



---

# Bioengineered Photosynthesis Offers Hope for Dry Eye Treatment

## Description

Photosynthesis is a vital process that allows plants to live. Without it, most life on Earth would not survive. Mammals, like humans, cannot photosynthesize and must eat food. However, a new study has used a part of this process in mammal eye cells.

Scientists used light-harvesting particles from spinach in eye model studies. They aimed to use these particles to produce chemicals that help treat dry eye disease. Dry eye disease affects about 1.5 billion people globally and is difficult to manage. The eye, which constantly processes light, suffers from oxidative stress, causing damage that contributes to this disease.

The researchers created a tiny particle called LEAF from spinach chloroplasts. These particles were able to capture light. LEAF was tested in cells to see if it could restore chemical balance using the light. When exposed to light, these particles helped reduce cell inflammation.

The study has not yet been tested on humans, and researchers suggest it could become a treatment in the form of eye drops. This approach mimics a sea slug's ability to use algae for photosynthesis. However, there are concerns about safety and possible immune reactions.

The research, published in the journal *Cell*, could lead to new treatments for dry eye disease. But moving from experimental stages to human trials is a major challenge.

---

## Vocabulary List:

1. **photosynthesis** //,fəʊtə'sɪnθəʊsɪs// (noun): how plants use light to make food
2. **chloroplasts** //'klɒrə,plæsts// (noun): tiny parts inside plant cells that make food
3. **oxidative** //,ɒksɪ'deɪtɪv// (adjective): caused by chemical reactions with oxygen
4. **inflammation** //,ɪnflə'meɪʃən// (noun): swelling or pain in a part of the body
5. **immune** //ɪ'mjuːn// (adjective): related to the body's system that fights illness
6. **experimental** //,ɛkspə'rɪmentəl// (adjective): used to try new ideas, not final

## Comprehension Questions

### Multiple Choice



1. What is the vital process that allows plants to live?
  - Option: Respiration
  - Option: Photosynthesis
  - Option: Metabolism
  - Option: Fermentation
  
2. How many people are affected by dry eye disease globally?
  - Option: 500 million
  - Option: 1.5 billion
  - Option: 2 billion
  - Option: 750 million
  
3. From which part of spinach were light-harvesting particles used in the study?
  - Option: Leaves
  - Option: Roots
  - Option: Chloroplasts
  - Option: Stems
  
4. What is the name of the tiny particle created from spinach?
  - Option: SPIN
  - Option: LEAF
  - Option: LIGHT
  - Option: SPC
  
5. What is the potential form of treatment suggested for dry eye disease?
  - Option: Pills
  - Option: Injections
  - Option: Eye drops
  - Option: Laser therapy
  
6. What ability does the approach mimic from a sea slug?
  - Option: Color change
  - Option: Photosynthesis
  - Option: Swimming speed
  - Option: Camouflage

**True-False**



7. Mammals can photosynthesize.
8. The study has been tested on humans.
9. LEAF particles were able to capture light.
10. Dry eye disease is easy to manage.
11. The research was published in the journal Cell.
12. The research has no concerns about safety.

### Gap-Fill

13. Photosynthesis is vital for plants and without it, most life on Earth would not \_\_\_\_\_.
14. Dry eye disease affects about \_\_\_\_\_ billion people globally.
15. LEAF was created from spinach \_\_\_\_\_.
16. The particles were tested to restore \_\_\_\_\_ balance in the cells.
17. Moving from experimental stages to human trials is a major \_\_\_\_\_.
18. Researchers suggest the treatment could come in the form of eye \_\_\_\_\_.

### Answer

**Multiple Choice:** 1. Photosynthesis 2. 1.5 billion 3. Chloroplasts 4. LEAF 5. Eye drops

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

**Gap-Fill:** 13. survive 14. 1.5 15. chloroplasts 16. chemical 17. challenge 18. drops

### Vocabulary quizzes

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

1. What condition is characterized by weakened bones, making them more prone to fractures?



- 
- Option: Arthritis  
Option: Osteoporosis  
Option: Scoliosis  
Option: Osteomyelitis
2. What substances are recognized by the immune system as foreign and can trigger an immune response?  
Option: Hormones  
Option: Antibodies  
Option: Antigens  
Option: Integrins
3. In biology, what term refers to structures that extend outward from a surface?  
Option: Contractions  
Option: Protrusions  
Option: Integration  
Option: Inflammation
4. Which of the following are often used to enhance dietary intake of vitamins and minerals?  
Option: Supplements  
Option: Placebo  
Option: Antivirals  
Option: Integrins
5. What term is used for experiments conducted to test new medical treatments?  
Option: Research  
Option: Studies  
Option: Trials  
Option: Evaluations
6. What term describes a system where decision-making is distributed rather than concentrated?  
Option: Integrated  
Option: Centralized  
Option: Decentralized  
Option: Hierarchical
7. What process do plants use to convert light energy into chemical energy?  
Option: Respiration  
Option: Photosynthesis  
Option: Metabolism  
Option: Digestion
8. What term describes processes related to thinking, learning, and memory?  
Option: Emotional



- Option: Cognitive
- Option: Sensory
- Option: Motor

9. What term describes something that is advantageous or helpful?

- Option: Detrimental
- Option: Beneficial
- Option: Neutral
- Option: Adverse

10. What type of stress is associated with the damage caused by free radicals in the body?

- Option: Oxidative
- Option: Nitrosative
- Option: Metabolic
- Option: Physical

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

11. Integrins are proteins that facilitate cell-to-cell and cell-to-\_\_\_\_\_ interactions.

12. The body's response to injury often involves \_\_\_\_\_ as a means of protecting and healing.

13. Cells that have reached a state of senescence cease to divide and may contribute to \_\_\_\_\_ diseases.

14. Targeted therapies are designed to precisely identify and treat specific \_\_\_\_\_ in diseases.

15. A \_\_\_\_\_ is often used in clinical trials to provide a control group that receives no active treatment.

16. Biological \_\_\_\_\_ can prevent pathogens from entering the body and causing disease.

17. The results from the \_\_\_\_\_ group were compared to those of the control group to



determine effectiveness.

18. A systematic \_\_\_\_\_ of existing literature helps in understanding current trends in research.

19. Osteoporosis increases the risk of bone \_\_\_\_\_, especially in older adults.

20. Antiviral medications are often used to treat infections caused by \_\_\_\_\_ agents.

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

21. The coordinated movements of the muscles allow for smooth and efficient motion.
22. Chloroplasts are the organelles in plant cells responsible for conducting photosynthesis.
23. Muscle fibers are contractile cells that enable movement through contraction.
24. Recent studies have provided valuable insights into the mechanisms of immune response.
25. Health professionals often recommend supplements for those who have dietary deficiencies.
26. Understanding the context of a research study is crucial for interpreting its findings accurately.
27. The immune system plays a critical role in defending the body against infections and diseases.
28. Certain foods have been shown to have beneficial effects on overall health and wellness.
29. Antiviral drugs are designed to specifically target viral infections and inhibit their replication.
30. Inflammation is a natural response of the body to injury or infection, often characterized by redness and swelling.

**Answer**

**Multiple Choice:** 1. Osteoporosis 2. Antigens 3. Protrusions 4. Supplements 5. Trials 6. Decentralized 7. Photosynthesis 8. Cognitive 9. Beneficial 10. Oxidative

**Gap-Fill:** 11. matrix 12. inflammation 13. age-related 14. pathways 15. placebo 16. barriers 17. experimental 18. review 19. fractures 20. viral

**Matching sentence:** 1. coordinated 2. chloroplasts 3. contractile 4. insights 5. recommend 6. context 7. immune 8. beneficial 9. antiviral 10. inflammation



## **CATEGORY**

1. Health - LEVEL3

## **POST TAG**

1. B1
2. bioengineer
3. dry eye disease
4. ESL learning
5. esl news
6. L3
7. Level 3
8. photosynthesis
9. scientists

## **Tags**

1. B1
2. bioengineer
3. dry eye disease
4. ESL learning
5. esl news
6. L3
7. Level 3
8. photosynthesis
9. scientists

## **Date Created**

2026/05/21

## **Author**

aimeeyoung99

ESL-NEWS.COM