

# Breakthrough Vibrating Molecules Eliminate 99% of Lab Cancer Cells

## Description

Recent advancements in oncological research have unveiled an extraordinary modality for the annihilation of cancer cells. A pioneering study disseminated in the previous year elucidated that the excitation of [aminocyanine molecules](#) with near-infrared radiation precipitated synchronized vibrations capable of compromising the integrity of cancerous cell membranes.

Aminocyanines, being synthetic dyes employed in bioimaging, are conventionally administered in subtherapeutic doses for oncological detection. Their hydrophilic stability and propensity for cytosolic adherence render them particularly advantageous.

Cell membrane full diagram

Mechanistic depiction of the vibrational process. ([Ciceron Ayala-Orozco et al., Nature Chemistry, 2023](#))

Researchers from Rice University, Texas A&M University, and the University of Texas have asserted that their innovative approach signifies a substantial enhancement over the previously developed Feringa-type motors, which possessed limited efficacy in disrupting pathological cell structures.

"This represents a novel generation of molecular machines, aptly referred to as molecular jackhammers," remarked chemist James Tour from Rice University upon the study's publication in December 2023. "These contrivances exhibit mechanical velocities exceeding one million times that of prior technologies, and are operable via near-infrared light as opposed to visible light."

The application of near-infrared light is paramount, as it facilitates deeper penetration into tissue, thereby allowing for potential non-invasive interventions in solid organ malignancies.

Experiments conducted on cultured cancer cell lines demonstrated an astonishing 99 percent efficacy in cellular destruction, with preliminary trials on murine models bearing [melanoma](#) tumors revealing a remarkable rate of tumor eradication.

A molecule with green and yellow sections

Structural illustration of an aminocyanine molecule superimposed with the predicted plasmonic behavior. ([Ciceron Ayala-Orozco/Rice University](#))

This seminal research elucidates a previously unrecognized mechanism by which molecular plasmons can energize the entire molecular structure, producing kinetic actions that effectively disrupt malignant cellular membranes.

Currently, the inquiry is in its nascent stages; however, these findings are emblematic of a promising trajectory in oncological therapy, employing fundamental biomechanical forces that limit the potential for cancer cells to develop resistance.

The study, published in [Nature Chemistry](#), underscores an inventive paradigm in cancer treatment.



*A previous version of this article was released in December 2023.*

## Vocabulary List:

1. **Annihilation** /əˌnɪhɪˈleɪʃən/ (noun): The act of destroying something completely.
2. **Precipitated** /prɪˈsɪpɪteɪtɪd/ (verb): Caused an event or situation to happen suddenly.
3. **Synchronized** /ˈsɪŋkrəˌnaɪzd/ (adjective): Operating at the same time or rate.
4. **Efficacy** /ˈefɪkəsi/ (noun): The ability to produce a desired or intended result.
5. **Innovative** /ˈɪnəˌveɪtɪv/ (adjective): Introducing new ideas; original and creative in thinking.
6. **Trajectory** /trəˈdʒektəri/ (noun): The path followed by an object moving through space.

## Comprehension Questions

### Multiple Choice

1. What did the recent advancements in oncological research unveil for the annihilation of cancer cells?  
Option: A novel modality involving aminocyanine molecules  
Option: A traditional chemotherapy approach  
Option: A surgical intervention technique  
Option: A radiotherapy method
2. Why are aminocyanine molecules advantageous in oncological detection?  
Option: Due to their hydrophobic stability  
Option: Due to their propensity for cytosolic adherence  
Option: Due to their high cost  
Option: Due to their low efficacy
3. What did the researchers from Rice University, Texas A&M University, and the University of Texas develop?  
Option: Feringa-type motors  
Option: Molecular Jackhammers  
Option: Nanoparticles  
Option: Chemotherapy drugs
4. Which type of light is utilized for operating the molecular jackhammers?



- Option: Visible light
- Option: Ultraviolet light
- Option: Near-infrared light
- Option: Infrared light

5. How much efficacy in cellular destruction was demonstrated on cultured cancer cell lines?

- Option: 50%
- Option: 75%
- Option: 90%
- Option: 99%

6. What type of tumors were used in preliminary trials on murine models?

- Option: Breast tumors
- Option: Lung tumors
- Option: Melanoma tumors
- Option: Brain tumors

### True-False

7. Aminocyanine molecules are conventionally used in supratherapeutic doses for oncological detection.

8. The application of near-infrared light is crucial for potential non-invasive interventions in solid organ malignancies.

9. Molecular plasmons play a role in disrupting malignant cellular membranes.

10. The recent research in oncology suggests a decline in the potential for cancer cells to develop resistance against treatment.

11. The study was published in Nature Chemistry in December 2023.

12. The innovative approach developed by the researchers is based on Feringa-type motors.

### Gap-Fill

13. In December 2023, chemist James Tour referred to the novel generation of molecular machines as molecular \_\_\_\_\_.

16. The application of near-infrared light enables deeper penetration into tissue, allowing for potential non-



invasive interventions in solid organ malignancies, offering a promising avenue for advanced oncological  
\_\_\_\_\_.

17. The recent research in oncology has uncovered a previously unrecognized mechanism by which  
molecular plasmons can energize the entire molecular structure, producing kinetic actions that disrupt  
malignant cellular \_\_\_\_\_.

18. The study, published in Nature Chemistry, highlights an inventive paradigm in cancer treatment, paving  
the way for the application of fundamental biomechanical forces to limit the potential for cancer cells to  
develop \_\_\_\_\_.

## Answer

**Multiple Choice:** 1. A novel modality involving aminocyanine molecules 2. Due to their propensity for  
cytosolic adherence 3. Molecular Jackhammers 4. Near-infrared light 5. 99% 6. Melanoma tumors

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

**Gap-Fill:** 13. Jackhammers 16. therapy 17. membranes 18. resistance

## Vocabulary quizzes

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

1. What is the term used to describe the relationship or connection between two or more things?

- Option: A) Cognitive
- Option: B) Correlate
- Option: C) Cerebrospinal
- Option: D) Contamination

2. Which word means to make something clear or explain something?

- Option: A) Innovative
- Option: B) Elucidates
- Option: C) Pathology
- Option: D) Fossilization



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3. What is the term for taking steps to lessen the severity or extent of something?
- Option: A) Mitigate
  - Option: B) Infiltration
  - Option: C) Precipitated
  - Option: D) Nexus
4. Which word describes introducing new ideas or methods?
- Option: A) Synchronized
  - Option: B) Mitigate
  - Option: C) Innovative
  - Option: D) Unearthed
5. To cause something to happen suddenly or unexpectedly is to \_\_\_\_\_.
- Option: A) Taxonomy
  - Option: B) Epitomizes
  - Option: C) Adsorption
  - Option: D) Precipitated
6. Which term refers to a practice that can be maintained over the long term without depleting resources?
- Option: A) Trajectory
  - Option: B) Correlate
  - Option: C) Sustainable
  - Option: D) Amalgamation
7. What is the process of combining or uniting multiple entities into one?
- Option: A) Annihilation
  - Option: B) Mitigate
  - Option: C) Amalgamation
  - Option: D) Infiltration
8. Which word describes the path followed by a projectile or an object moving under the action of given forces?
- Option: A) Synaptic
  - Option: B) Trajectory
  - Option: C) Enigmatic
  - Option: D) Valuation
9. What is a central or most important point?
- Option: A) Infiltration
  - Option: B) Nexus
  - Option: C) Elucidates
  - Option: D) Contamination



10. Which word refers to a single item example or representative of a group?

- Option: A) Taxonomy
- Option: B) Contamination
- Option: C) Specimen
- Option: D) Synchronized

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

11. The \_\_\_\_\_ puzzle has puzzled scientists for decades.

12. \_\_\_\_\_ is the process in which a solid holds molecules of a gas or liquid on its surface.

13. The unexpected power outage caused the company to \_\_\_\_\_ its production schedule.

14. Proper \_\_\_\_\_ of the antique vase required the expertise of a skilled appraiser.

15. Before conducting the experiment the scientist formulated a \_\_\_\_\_ to test.

16. The process of \_\_\_\_\_ can preserve the remains of animals and plants for millions of years.

17. The study of the causes and effects of diseases is known as \_\_\_\_\_.

18. Communication between neurons occurs at the \_\_\_\_\_ junction.

19. The discovery of water \_\_\_\_\_ raised concerns about the safety of the local population.

20. Total destruction or \_\_\_\_\_ of the enemy forces was the primary objective of the battle.

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

21. The sudden appearance of a double rainbow after the rain shower amazed everyone.



|                                                                                             |
|---------------------------------------------------------------------------------------------|
| 22. The fluid surrounds the brain and spinal cord protecting them from injury.              |
| 23. Archaeologists ancient artifacts buried beneath the temple ruins.                       |
| 24. Biologists use to classify and organize living organisms into hierarchical groups.      |
| 25. The of the new treatment in reducing pain was proven in clinical trials.                |
| 26. The spy's mission involved a secret into the enemy's headquarters.                      |
| 27. His dedication and hard work the values of the company.                                 |
| 28. The merger of the two companies resulted in a successful of resources and expertise.    |
| 29. The dancers performed a beautifully routine that captivated the audience.               |
| 30. An accurate of the artwork required knowledge of art history and current market trends. |

## Answer

**Multiple Choice:** 1. B) Correlate 2. B) Elucidates 3. A) Mitigate 4. C) Innovative 5. D) Precipitated 6. C) Sustainable 7. C) Amalgamation 8. B) Trajectory 9. B) Nexus 10. C) Specimen

**Gap-Fill:** 11. Enigmatic 12. Adsorption 13. Disrupt 14. Valuation 15. Hypothesis 16. Fossilization 17. Pathology 18. Synaptic 19. Contamination 20. Annihilation

**Matching sentence:** 1. Phenomenon 2. Cerebrospinal 3. Unearthed 4. Taxonomy 5. Efficacy 6. Infiltration 7. Epitomizes 8. Amalgamation 9. Synchronized 10. Valuation

## CATEGORY

1. Health - LEVEL6

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