

# Breakthrough Malaria Vaccine Delivered via Mosquito Bite

## Description

Traditionally, mosquitoes evoke images of disease transmission, such as malaria, yet recent research has intriguingly transformed this perception. Scientists have ingeniously employed these insects as vehicles to deliver a groundbreaking vaccine, demonstrating significantly enhanced efficacy against malaria compared to existing alternatives.

This advancement represents the second iteration of a vaccine of this nature, yielding promising outcomes: of the nine young adults who received the innovative vaccine, eight exhibited robust protection against malaria, in stark contrast to only one in eight participants given the conventional vaccine.

The newly formulated vaccine, developed by researchers from Leiden University and Radboud University in the Netherlands, utilizes a genetically modified, attenuated strain of the *Plasmodium falciparum* parasite, which is responsible for malaria in humans. This altered version, designated GA2, does not induce malaria yet primes the immune system to combat the genuine threat effectively.

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The new vaccine (GA2) offered strong protection against malaria infection. (Larners et al., *New England Journal of Medicine*, 2024)

Vaccinologist Meta Roestenberg from Leiden University elaborates on the mechanism: "These incapacitated parasites are administrated via mosquito bites, traversing to the human liver akin to their unmodified counterparts. However, due to selective genetic alteration, this variant is incapable of completing its lifecycle within the liver, thus precluding the onset of symptomatic malaria."

"This modified interaction elicits a pronounced immune response in the liver, equipping the individual with defensive capabilities against future malaria infections."

The GA2 variant notably prolongs developmental maturation within the body, requiring nearly a week compared to the mere 24 hours for the predecessor GA1. This extended timeframe affords the immune system an opportune window to identify and combat the pathogen effectively.

The study revealed that the GA2 vaccine stimulated a more extensive and diverse array of immune cells, elucidating its remarkable efficacy. Analyzing the underlying mechanisms of this heightened performance will further empower researchers to refine this innovative approach.

Reported side effects were minimal, primarily exhibiting as localized erythema and pruritus at the bite site, with all participants receiving prophylactic anti-malarial treatment post-study.

Progress in the global fight against malaria remains paramount, as the disease continues to afflict nearly 250 million individuals annually, resulting in hundreds of thousands of fatalities. Current vaccines provide partial protection, ranging from 50-77 percent, often lasting no more than a year.

Utilizing mosquito-delivered systems, although not conventionally scalable for public vaccine deployment,



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presents novel opportunities for targeted preventive measures.

In closing, clinical microbiologist Matthew McCall from Radboud University asserts the success of the GA2 parasite in these trials, heralding plans to evaluate its efficacy in real-world contexts.

The findings have been documented in the prestigious [New England Journal of Medicine](#).

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## Vocabulary List:

1. **Intriguingly** /ɪn'truː.ɡɪŋ.li/ (adverb): In a manner that arouses curiosity or interest.
2. **Efficacy** /'ɛf.i.kə.si/ (noun): The ability to produce a desired or intended result.
3. **Mechanism** /'mɛk.ə.nɪ.zəm/ (noun): A process or system by which something happens or is maintained.
4. **Robust** /rɒs'tʌst/ (adjective): Strong and healthy; vigorous.
5. **Variant** /'vɛər.i.ənt/ (noun): Something that differs from others of the same type.
6. **Prophylactic** /,prɒf.fɪ'læk.tɪk/ (adjective): Preventing disease or a related condition.

## Comprehension Questions

### Multiple Choice

1. What is the main purpose of the vaccine developed by researchers from Leiden University and Radboud University?

- Option: To study the behavior of mosquitoes
- Option: To treat malaria symptoms
- Option: To enhance efficacy against malaria
- Option: To develop a treatment for COVID-19

2. How many young adults exhibited robust protection against malaria after receiving the innovative vaccine?

- Option: One out of eight
- Option: All nine participants
- Option: Eight out of nine
- Option: None of them

3. What does the GA2 variant of the vaccine do in the human body compared to GA1?

- Option: It shortens the immune response time



- Option: It requires less time for developmental maturation
- Option: It extends the immune system's opportunity to combat the pathogen
- Option: It is less effective in stimulating immune cells

4. What were the reported side effects of the vaccine?

- Option: Fever and chills
- Option: Localized erythema and pruritus at the bite site
- Option: Nausea and vomiting
- Option: Allergic reactions

5. What percentage of individuals worldwide are afflicted by malaria annually?

- Option: 10-25%
- Option: 25-50%
- Option: 50-75%
- Option: 75-100%

6. What novel opportunities are presented by utilizing mosquito-delivered systems for vaccines?

- Option: Enhancing COVID-19 treatment
- Option: Creating targeted preventive measures
- Option: Developing new antibiotics
- Option: Reducing the population of mosquitoes

### True-False

- 7. The GA2 vaccine induces symptomatic malaria in the human body.
- 8. The GA2 variant requires a longer developmental maturation time in the body compared to GA1.
- 9. The study revealed that the GA2 vaccine had minimal side effects on the participants.
- 10. Current vaccines provide complete protection against malaria.
- 11. Mosquito-delivered systems for vaccines are not scalable for public deployment.
- 12. Clinical microbiologist Matthew McCall plans to stop evaluating the efficacy of the GA2 parasite.

### Gap-Fill

- 14. Utilizing mosquito-delivered systems presents \_\_\_\_\_ opportunities for targeted



preventive measures.

15. The GA2 vaccine stimulated a more extensive and diverse array of immune cells, elucidating its

\_\_\_\_\_ efficacy.

16. The success of the GA2 parasite in trials prompted plans to evaluate its efficacy in

\_\_\_\_\_ contexts.

17. The GA2 variant notably prolongs developmental maturation within the body, requiring nearly a

\_\_\_\_\_ compared to the predecessor GA1.

18. Reported side effects of the vaccine were minimal, primarily exhibiting as localized

\_\_\_\_\_ at the bite site.

## Answer

**Multiple Choice:** 1. To enhance efficacy against malaria 2. Eight out of nine 3. It extends the immune system's opportunity to combat the pathogen 4. Localized erythema and pruritus at the bite site 5. 25-50% 6. Creating targeted preventive measures

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

**Gap-Fill:** 14. novel 15. remarkable 16. real-world 17. week 18. erythema and pruritus

## 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



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- 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

### Date Created

2024/12/09

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