



Reducing One Amino Acid Boosts Lifespan by 33% in Mice

Description

Investigations conducted on murine models have elucidated that restricted consumption of a particular essential amino acid may mitigate the deleterious effects of aging, potentially extending lifespan. This intriguing revelation invites contemplation regarding the applicability of such findings in enhancing human longevity and quality of life.

Isoleucine, classified among the trio of branched-chain amino acids integral to protein synthesis, is indispensable for human vitality. Given the body's incapacity to synthesize it *de novo*, it must be acquired through dietary sources such as eggs, dairy, soy protein, and meats.

Nevertheless, an adage warns of excess in all things. Previous research, which analyzed dietary isoleucine levels among Wisconsin residents from 2016 to 2017, revealed a correlation between heightened isoleucine intake and metabolic health, with higher body mass indices (BMIs) associated with increased consumption of this amino acid.

According to metabolism researcher Dudley Lamming from the University of Wisconsin, this research is promising. He states, "It's compelling to consider that dietary modifications could substantially influence both lifespan and 'healthspan,' particularly if initiated around mid-life."

The latest study involved a genetically diverse cohort of mice provided with either a control diet rich in 20 common amino acids, a significantly reduced amino acid diet, or a regimen where only isoleucine was diminished by two-thirds. Despite an unrestricted caloric intake, mice with restricted isoleucine displayed enhanced longevity and health, characterized by reduced frailty and improved glycemic control.

Notably, male mice exhibited a remarkable 33 percent lifespan increase compared to their isoleucine-sufficient counterparts, while female mice experienced a 7 percent enhancement. Additionally, these murine subjects demonstrated superior outcomes across 26 health metrics such as muscular strength and endurance.

Although the researchers posit that the restriction of dietary isoleucine in humans—whether through dietary adjustments or pharmacological interventions—might yield analogous anti-aging benefits, they acknowledge the inherent complexities of human dietary interactions. Careful calibration would be essential to optimize the effects on diverse human populations.

The findings were published in *Cell Metabolism*.

Vocabulary List:

1. **Elucidated** /ɪˈluː.si.deɪ.tɪd/ (verb): To make something clear or explain.



2. **Mitigate** /'mɪt.i.geɪt/ (verb): To make less severe or serious.
3. **Indispensable** /,ɪn.dɪ'spɛn.sə.bəl/ (adjective): Absolutely necessary or essential.
4. **Correlation** /,kɔːr.ə'leɪ.ʃən/ (noun): A mutual relationship or connection between two or more things.
5. **Calibrated** /'kæl.ɪ.breɪ.tɪd/ (verb): To adjust or fine-tune something for accurate measurement or performance.
6. **Frailty** /'freɪl.ti/ (noun): The quality of being weak or fragile.

Comprehension Questions

Multiple Choice

1. Which essential amino acid was restricted in the murine models to potentially extend lifespan?
Option: Leucine
Option: Isoleucine
Option: Valine
Option: Arginine
2. Isoleucine is classified among which group of amino acids integral to protein synthesis?
Option: Essential amino acids
Option: Non-essential amino acids
Option: Conditional amino acids
Option: Acidic amino acids
3. What dietary sources provide isoleucine for human vitality?
Option: Fruits and vegetables
Option: Grains and cereals
Option: Eggs, dairy, soy protein, meats
Option: Nuts and seeds
4. What percentage of lifespan increase did male mice exhibit with restricted isoleucine intake?
Option: 20%
Option: 25%
Option: 33%
Option: 40%
5. In the study, which gender of mice experienced a 7 percent enhancement in lifespan with restricted isoleucine?
Option: Male mice



- Option: Female mice
- Option: Both genders
- Option: None of the above

6. What type of diet regimen was used for mice with restricted isoleucine in the latest study?

- Option: High-fat diet
- Option: Control diet with 20 amino acids
- Option: Ketogenic diet
- Option: Vegetarian diet

True-False

7. Restricted consumption of isoleucine in murine models did not show any positive effects on longevity and health.

8. Isoleucine can be synthesized de novo by the human body.

9. Heightened isoleucine intake was correlated with improved metabolic health in the study.

10. The researchers recommend immediate dietary adjustments to restrict isoleucine in the human population.

11. Dudley Lamming is a metabolism researcher from the University of Wisconsin.

12. The study outcomes demonstrated inferior health metrics in mice with restricted isoleucine intake.

Gap-Fill

13. According to Dudley Lamming, dietary modifications could substantially influence both lifespan and healthspan, particularly if initiated around _____.

14. Male mice exhibited a _____ percent lifespan increase with restricted isoleucine intake compared to their isoleucine-sufficient counterparts.

15. The latest study involved a genetically diverse cohort of mice provided with a control diet rich in 20 common amino acids, a significantly reduced amino acid diet, or a regimen where only isoleucine was



diminished by _____.

16. The findings of the study were published in _____.

17. The researchers acknowledge the inherent complexities of human dietary interactions, stating that careful calibration would be essential to optimize the effects on diverse human _____.

18. Previous research revealed a correlation between heightened isoleucine intake and _____ health.

Answer

Multiple Choice: 1. Isoleucine 2. Essential amino acids 3. Eggs, dairy, soy protein, meats 4. 33% 5. Female mice 6. Control diet with 20 amino acids

True-False: 7. False 8. False 9. True 10. False 11. True 12. False

Gap-Fill: 13. mid-life 14. 33 15. two-thirds 16. Cell Metabolism 17. populations 18. metabolic

Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. What term describes the ability of a product to produce a desired effect?

Option: Efficacy

Option: Variant

Option: Frailty

Option: Eclipses

2. What word means a visual representation or description of something?

Option: Mitigate

Option: Deposition

Option: Indispensable

Option: Engaged

3. Which term is used to describe the action of fine-tuning or adjusting something for accuracy?

Option: Calibrated

Option: Robust

Option: Prohibition



Option: Extrusion

4. What term refers to a remarkable event or occurrence?

Option: Biocompatibility

Option: Ecological

Option: Phenomenon

Option: Pollination

5. Which term relates to the study of the adverse effects of chemical substances on living organisms?

Option: Sustainable

Option: Consequently

Option: Toxicological

Option: Accumulation

6. What term describes the process or means by which something operates or is achieved?

Option: Modifiability

Option: Prophylactic

Option: Mechanism

Option: Substantiating

7. What term refers to the act of forbidding or banning something?

Option: Nanosketti

Option: Eclipses

Option: Prohibition

Option: Emulsifying

8. Which term means to make something less severe serious or painful?

Option: Intriguing

Option: Mitigate

Option: Substantiating

Option: Deposition

9. What word describes something that can be maintained for a long time without exhausting resources?

Option: Sustainable

Option: Engaged

Option: Pollination

Option: Indispensable

10. Which term refers to the process of shaping or forming objects by forcing material through a die?



- Option: Extrusion
- Option: Robust
- Option: Variant
- Option: Elucidated

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. A _____ security system is essential to protect sensitive information.
12. The flu vaccine is adjusted each year to target the most prevalent _____ of the virus.
13. Good communication skills are _____ in a customer service role.
14. The _____ of evidence led to the breakthrough in the case.
15. The employees were actively _____ in the team-building exercises.
16. Bees play a crucial role in the _____ of flowering plants.
17. The professor _____ the complex theory in a way that everyone could understand.
18. The software's _____ allows users to customize its features.
19. Materials used in medical implants must possess _____ to avoid rejection by the body.
20. The budget cuts led to a reduction in staff numbers; _____ workload increased for remaining employees.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. Understanding the inner of a machine is crucial for its maintenance.
22. The old bridge collapsed due to the of its structure.
23. Researchers are exploring the applications of particles in advanced technologies.
24. The study provided ample evidence the hypothesis.



25. During a solar the moon passes between the sun and the earth.
26. agents are commonly used in food preparation to mix oil and water.
27. The study aimed to determine the between sleep patterns and cognitive function.
28. The new data is crucial for the previous research findings.
29. The mystery novel had a plot full of twists and turns that kept readers engaged.
30. The environmental organization focuses on promoting conservation practices.

Answer

Multiple Choice: 1. Efficacy 2. Depiction 3. Calibrated 4. Phenomenon 5. Toxicological 6. Mechanism 7. Prohibition 8. Mitigate 9. Sustainable 10. Extrusion
Gap-Fill: 11. robust 12. variant 13. indispensable 14. accumulation 15. engaged 16. pollination 17. elucidated 18. modifiability 19. biocompatibility 20. consequently
Matching sentence: 1. mechanism 2. frailty 3. nanosketti 4. substantiating 5. eclipses 6. emulsifying 7. correlation 8. substantiating 9. intriguing 10. ecological

CATEGORY

1. Health - LEVEL6

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