Pomegranate Leaf Compound Targets Harmful Amyloid Clumps

Description

Researchers at Kumamoto University have discovered a compound in pomegranate leaves and branches that can effectively break apart protein aggregates linked to transthyretin amyloidosis, a condition that can cause serious damage to nerves and the heart. This discovery highlights a potential new avenue for medical treatment.

The compound, named 1,2,3,4,6-penta-O-galloyl-?-D-glucose (PGG), was identified as an "amyloid disruptor." In transthyretin amyloidosis, the transthyretin protein can misfold, forming amyloid fibrils that accumulate in organs. Most current treatments aim to stabilise the protein or reduce its production, but once these fibrils form, it is challenging to remove them.

To find effective solutions, the research team screened over 1,500 plant extracts. They found that extracts from pomegranate clearly stood out for their ability to disrupt existing TTR fibrils. They focused specifically on the compound PGG, which showed remarkable efficacy.

In lab experiments, PGG broke down amyloid fibrils from both normal and mutated forms of TTR without affecting amyloid-? fibrils related to Alzheimer’s disease. This specificity suggests that PGG works by targeting TTR aggregates selectively.

When tested in a model organism, C. elegans, engineered to produce TTR fragments, those treated with PGG showed fewer protein deposits and a notable increase in both lifespan and healthspan. Furthermore, PGG was also effective against amyloid fibrils obtained from a patient’s heart tissue, confirming its potential in practical applications.

Despite the need for further research on safety and effectiveness in humans, these findings suggest that PGG could be a promising candidate for future treatments, helping to remove harmful amyloid deposits in transthyretin amyloidosis.

Vocabulary List:

1. **Compound** /ˈkɒm.paʊnd/ (noun): A thing made of two or more parts.
2. **Pomegranate** /ˈpɒm.ɪ.græn.ɪt/ (noun): A round fruit with red seeds inside.
3. **Protein** /ˈprəʊ.tiːn/ (noun): A substance in food for building body.
4. **Aggregate** /ˈæg.rɪ.gət/ (noun): A total formed from many parts.
5. **Amyloidosis** /ˌæ.mə.lɔɪˈdoʊ.sɪs/ (noun): A disease caused by protein build-up.
6. **Fibrils** /ˈfaɪ.brɪlz/ (noun): Thin fibers formed from proteins.

Comprehension Questions

Multiple Choice

1. What is the name of the compound discovered by researchers at Kumamoto University?

   Option: 1,2,3,4,6-penta-O-galloyl-?-D-glucose
   Option: Transthyretin
   Option: Amyloid-?
   Option: C. elegans

2. What condition is linked to the protein aggregates that PGG can break apart?

   Option: Alzheimer's disease
   Option: Transthyretin amyloidosis
   Option: Parkinson's disease
   Option: Multiple sclerosis

3. How many plant extracts did the research team screen?

   Option: 500
   Option: 1,000
   Option: 1,500
   Option: 2,000

4. In lab experiments, PGG showed efficacy against which type of fibrils?

   Option: Alzheimer's disease fibrils only
   Option: TTR fibrils
   Option: All amyloid fibrils
   Option: None of the above

5. What model organism was used to test the effects of PGG?

   Option: Mouse
   Option: Fruit fly
   Option: C. elegans
   Option: Zebrafish

6. What is one potential benefit of treating with PGG in the tested model organism?

   Option: Decreased healthspan

Option: Increase in protein deposits
Option: Increased lifespan
Option: Decrease in lifespan

True-False

7. PGG targets amyloid-? fibrils related to Alzheimer’s disease.

8. Transthyretin amyloidosis can cause serious damage to nerves and the heart.

9. The research team focused on over 1,000 plant extracts.

10. PGG was effective against amyloid fibrils from a patient’s heart tissue.

11. After treatment with PGG, there was a decrease in healthspan in the model organism.

12. PGG works as a stabilizer for the transthyretin protein.

Gap-Fill

13. The compound discovered is named 1,2,3,4,6-penta-O-galloyl-?-D-glucose (PGG) and is an _____ disruptor.

14. Transthyretin amyloidosis involves misfolding of the transthyretin protein, forming _____ fibrils.

15. The research highlighted a potential new avenue for _____ treatment.

16. In the model organism C. elegans, treated individuals showed _____ protein deposits.

17. The findings suggest that PGG could be a promising candidate for future _____ in transthyretin amyloidosis.

18. PGG was identified as an amyloid disruptor which specifically targets _____

aggregates.

Answer

Multiple Choice: 1. 1,2,3,4,6-penta-O-galloyl-?-D-glucose 2. Transthyretin amyloidosis 3. 1,500 4. TTR fibrils 5. C. elegans 6. Increased lifespan
True-False: 7. False 8. True 9. False 10. True 11. False 12. False
Gap-Fill: 13. amyloid 15. medical 16. fewer 17. treatments 18. TTR

Vocabulary quizzes

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

1. What is a common use for a tampon?
   Option: Contraception
   Option: Menstrual hygiene
   Option: Infection prevention
   Option: Surgical assistance

2. Which of the following substances is considered toxic?
   Option: Water
   Option: Oxygen
   Option: Lead
   Option: Glucose

3. Which of the following is a primary symptom of fatigue?
   Option: Increased energy
   Option: Drowsiness
   Option: Hyperactivity
   Option: Euphoria

4. What is a single-celled organism classified as a bacterium?
   Option: Virus
   Option: Fungi
   Option: Protozoa
   Option: Eubacteria

5. The term 'inflate' typically refers to what action?

Option: Deplete
Option: Expand
Option: Compress
Option: Contract

6. What is the primary function of DNA?

Option: Energy production
Option: Genetic information storage
Option: Cell respiration
Option: Protein synthesis

7. What does the term 'discharge' refer to in medical terms?

Option: Release of fluid
Option: Infection
Option: Surgery
Option: Diagnosis

8. Microtubules are primarily involved in which cellular function?

Option: Energy production
Option: Structural support
Option: Protein synthesis
Option: Genetic replication

9. What is the body's natural response to infection or injury called?

Option: Euphoria
Option: Asthenia
Option: Inflammation
Option: Amnesia

10. What is a common environmental concern associated with hydrofluorocarbons?

Option: Acid rain
Option: Ozone depletion
Option: Global warming potential
Option: Water pollution

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

11. Certain chemicals can have a _____ effect on human health.

12. Toxic substances can _____ in the bloodstream over time.

13. In nature, species often engage in _____ for resources.

14. A scientific _____ is a proposed explanation for a phenomenon.

15. Genetic _____ can lead to variations in a species.

16. Proteins can _____ into larger structures called fibrils in diseases.

17. The _____ is a fruit known for its numerous health benefits.

18. Antibiotic _____ is a growing concern in medicine.

19. A _____ is a substance used in cooling systems.

20. The _____ of a substance defines the temperature at which it transitions from solid to liquid.

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

21. Fluorescence is the emission of light by a substance that has absorbed light or other electromagnetic radiation.
22. Amyloidosis is a disorder characterized by the accumulation of amyloid proteins in organs andtissues.
23. Fibrils are thread-like structures formed by proteins and are associated with various diseases.
24. Ionocaloric materials are related to changes in thermal properties when ions are applied.
25. Global warming potential is a measure of how much heat a greenhouse gas traps in the atmosphere.
26. A compound is a substance formed when two or more elements chemically bond together.
27. Resistance refers to the ability of an organism to withstand harmful effects from antibiotics.
28. Many substances can be classified as toxic depending on their effects on biological organisms.
29. When a foreign object is lodged in the throat, it can obstruct breathing.
30. Hydrofluorocarbons are compounds often used in refrigeration that pose a risk to global warming.

Answer

Multiple Choice: 1. Menstrual hygiene 2. Lead 3. Drowsiness 4. Eubacteria 5. Expand 6. Genetic information storage 7. Release of fluid 8. Structural support 9. Inflammation 10. Global warming potential
Gap-Fill: 11. detrimental 12. accumulates 13. competing 14. hypothesis 15. mutations 16. aggregate 17. pomegranate 18. resistance 19. refrigerant 20. melting point
Matching sentence: 1. fluorescence 2. Amyloidosis 3. fibrils 4. Ionocaloric 5. Global warming potential 6. Compound 7. Resistance 8. Toxic 9. Lodged 10. Hydrofluorocarbons

CATEGORY

1. Health - LEVEL5

POST TAG

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2. ESL learning
3. esl news
4. Level 5
5. natural compound
6. pomegranate leaves

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