

## STRESS PHYSIOLOGY | Exam 2 Study Guide

What is a hydroxyl group?

What's the difference between methanol and ethanol?

How does distillation work?

What is the azeotropic limit (concept and value)?

What's the difference between the U.S. and U.K. definitions of proof? U.K. origin story?

What are alcohol dehydrogenase and aldehyde dehydrogenase?

What are the products of those enzymes with ethanol and methanol?

What explains flush syndrome?

Adaptation to alcohol (alcohol dehydrogenase in stomach)?

Eating food with ingested alcohol: what's the effect?

Metabolic ("pharmacokinetic") vs. functional ("pharmacodynamic") alcohol adaptations.

How does ethanol interact with mTORc1 and mTORc2?

Resveratrol and mTOR activation?

What is a potential *chronic* effect of constant ethanol administration on mTOR?

How might high alcohol drinks have a different "mouth feel"? (What are clathrates?)

What is veisalgia? What causes it? What cures it?

Alcohol and vasopressin: what is the relationship?

Excess methanol ingestion: consequences and cure.

What are endocannabinoids? Endorphins?

What do CBD and THC bind to?

THC and the munchies: how does appetite increase?

Do all compounds have the same effect on AMPK in the hypothalamus and periphery?

Does CBD increase or decrease mTOR signaling?

Does THC increase or decrease mTOR signaling?

Developing behavioral tolerance to THC. How does it work?

How might ibuprofen (and other NSAIDs) impair aerobic sport performance?

How does ibuprofen (and other NSAIDs) impair recovery after performance?

Acetaminophen (i.e., Tylenol): better or worse than NSAIDs for athletic performance?

What baroreceptors? Where do they live? What do they sense? Where do they send their signals? What is the “baroreflex”? How fast is it?

What are chemoreceptors? Where do they live? What do they sense? Where do they send their signals? What do they regulate?

What is the vagus nerve? What is its neurotransmitter?

What are five ways to manipulate vagal activity to slow a racing heart?

How do acetylcholine and norepinephrine affect contractility of the heart?

What is a sympathomimetic?

$V_E$ ,  $VO_2$ ,  $VO_2$  max,  $S_pO_2$ . What are these? What happens at altitude?

What’s in the air we breathe?

Ventilation vs. respiration.

Why do the bronchioles branch so much? Where does 90% of gas exchange happen?

What is erythropoietin?

Hematocrit / red blood cells: how much/many do we have?

Hemoglobin: how much do we have and what does it do?

Henry’s law?

Boyle's law?

Dalton's law of partial pressures?

Tidal volume, inspiratory reserve volume, expiratory reserve volume, residual lung volume, forced vital capacity, total lung capacity.

How do gases move in the body?

What factors affect the relationship between hemoglobin and oxygen?

Vocabulary: hypobaria, normobaria, hyperbaria, hypoxia, hyperoxia.

Responses to hyperbaria:

- Work of Breathing
- Diving Response
- Fluid Balance
- Cold Shock Response
- Barotrauma
- Decompression Sickness
- Hypoxic Blackout

Winter at the peak of Everest: what's the barometric pressure and what happens to  $VO_2$  max?

What's the highest elevation in which people can live? What is the "death zone"?

Hypoxia-inducible transcription factor (HIF-1). What activates it? What does it activate?

Breathing at high altitude. Cheyne-Stokes respiration.

During your first week at altitude, what does your heart do?

You've been at altitude for a week. You exercise. What happens with your heart and lungs?

You exercise at 3,000m: what causes fatigue? You exercise at 7,000m: what causes fatigue?

You loiter at 15,000 to 20,000 feet. What happens to bodyweight? Mechanisms?

What are Acute Mountain Sickness, HAPE, and HACE?

What do "highlanders" have that "lowlanders" don't (consider heart, blood, and circulation)?

What are the adaptations to chronic altitude exposure?

After adapting to altitude, you return to sea level. How long before adaptations decay?

What symptoms do most astronauts experience during the first 2-3 days of microgravity?

What is the “sensory conflict hypothesis” explaining these symptoms?

What is the “fluid shift hypothesis” that explains these symptoms?

Why would an astronaut eliminate more fluids?

Intracellular vs. extracellular fluid shifts?

What happens to the heart during microgravity?

Circa diem. Do all animals have rhythms? Since when?

Why do we have circadian rhythms?

Is there genetic variation among humans (“chronotypes”) or is human biology consistent?

What hormones influence the urge to rise from bed? Diurnal rhythms of those hormones?

What regulates diurnal rhythm of cortisol?

What is the suprachiasmatic nucleus?

What are the three photoreceptor cell types? What do they do?

What is a zeitgeber? The most important one is...

What happens to sleep patterns in polar regions with abnormal light-dark cycles?

1938: two researchers spend 32 days in a dark cave. What did they find?

What qualities of light help entrain our circadian rhythm?

Indoors with lights on or outdoors with sunglasses on: which environment has more lux?

What are nonphotic regulators of circadian rhythm?

Where does melatonin come from? What is it made out of?

Melatonin and dopamine: friends or enemies?

Do fetuses and newborns have circadian rhythms?

What light wavelength (color) suppresses melatonin the most?

Will candles and a full moon suppress melatonin?

What controls the circadian rhythm of body temperature?

In a normal circadian rhythm, what is the best time for physical performance?

How does caffeine wake us up?

What does the thalamus do? What happens to it during sleep?

What is orexin? Where does it come from? What does it do? What does its absence cause?

R.E.M. sleep and atonia: relationship?

What is unihemispheric sleep?

How much R.E.M. sleep do fetuses get?

What happens to our sleep timing and efficiency as we get older?

Relationship between sleep and learning.

What is the “first night effect” in sleep?

“Travel fatigue”. What’s worse: flying east or flying west? Consequences of chronic jet lag?

Growth hormone, testosterone, leptin, and ghrelin: relationship with sleep.

Sleep and risk of injury in athletic contexts.

Heat or noise: what impairs sleep more?

Alcohol and sleep.

Are naps beneficial?