complications.

*Moller et al, Long-term postoperative cognitive dysfunction in the elderly:ISPOCD<sub>1</sub> study, Lancet, 1998;351:857-861*

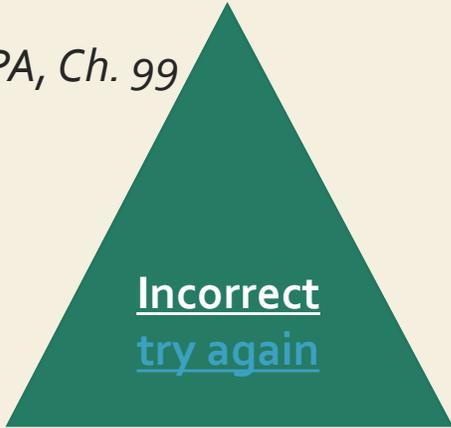
*5. All of the following have been considered as explanations for the etiology of POCD EXCEPT :*

- a. Volatile anesthetics causing neurotoxicity in animals.
  - b. Inflammatory mediators
  - c. Hypoxemia
  - d. Cortisol
-

## *a. Volatile anesthetics causing neurotoxicity in animals*

This is true. Jevtovic-Todorovic et al examined the developing brain of rats after exposure to isoflurane and found apoptosis in thalamic nuclei and parietal cortex. And this appeared to translate to inferior performance in using a water maze in anesthetized rats compared to controls.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 99*



Incorrect  
try again

## *b. Inflammatory mediators*

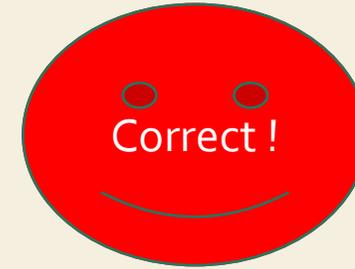
This is true. Surgery-induced release of inflammatory mediators like cytokines IL-1 and IL-10 may contribute to the development of POCD.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 99*

Incorrect  
try again



## c. Hypoxemia



According to results of the ISPOCD<sub>1</sub> study, hypoxemia does not appear to influence the risk of POCD. However, in this multicenter prospective study, less than a quarter of the patients had either oxygen desaturation ( $\leq 80\%$  for more than 2 min) or post-operative hypotension (MAP less than or equal to 60% below baseline values for >30 min or MAP less than equal to 50% below baseline for 30 min). One can assume that autoregulatory mechanisms together with the absence of cerebral vascular disease played a role in ensuring adequate CBF in both of these groups as well as the 7 /1218 pts who had both insults simultaneously.



*Moller et al, Long-term postoperative cognitive dysfunction in the elderly:ISPOCD<sub>1</sub> study, Lancet, 1998;351:857-861*



## d. Cortisol

This is true. The release of hypothalamic-pituitary-adrenal (HPA) and sympathetic nervous system hormones consequent to the endocrine response from surgery leads to an increase in glucocorticoids, like cortisol. High levels of cortisol can be toxic to the hippocampus which is essential in converting short-term to long term memory. There is evidence that in patients undergoing major non-cardiac surgery, changes in cortisol secretion are associated with POCD at 1 week after surgery.

*Miller's Anesthesia, 8<sup>th</sup> edition, 2015, Elsevier Saunders, PA, Ch. 99*

