Sleepy-Time

1. Neurotransmitters involved in **promoting wakefulness** include all of the following **EXCEPT**:

   A. **FALSE**  adenosine=sleep promoting; effects blocked by caffeine. Is “sleep factor” that regulates the activity of VLPO neurons; increase firing of VLPO=sleep-onset via inhibiting ARAS nuclei
   B. **TRUE**  DA is part of ARAS=wakefulness
   C. **TRUE**  major player in wakefulness
   D. **TRUE**  ever take an antihistamine? Sleepy time? Found in cells in the tuberomammillary nucleus (TM) of the hypothalamus. This histaminergic projection reaches thalamus and cortex
   E. **TRUE**  think LC and arousal/wakefulness

2. Which of the following nuclei are GABA-ergic?

   A. **FALSE**  LC=NE
   B. **FALSE**  dorsal raphe-serotonin (5HT)
   C. **FALSE**  LDT-acetyl choline
   D. **FALSE**  PPT is LDT’s cousin=AChe
   E. **TRUE**  gee, where is that GABA? Any GABA cells in nucleus basalis? **SURE**! How about VLPO=**SURE**

3. Which of the following nuclei are cholinergic?

   A. **FALSE**  LC=NE
   B. **FALSE**  DR=serotonin
   C. **TRUE**  LDT=ACh
   D. **TRUE**  it’s good enough for its cousin
   E. **TRUE**  see the cousins (C and D)

4. Which of the following nuclei are serotonergic?

   A. **FALSE**  LC=NE
   B. **TRUE**  DR=5HT
   C. **FALSE**  LDT=ACh
   D. **FALSE**  PPT=ACh
   E. **FALSE**  TMN=histimine

5. Which of the following nuclei/areas contain norepinephrine?

   A. **FALSE**  VLPO=GABA
   B. **FALSE**  contains GABA-ergic neurons; this is not the same as VLOP/preoptic (is caudal)
   C. **FALSE**  basalis=ACh and GABA, but not NE
   D. **FALSE**  reticular pontis=ACh
   E. **TRUE**
6. Which of the following occur(s) following destruction of the ARAS in the midbrain?

A. FALSE  loss of wakefulness promoting pathways=sleepy time  
B. FALSE  id you interrupt all of the ascending fibers in the midbrain you basically leave the GABA projections in control. So you will have NREM sleep continually. Remember, the ascending fibers from the reticularis pontis (ACH) are interrupted too, so the REM-promoting pathway is lost too.  
C. FALSE  the EEG would consist of delta waves  
D. FALSE  seen only when “brain dead!”  
E. TRUE

7. Which of the following statements is/are TRUE?

A. TRUE  nicotine=cholinergic agonist  
B. TRUE  TM turns on thalamus and cortex—inhibited by VLPO  
C. TRUE  because the EEG looks awake!  
D. TRUE  which means that VLPO does not kick in!  
E. TRUE

8. Which of the following is/are TRUE?

A. FALSE  they are present!  
B. TRUE  eye movements cease during stages 2-4  
C. TRUE  sudden muscle contractions, sometimes accompanied by a sense of falling and/or dreamlike imagery=stage 1  
D. FALSE  sleep spindles and K complexes=stage 2  
E. TRUE  see B and C

9. Which of the following statements is TRUE?

A. TRUE  
B. FALSE  theta=stage 1; sleep spindles and K complexes=stage 2  
C. FALSE  occur in phasic REM  
D. FALSE  occur in tonic REM  
E. FALSE  eye movements cease during stages 2-4

10. When it comes to sleep, a healthy young medical student:

A. FALSE  most time is in stages 3-4 but slowly losing 3-4 for more 1-2  
B. FALSE  this pattern is limited to older Neuroscience Profs!  
C. FALSE  occurs at 50-60 minute intervals in human infants and 90-100 minute intervals in middle-aged adults  
D. TRUE  slow wave sleep (stages 3 and 4) is most prominent early in the night, especially during the first NREM period; diminishes as night progresses.  
E. FALSE  As SWS wanes, REM sleep lengthen, while showing greater phasic activity and generally more intense dreaming later in the night
11. Which of the following statements is **TRUE**?

A. **FALSE**  this occurs in **phasic** REM  
B. **TRUE**  sleepy/restful time  
C. **FALSE**  sleepy/restful time  
D. **FALSE**  arrhythmias are most prevalent in REM-sleep  
E. **FALSE**  temporary breathing instability and/or periodic breathing may occur at **onset** of sleep

12. Which of the following statements is **TRUE**?

A. **FALSE**  they are **down-regulated**  
B. **FALSE**  GH release=early part of night  
C. **TRUE**  
D. **FALSE**  evening just prior to sleep onset; (you could brush your teeth before going to bed, but you’ll be pretty sleepy when TSH is peaking!)  
E. **FALSE**  cortisol levels rise at the end of the sleep period  

**THINK TGPC=--TSH—GH—PROLATIN—CORTISOL**

13. Which of the following statements is/are **TRUE**?

A. **FALSE**  sleep apnea=**decreased** levels of GH and prolactin  
B. **TRUE**  
C. **FALSE**  darkness during the night stimulates the secretion of melatonin; darkness during the day does not stimulate melatonin secretion  
D. **TRUE**  
E. **TRUE**  see B and D

14. Which of the following nuclei/areas contain DA neurons?

A. **FALSE**  preoptic area=GABA  
B. **FALSE**  anterior hypothalamus=GABA  
C. **FALSE**  PPT (and its cousin) LDT=ACh  
D. **FALSE**  reticularis pontis=ACh  
E. **TRUE**  Classic NB!

15. A complete transection of the brain stem at the level of the spino-medullary junction:

A. **FALSE**  are any major parts of the ARAS interrupted? **NO!**  
B. **FALSE**  are any major parts of the ARAS interrupted? **NO!**  
C. **FALSE**  are any major parts of the ARAS interrupted? **NO!**  
D. **FALSE**  are any major parts of the ARAS interrupted? **NO!**  
E. **TRUE**  are any major parts of the ARAS interrupted? **NO!**
16. A lesion of the nucleus reticularis pontis:

A. FALSE  reticularis pontis=REM sleep generator. Its loss=inability to enter REM sleep from NREM sleep
B. FALSE  reticularis pontis projects directly to cells in the medulla that in turn project to the spinal cord
C. TRUE  reticularis pontis=REM sleep generating nucleus
D. FALSE  its loss=inability to enter REM sleep from NREM sleep
E. FALSE  only brain death=flat EEG

17. Which of the following statements is/are TRUE?

A. TRUE  remember, the DA/VTA neurons project not only to nucleus accumbens, but to cortex
B. FALSE  just the opposite—ACh concentrations would be increased!
C. FALSE  nicotine=ACh receptor agonist=increase in firing of circuitry that affects wakefulness/arousal
D. FALSE  muscarinic receptor antagonists= decrease in firing of circuitry that affects wakefulness/arousal
E. FALSE  acetylcholinesterase's biological role is the termination of impulse transmissions at cholinergic synapses—\textit{neostigmine} apposes the action of acetylcholinesterase=wakefulness/arousal (Don’t confuse with carbachol =cholinergic (muscarinic) agonist)

18. Which of the following statements is/are TRUE?

A. FALSE  sleepy time! One or two sprays and turn off the light!!
B. TRUE  posterior hypothalamus/TM=histamine=arousal—lesion=no histamine/arousal=sleepy time!
C. FALSE  think reticularis pontis/REM/ACh
D. FALSE  both inhibit (GABA) reticularis pontis
E. FALSE  a GABA-ergic cell group in the pons (has no name that you need to know!) suddenly kicks in to inhibit both DR and LC. This means that DR and LC can no longer inhibit reticularis pontis, which is then free to do its REM-sleep induction.

19. Sleep patterns in infants differ from those in adults in all of the following ways EXCEPT:

A. TRUE  newborn infant=16-18 hours/day
B. TRUE  duh!
C. FALSE  can exceed 50% in infants—20-25% in adults
D. TRUE  50-60 minutes=infant; 90-100=adults
E. TRUE  so true!
20. All of the following may be associated with aging **EXCEPT**:

A. TRUE  replaced by stages 1 and 2  
B. TRUE  most common=insomnia  
C. FALSE  napping!!  
D. TRUE  
E. TRUE

21. The human circadian pacemaker is located in the:

A. FALSE  no, suprachiasmatic!  
B. FALSE  no, suprachiasmatic!  
C. FALSE  no, suprachiasmatic!  
D. FALSE  no, suprachiasmatic!  
E. **TRUE**  who would ever guess E?

22. The period of the endogenous human circadian pacemaker using the temporal isolation protocol:

A. FALSE  no, 25 hours  
B. **TRUE**  life in a cave!  
C. FALSE  no, 25 hours  
D. FALSE  no, 25 hours  
E. FALSE  no, 25 hours

23. Which of the following statements is **TRUE**?

A. FALSE  more than 50% in one year old’s and 20-25% in Mom’s  
B. FALSE  just the opposite is true!  
C. FALSE  the adolescent decrease in sleep duration may not represent a decrease in sleep need because the decreased sleep duration is accompanied by increased daytime sleepiness  
D. FALSE  just the opposite is true  
E. **TRUE**  approximately. Just get the concept that they are about the same

24. Which of the following statements is **TRUE**?

A. FALSE  you lose 3-4 and it is replaced by 1-2  
B. FALSE  sadly, age!!  
C. FALSE  duh!  
D. **TRUE**  so true!  
E. FALSE  sadly less, but more napping!
25. Which of the following is/are **TRUE**?

A. FALSE  you lose 3-4 and it is replaced by 1-2  
B. FALSE  insomnia  
C. FALSE  
D. FALSE  as one ages, you lose 3-4 and it is replaced by 1-2  
E. TRUE

26. Which of the following statements is/are **TRUE**?

A. FALSE  the pacemaker for circadian rhythms=suprachiasmatic nucleus  
B. **TRUE**  the pacemaker for circadian rhythms=suprachiasmatic nucleus  
C. FALSE  the greatest circadian propensity for sleep coincides with the temperature minimum  
D. FALSE  reticularis pontis is in the pons!!  
E. FALSE  fractured sleep but same total hours sleep

27. Which of the following statements is/are **TRUE** regarding a desynchronized EEG?

A. FALSE  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized =relaxed/lazy/low frequency, high amplitude/sleepy time/delta  
B. FALSE  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized looks relaxed/lazy/low frequency, high amplitude/sleepy time  
C. FALSE  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized looks relaxed/lazy/low frequency, high amplitude/sleepy time  
D. **TRUE**  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized looks relaxed/lazy/low frequency, high amplitude/sleepy time  
E. FALSE  see D

28. Which of the following statements is/are **TRUE** regarding a synchronized EEG?

A. FALSE  REM=desynchronized/awake-like  
B. FALSE  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized looks relaxed/lazy/low frequency, **high amplitude**/sleepy time  
C. **TRUE**  desynchronized EEG looks “nervous/jittery/low amplitude/high frequency/awake.”  Synchronized looks relaxed/lazy/**low frequency**, high amplitude/sleepy time  
D. FALSE  sleepy time  
E. FALSE  sleepy time
29. Which of the following statements is **FALSE** regarding REM sleep?

A. **TRUE**  tonic REM=generalized atonia of skeletal muscles except for the extraocular muscles and the diaphragm  
B. **TRUE**  Classic NB  
C. **FALSE**  I have roughly what you have! Lot less than when I was born!!  
D. **TRUE** Classic NB  
E. **TRUE** desynchronized/jittery/awake-like  

30. Which of the following statements is **TRUE** regarding the EEG pattern shown above? **Drawing shows a real lazy looking EEG!**

A. **FALSE** drawing shows an extremely lazy looking EEG!  
B. **FALSE** drawing shows an extremely lazy looking EEG!  
C. **FALSE** drawing shows an extremely lazy looking EEG!  
D. **FALSE** drawing shows an extremely lazy looking EEG!  
E. **TRUE** drawing shows an extremely lazy looking EEG!  

31. Which of the following statements is **TRUE** regarding the EEG pattern shown above? **Drawing shows an intermediate looking EEG (not real jittery but not lazy) with SLEEP SPINDLES and K COMPLEXES=STAGE 2!**

A. **FALSE** drawing shows an intermediate looking EEG (not real jittery but not lazy) with SLEEP SPINDLES and K COMPLEXES= STAGE 2  
B. **FALSE** drawing shows an intermediate looking EEG (not real jittery but not lazy) with SLEEP SPINDLES and K COMPLEXES= STAGE 2  
C. **FALSE** drawing shows an intermediate looking EEG (not real jittery but not lazy) with SLEEP SPINDLES and K COMPLEXES= STAGE 2  
D. **FALSE** alpha=8-12 cps  
E. **TRUE** drawing shows an intermediate looking EEG (not real jittery but not lazy) with SLEEP SPINDLES and K COMPLEXES= STAGE 2  

32. Which of the following statements is **TRUE** regarding the EEG pattern shown above? **Drawing shows an intermediate looking EEG (not real jittery but not lazy) with THETA ACTIVITY/WAVES=STAGE 1**

A. **FALSE** pretty similar  
B. **FALSE** jittery versus lazy  
C. **FALSE** 18-24 cps=beta  
D. **TRUE** more jittery than lazy delta  
E. **FALSE** sleep spindles and K complexes=stage 2 while theta waves=stage 1
33. Which of the following statements is **TRUE** regarding the EEG pattern shown above? **Drawing shows an intermediate looking EEG (not real jittery but not lazy) with SAWTOOTH waves=REM**

A. FALSE  very similar  
B. FALSE  REM=dreaming  Classic…….  
C. FALSE is more jittery(asynchronous) than lazy stage 4/delta  
D. FALSE  SAWTOOTH WAVES  
E. **TRUE**  except for the extraocular muscles and the diaphragm

34. Hypocretin (orexin):

A. FALSE  hypocretin (orexin) is produced by cells in the hypothalamus that provide **excitatory input** to all components of the ARAS and the LC is part of the ARAS.  
B. FALSE  hypocretin (orexin) is produced by cells in the hypothalamus that provide **excitatory input** to all components of the ARAS  
C. FALSE  animal models of narcolepsy are related to deficits in the hypocretin system; canine narcolepsy is caused by a mutation in the hypocretin type 2 receptor gene.  
D. FALSE  hypocretin (orexin) is produced by cells in the hypothalamus  
E. **TRUE**  hypocretin (orexin) is produced by cells in the hypothalamus

35. Which of the following statements is **TRUE**?

A. FALSE  process S” increases the longer one stays awake.  It (process S) behaves like an adjustable hourglass, filling more with increased wakefulness.  
B. FALSE  the circadian process C reaches its peak during the latter half of the night.  It is confusing but C reaches its peak at trough; C1 in the illustration  
C. FALSE  process S increases the longer you are awake; see A  
D. **TRUE**  
E. FALSE  see D

**Epilepsy**

1. Seizures that begin in one area of the cortex are called:

A. FALSE  generalized seizures begin diffusely throughout the cortex  
B. FALSE  an absence seizure is a generalized seizure, and generalized seizures begin diffusely throughout the cortex  
C. FALSE  there is no such thing as a primary seizure—don’t confuse with partial  
D. **TRUE**  partial (also called focal) seizures start in one region of the cortex  
E. FALSE  see D
2. Generalized seizures:

A. TRUE
B. TRUE
C. TRUE
D. TRUE **A, B and C are correct.**
E. FALSE

3. Partial seizures that impair consciousness:

A. TRUE
B. FALSE  *impairment of consciousness= involvement of limbic structures*
C. FALSE  *any seizure that begins in one area of the cortex (partial or focal) may spread and the seizure may evolve into a generalized tonic-clonic or grand mal seizure.*
D. FALSE- *there is significant dysfunction of the hippocampi during the seizure that blocks memory formation.*
E. FALSE  see A

4. Which of these mechanisms have anti-epileptic actions?

A. TRUE  *seizures appear to begin because of an imbalance between synaptic inhibition and excitation, with too much excitation resulting in the seizure activity*
B. TRUE
C. TRUE  *an effective drug for absence seizures is ethosuximide, which reduces low threshold calcium currents*
D. TRUE
E. FALSE  *this would increase overall excitation*

5. Which of the following statements is FALSE regarding complex partial seizures?

A. TRUE
B. TRUE
C. FALSE
D. TRUE
E. TRUE

6. Consciousness is **normal** during which type of seizure?

A. FALSE
B. FALSE
C. FALSE
D. TRUE
E. FALSE  see D
Consciousness

1. The most common cause of coma is:

A. TRUE  the most common cause of coma = metabolic dysfunction (drugs or endogenous)
B. FALSE  the most common cause of coma = metabolic dysfunction (drugs or endogenous)
Supratentorial lesions are lesions of structures above the tentorium cerebelli. The most common causes of coma are metabolic derangements. We term this condition encephalopathy. The cerebral hemispheres, thalamus, basal ganglia, lateral and third ventricles, and hypothalamus are considered supratentorial. (About 73% of cavernous angiomas are supratentorial). Infratentorial = below the level of the tentorium = cerebellum, pons, medulla, midbrain, and fourth ventricle. (About 27% of cavernous angiomas are infratentorial).
C. FALSE  the most common cause of coma = metabolic dysfunction (drugs or endogenous)
D. FALSE  the most common cause of coma = metabolic dysfunction (drugs or endogenous)
E. FALSE  the most common cause of coma = metabolic dysfunction (drugs or endogenous)

2. Which of the following occurs in locked in syndrome?

A. FALSE  this refers to persistent vegetative state, not locked in
B. TRUE  ARAS is not affected, as pathways run in tegmentum of pons, not basilar region (where cortico-bulbar and -spinal are!)
C. FALSE  ARAS is not affected
D. FALSE  UMN lesion, so reflexes are present
E. FALSE  UMN lesion, so reflexes are present

3. Which of the following occurs in coma?

A. FALSE  this is true for persistent vegetative state, not coma!
B. FALSE  coma = abnormal EEG
C. TRUE
D. FALSE  the reflexes affected would depend on the brain stem level of damage
E. FALSE  reserved for Brain Death only

4. Which of the following occurs in brain death?

A. FALSE  refers to persistent vegetative state, not brain death
B. FALSE  brain death = flat EEG
C. FALSE  brain death = son a respirator
D. TRUE  brain death = no brain stem reflexes
E. FALSE  brain death = no reflexes

5. Which of the following occurs in persistent vegetative state?

A. TRUE
B. FALSE  the EEG is abnormal
C. FALSE  there is relatively normal respiration due to intact brain stem
D. FALSE  relatively normal brain stem reflexes due to intact brain stem
E. FALSE  sleep wake cycles are relatively normal
6. Which of the following statements is **FALSE**?

A. TRUE  
B. TRUE  **you can have everything else working for you but without the cortex you are not conscious**  
B. TRUE  
D. TRUE  
**E. FALSE** it is the part that keeps you awake!

7. Which of the following statements is **FALSE**?

A. TRUE  **this causes interruption of the ARAS and the thalamus**  
B. TRUE  **central herniation that pushes on the midbrain=mid-sized that are unreactive to light (fixed; bilateral interruption of the descending autonomies and stretching of CN IIIs.**  
C. TRUE  **any ARAS pathways ascending from the spinal cord? None that I know of!**  
D. TRUE  **Classic NB**  
**E. FALSE** ARAS is traveling in the upper/dorsal part of the pons known as the tegmentum, while cortico-spinals and -bulbars are in the basilar or lower/ventral part of the pons

8. Which of the following statements is **FALSE** regarding the clinical deficits that can result from a cortical mass in the **left** cortex and **left** uncal herniation?

A. TRUE  
B. TRUE  **this is the first sign of uncal herniation**  
C. TRUE  
D. TRUE  **once the left side uncal herniation pushes the opposite, right cerebral peduncle against the free border of the tentorium=left hemiplegia added to the earlier right hemiplegia=quadruplegia**  
**E. FALSE** would such a lesion affect the ARAS? Sure!

9. Which of the following statements is **FALSE** about **brain death**?

A. TRUE  **brain death=no reflexes**  
B. **FALSE** brain death=flat EEG  
C. TRUE  **brain death=no respiration**  
D. TRUE  **brain death=sleep wake cycles**  
E. TRUE  **brain death=no reflexes**

10. Which of the following statements is **TRUE** about the lesion shown here? **Lesion involves entire basilar pons at level of superior cerebellar peduncle.**

A. FALSE  the ARAS is traveling in the tegmentum  
B. **FALSE** no corticobulbars are working  
C. **FALSE** no corticobulbars or corticospinals are working  
D. **FALSE** this is locked-in syndrome. Classic NB!  
**E. TRUE**
11. Which of the following statements is **FALSE** about the persistent vegetative state?

A. TRUE  
B. TRUE  
C. TRUE  
D. **FALSE** abnormal/irregular EEG  
E. TRUE  

12. Which of the following statements is **FALSE** regarding locked-in syndrome?

A. TRUE  
B. TRUE  
C. TRUE  
D. **TRUE** after the period of spinal shock  
E. **FALSE** bilateral lesion of corticobulbar—basilar pons blow out!!  

13. Fill in the blanks in the table below.

<table>
<thead>
<tr>
<th>Sleep Waking cycle in coma</th>
<th>abnormal/absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEG in brain death</td>
<td>flat!</td>
</tr>
<tr>
<td>Respiration in PVS</td>
<td>normal</td>
</tr>
<tr>
<td>EEG in locked-in</td>
<td>normal</td>
</tr>
</tbody>
</table>

14. Which of the following statements is **TRUE**?

A. **FALSE** decerebrate=arms extended, legs extended  
B. **FALSE** the legs are EXTENDED in both decerebrate and decorticate rigidity  
C. **FALSE** lesion in decerebrate lies caudal to the ruber  
D. **FALSE** the lesion lies between the superior and inferior colliculi in DECEREBRATE rigidity  
E. **TRUE** I can’t find one!  

15. In brain death:

A. **FALSE** brain death=no reflexes  
B. **FALSE** brain death=no reflexes  
C. **FALSE** brain death=no reflexes  
D. **FALSE** brain death=no reflexes  
E. **TRUE** lots of falses!  

16. Which of the following is **TRUE** regarding Kernohan’s notch?

A. **TRUE** the notch is in the cerebral peduncle opposite to an uncle herniation. There is a Babinski contra to the notch!  
B. **FALSE** the notch is in the cerebral peduncle opposite to an uncle herniation, and the subdural is ipsi to the uncal herniation  
C. **TRUE**  
D. **FALSE** in the cerebral peduncle  
E. **TRUE** see A and C
17. Which of the following associations is/are correct regarding the four different stages of damage shown here? 

A. **damage to right cerebral hemisphere and underlying diencephalon (includes hypothalamus)**; 
B. **central herniation**; 
C. **lesion between superior and inferior colliculi**; 
D. **lesion rostral medulla**

**A. TRUE**  all of the circuitry for the VOR is intact, from the semicircular canals (SCCs) to CN III 
**B. FALSE**  decorticate; lesion needs to be south of the ruber for decerebrate 
**C. FALSE**  the pupil are mid-sized. The descending hypothalamic fibers that are headed for T1-L2 are interrupted = constricted pupils but CN III is shot too = dilated pupils 
**D. FALSE**  they are midsized as the lesion shown at D includes all of the damage rostral to it! 
**E. FALSE**  the pupils following A are constricted since the descending hypothalamic fibers that are headed for T1-L2 are interrupted = constricted pupil (miosis)

18. Which of the following associations is/are correct regarding the four different stages of damage shown above? 

A. **damage to right cerebral hemisphere and underlying diencephalon (includes hypothalamus)**; 
B. **central herniation**; 
C. **lesion between superior and inferior colliculi**; 
D. **lesion rostral medulla**

**A. TRUE** 
**B. TRUE**  B = decorticate rigidity 
**C. FALSE**  since in C CN III is damaged, the action of the VOR is affected. Thus stimulation of the right ear with warm water will result in movement of the left eye to the left, (right vestibular apparatus, right vestibular nuclei, left PPRF and left LR6 are fine). However, the right medial rectus cannot contract as CN III is shot. No DOLL’S EYES 
**D. FALSE**  lesion shown at D includes all of the damage rostral to it. So CN III is wiped out.  **The pupils cannot be reactive without CN III!** 
**E. TRUE**  see A and B