

- 1) What is the collective term for the use of light as a physical agent?
 - A. Phototherapy
 - B. Photobiomodulation
 - C. Low Level Laser Therapy
 - D. Cold Laser Therapy

- 2) The most critical part of the North American Association for Light Therapy's definition of PBM is _____?
 - A. That it uses non-ionizing forms of light sources
 - B. Includes the use of lasers, LEDs, and broadband light
 - C. Uses visible and infrared wavelengths
 - D. It is a non-thermal process

- 3) The BEST simple explanation of how PBM works is _____?
 - A. Laser energy is converted to ATP to stimulate mitochondrial activity
 - B. Light penetrates through skin and is absorbed by the mitochondria in the cell, the energy is transformed into biochemical energy and assist cells to enhance healing and to restore normal cell functional
 - C. Excessive ROS generated via cellular respiration inhibits the immune response
 - D. The absorption of light by cytochrome c oxidase (CCO) resulting in an increase in cellular activity.

- 4) Which of the following is not a synonym for PBM?
 - A. Low Level Laser Therapy
 - B. High Powered Laser Therapy
 - C. Photobiostimulation
 - D. Phototherapy

- 5) Friedman, et al found the combination of SPL, IREDs and LEDs to be nearly the same as Eichler et al found, however _____.
 - A. The excess ROS generation was found to be harmful.
 - B. Each of the separate wavelengths of light reduced the TEMPO signal greater individually than when combined.
 - C. The dose needed by Friedman et al was 1/10th that Eichler et al utilized.
 - D. Did not find the same reduction of ROS generation.

- 6) What is the name of the biomolecule Friedman, et al measured using a reduction in the TEMPO signal?
 - A. Adenosine Tri-Phosphate
 - B. Nitric Oxide
 - C. Reactive Oxygen Species
 - D. C Reactive Protein

- 7) Albuquerque-Pontes, et al found that when the multiple wavelengths are applied:
- A. The stimulation of CCO is maximized at all time points
 - B. The activity of CCO is down regulated
 - C. Nitric oxide release is inhibited
 - D. It is better to apply wavelengths independently than collectively
- 8) Biphasic dose is defined as:
- A. Containing both stimulatory and inhibitory characteristics
 - B. Only stimulatory responses
 - C. Only inhibitory responses
 - D. Area to avoid due to “lethal” limit exposure
- 9) Better results will be yielded when cryotherapy is used:
- A. Before applying laser therapy
 - B. After applying laser therapy
 - C. Applied simultaneously with laser therapy
 - D. Cryotherapy should not be used in conjunction with laser therapy
- 10) Which of the following is NOT an effect of PBM on pain?
- A. Increased nitric oxide production
 - B. Increased nerve cell action potential
 - C. Increase in C fiber activity by blocking depolarization
 - D. Reduced release of Histamine, Bradykinins, Substance P and Acetylcholine
- 11) Of the following wavelengths, which is best for musculoskeletal disorders and pain reduction?
- A. Red
 - B. Blue
 - C. Violet
 - D. Infrared
- 12) More light absorbed at target tissue equates to better outcomes.
- A. False
 - B. True
- 13) Photocytotoxicity is caused by the use of high powered laser when skin temperatures reach a minimum of ____?
- A. 35°C
 - B. 40°C
 - C. 45°C
 - D. 50°C

- 14) The recently identified pathway for high powered lasers is known as?
- A. Photobiomodulation
 - B. Photohemotherapy
 - C. Photoapoptosis
 - D. Photodissociation of NO
- 15) _____ is an unwanted byproduct of light.
- A. Density
 - B. Heat
 - C. Fluency
 - D. Coherence
- 16) There are _____ 5500 studies on the use of LLLT.
- A. Significantly less than
 - B. Less than
 - C. Equal To
 - D. More than
- 17) Level I evidence includes:
- A. Case studies
 - B. Expert Opinion
 - C. Meta Analyses and Systematic Reviews
 - D. Randomized Double Blind Controlled Studies
- 18) There is _____ evidence to support LLLT for exercise performance.
- A. Strong
 - B. Weak
 - C. Limited
 - D. Moderate
- 19) Efficacy is defined as:
- A. How an individual devices functions – in practice – as related to the reported efficacy
 - B. A measure of the quality of scientific evidence supporting a categorical “modality”
 - C. The reported outcomes as reported in the literature
 - D. The magnitude of the effect size as seen in laboratory studies
- 20) In the study by Vanin, et al., strength was found to increase in the quadriceps when treatment was applied:
- A. Before and After
 - B. After
 - C. Before
 - D. It did not increase ($p < 0.05$) strength of the quads

- 21) Grandinetti, et al measured the Thermal Time Profile of the LaserShower on human skin. Which statement best describes their results.
- A. The surface temperature increased radically in darker pigmented skin
 - B. The TTP did not increase an additional 22.3°C in any skin type
 - C. Lighter pigmented skin had an increase in skin temperature of 22.3°C
 - D. As skin pigmentation increase there is a radical increase in skin temperature
- 22) In order to establish the biphasic dose response, a study MUST measure both _____ and _____ to determine the effects of dose.
- A. TEMPO signal, Thermal Time Profile (TTP)
 - B. Maximum voluntary contraction (MVC), creatine kinase (CK)
 - C. ATP, NOS
 - D. Inflammation (CK), pain (VAS)
- 23) Dose Optimization was shown to consist of three phases: stimulation, inhibition or toxicity. This is a prime example of bi-phasic dose response. When the treatment time reaches 400 seconds the dose then moves into which phase?
- A. Stimulatory
 - B. Inhibitory
 - C. Toxic
 - D. All of the above
- 24) Contraindications for PBM with low-level devices include:
- A. Metal Implants
 - B. Pregnancy
 - C. Areas of decreased sensation
 - D. Treatment over epiphysis in children
- 25) Miranda, et al. found that pre-treatment with low level laser _____ performance during progressive stress testing.
- A. Improved
 - B. Decreased
 - C. Maintained
 - D. Has no Effect on

Bonus:

- 26) To improve endurance with PBM, treatment should _____ exercise?
- A. Follow
 - B. Precede
 - C. Not be done at all
 - D. Be done before and after

Name	
BOC Cert #	
Address	
Phone	
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Organization:	Title of Course:	Total # of CEUs:
Multi Radiance Medical	Low Level Laser Therapy and Sports Performance	2
Provider #:	Instructor:	Date:
BOC AP#: P8233-2001	John Bruno, ATC	04/12/18
Results	Certificate Awarded	
/ 25 =	Yes No	

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
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23	A	B	C	D
24	A	B	C	D
25	A	B	C	D
BONUS	A	B	C	D