

HESI-A2^{Q&As}

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QUESTION 1

Reading Material

(1)

A research team from the University of Bonn has succeeded for the first time in using light stimuli to stop life-threatening cardiac arrhythmia in mouse hearts. (2) Furthermore, as shown in computer simulations at Johns Hopkins University, this technique could also be used successfully for human hearts.

(3)

The study opens up a whole new approach to the development of implantable optical defibrillators, in which the strong electrical impulses of conventional defibrillators are replaced by gentler, pain-free light impulses. (4) The Journal of Clinical Investigation has now published the results. (5) Ventricular fibrillation!

(6)

When the heart muscle races and no longer contracts in an orderly fashion, sudden death often follows due to the lack of blood circulation. (7) In such an emergency, a defibrillator helps to restore normal heart activity by means of intense electrical shocks. (8) In patients with a known risk for these arrhythmia, the prophylactic implantation of a defibrillator is the treatment of choice. (9) If ventricular fibrillation is detected, a pulse of electricity is automatically generated, which normalizes the excitation of the heart muscle and saves the person's life.

(10)

"When an implanted defibrillator is triggered, which unfortunately can also happen because of false detection of arrhythmia, it is always a very traumatic event for the patient", says the head of the study, Junior-Professor Philipp Sasse of the Institute of Physiology I at the University of Bonn. (11) "The strong electrical shock is very painful and can even damage the heart further". (12) Therefore, Professor Sasse's team investigated the principles for a pain-free, gentler alternative. (13) As the scientists have now shown, ventricular fibrillation can be stopped by optical defibrillation.

What is the main idea of this text?

- A. Traditional defibrillators cause painful shocks that may damage the heart.
- B. New research has suggested that light stimuli may be a gentler but effective way to treat cardiac arrhythmia.
- C. More research should be done to determine the cause of cardiac arrhythmia.
- D. The University of Bonn is at the cutting edge of cardiac research.

Correct Answer: B

QUESTION 2

Bacteria live in _____.

- A. the water
- B. all of these places
- C. the human body

D. the soil

Correct Answer: B

QUESTION 3

What is the total number of sulfur atoms represented in $3\text{Ca}(\text{SO}_4)_3$?

A. 3

B. 4

C. 6

D. 9

Correct Answer: D

QUESTION 4

Which of these correctly matches photosynthesis and aerobic cellular respiration with their corresponding, balanced chemical equations?

A. Photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{EM Radiation} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ Cellular Respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 36\text{ATP}$

B. Photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} + 36\text{ATP} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ Cellular Respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 36\text{ATP}$

C. Photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{EM Radiation} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ Cellular Respiration: $6\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 36\text{ATP}$

D. Photosynthesis: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 36\text{ATP}$ Cellular Respiration: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{EM Radiation} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Correct Answer: A

QUESTION 5

What is 0.85×0.65 ?

A. 0.5520

B. 0.5252

C. 0.5525

D. 0.2552

Correct Answer: C

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