

# Flex Therapist CEUs

## Hormetic Stress - Successful Integration into Physical Therapy

**1. What is one major cellular process activated by hormetic stress, which is crucial for maintaining cellular health and longevity?**

- A. Apoptosis
  - B. Autophagy
  - C. Necrosis
  - D. Metastasis
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**2. Which of the following adaptations is NOT typically associated with intermittent fasting as a form of hormetic stress?**

- A. Improved insulin sensitivity
  - B. Increased mitochondrial efficiency
  - C. Enhanced muscle hypertrophy
  - D. Upregulation of autophagy
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**3. How does HIIT (High-Intensity Interval Training) induce hormetic stress beneficial for muscle adaptations?**

- A. By maintaining constant low-level physical effort
  - B. By alternating high-intensity effort with recovery periods
  - C. By reducing energy expenditure and oxygen utilization
  - D. By avoiding oxidative stress
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**4. How do phytochemicals exert a hormetic effect on cells?**

- A. By inducing high levels of cellular stress
  - B. By triggering mild oxidative stress that stimulates adaptive responses
  - C. By preventing all forms of oxidative stress
  - D. By enhancing immediate cellular damage
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**5. In the context of hormetic stress, what is a primary benefit of controlled hypoxia through breathwork?**

- A. Promotes oxidative damage
- B. Suppresses the production of erythropoietin
- C. Enhances mitochondrial function and angiogenesis

D. Reduces the number of red blood cells

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**6. Which of the following best describes how hormetic stress influences oxidative stress levels?**

- A. Hormetic stress reduces oxidative stress by lowering the production of pro-inflammatory cytokines.
  - B. Hormetic stress increases oxidative stress by boosting the production of reactive oxygen species (ROS).
  - C. Hormetic stress enhances antioxidant defenses by increasing the production of antioxidant enzymes like superoxide dismutase (SOD).
  - D. Hormetic stress has no significant impact on oxidative stress levels.
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**7. Which mechanism is NOT a way that hormetic stressors help maintain cellular health?**

- A. Increasing the production of heat shock proteins (HSPs).
  - B. Promoting the degradation of healthy cellular components.
  - C. Activating autophagy to recycle damaged cellular components.
  - D. Activating the Nrf2 pathway to promote antioxidant gene expression.
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**8. How does hormetic stress enhance vagal nerve function?**

- A. By increasing the production of pro-inflammatory cytokines which stimulate vagal activity.
  - B. By enhancing neuroplasticity and stimulating brain-derived neurotrophic factor (BDNF) levels.
  - C. By decreasing sympathetic nervous system activity alone.
  - D. By reducing mitochondrial biogenesis, thus improving vagal tone.
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**9. Which of the following mechanisms explains how hormetic stress can positively affect chromosome telomere shortening?**

- A. By activating telomerase and increasing autophagy.
  - B. By reducing the production of heat shock proteins.
  - C. By decreasing mitochondrial function and telomerase activity.
  - D. By promoting chronic oxidative stress.
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**10. Which of the following is a method by which hormetic stress can improve metabolic health?**

- A. Enhancing the activation of pro-inflammatory pathways.
  - B. Increasing oxidative damage to cellular components.
  - C. Improving glucose metabolism and insulin sensitivity.
  - D. Reducing the body's ability to manage energy efficiently.
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**11. Which process, promoted by hormetic stressors, helps in the maintenance of cellular homeostasis and function by degrading and recycling damaged cellular components?**

- A. Mitochondrial biogenesis
  - B. Neuroplasticity
  - C. Autophagy
  - D. Telomerase activation
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**12. How does hormesis contribute to improved metabolic health?**

- A. By enhancing insulin sensitivity and optimizing glucose metabolism
  - B. By decreasing mitochondrial biogenesis
  - C. By increasing chronic inflammation
  - D. By reducing antioxidant defenses
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**13. What role does Nrf2 play in the body's response to hormetic stress?**

- A. Nrf2 helps in the upregulation of heat shock proteins
  - B. Nrf2 promotes the expression of antioxidant and detoxification enzymes
  - C. Nrf2 activates inflammatory pathways
  - D. Nrf2 decreases mitochondrial biogenesis
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**14. In the context of physical therapy practice, what is the recommended initial exercise intensity for integrating aerobic hormetic stress?**

- A. High intensity (70-90% of maximum heart rate)
  - B. Low intensity (30-50% of maximum heart rate)
  - C. Moderate intensity (50-70% of maximum heart rate)
  - D. Very low intensity (10-30% of maximum heart rate)
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**15. Which of the following best describes the impact of hormetic stressors on neuroprotection and cognitive function?**

- A. They reduce neuroplasticity and the production of brain-derived neurotrophic factor (BDNF)
  - B. They enhance neuroplasticity and cognitive function by stimulating BDNF production
  - C. They decrease the body's ability to adapt to stress by reducing cognitive function
  - D. They increase pro-inflammatory cytokines that negatively impact brain health
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**16. Which of the following accurately describes the primary mechanism through which cold exposure acts as hormetic stress in physical therapy?**

- A. Cold exposure increases blood flow by causing vasoconstriction, which enhances circulation in injured tissues.

- B. Cold exposure reduces inflammation by vasoconstriction, limiting swelling and inflammatory mediator production.
  - C. Cold exposure enhances muscle strength by triggering the production of new muscle fibers through a numbing effect.
  - D. Cold exposure improves oxygen utilization by increasing red blood cell production and reducing muscle spasms.
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**17. When integrating High-Intensity Interval Training (HIIT) into physical therapy, how should the intensity of the high-intensity intervals be structured for an effective program?**

- A. High-intensity intervals should be performed at 60-75% of the individual's maximum heart rate for 1-3 minutes.
  - B. High-intensity intervals should be performed at 70-85% of the individual's maximum heart rate for 2-4 minutes.
  - C. High-intensity intervals should be performed at 80-95% of the individual's maximum heart rate for 30 seconds to 4 minutes.
  - D. High-intensity intervals should be performed at 85-100% of the individual's maximum heart rate for 5-10 minutes.
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**18. Which of the following methods best integrates heat exposure into physical therapy to induce hormetic stress?**

- A. Applying hot packs directly on the skin of the affected area for 5-10 minutes.
  - B. Using warm baths at 110°F for 20-30 minutes, performed twice daily.
  - C. Spending 10-20 minutes in a sauna 2-3 times per week to enhance systemic circulation and promote relaxation.
  - D. Using infrared therapy for 5-10 minutes twice a week to reduce muscle tension and increase tissue stretchability.
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**19. Which combination of parameters would be safe to start with for a patient beginning intermittent hypoxic training (IHT) integrated into their physical therapy regimen?**

- A. 10 sessions per week with 10-second breath-holds followed by 30-second normal breathing.
  - B. 2-3 sessions per week with 15-30 second breath-holds followed by 1-2 minutes of normal breathing.
  - C. 4-5 sessions per week with 1-minute breath-holds followed by 30-second normal breathing.
  - D. Once per week with 5-minute breath-holds followed by 5-minute normal breathing.
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**20. Which of the following assessments would best measure the effectiveness of integrating hormetic stressors like HIIT and heat exposure in a physical therapy plan?**

- A. Recording only self-reported pain levels before and after therapy sessions.
- B. Measuring exercise capacity through standardized tests, heart rate variability, and subjective pain levels.
- C. Tracking only the ratio of high to low-intensity intervals completed during HIIT sessions.

D. Assessing muscle mass and fat percentage exclusively using bioelectrical impedance analysis.

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