



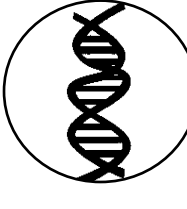
Analyzing the Optimal Treatment for Malaria Using the *Artemisia annua*

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Abstract

Malaria is a parasitic disease impacting 3 billion people worldwide. The *Plasmodium falciparum* is drug resistant to 90% of antimalarial compounds. Artemisinin is being used in a variety of forms to treat Malaria, and the best way is in edible tablets created from organic *Artemisia annua*.

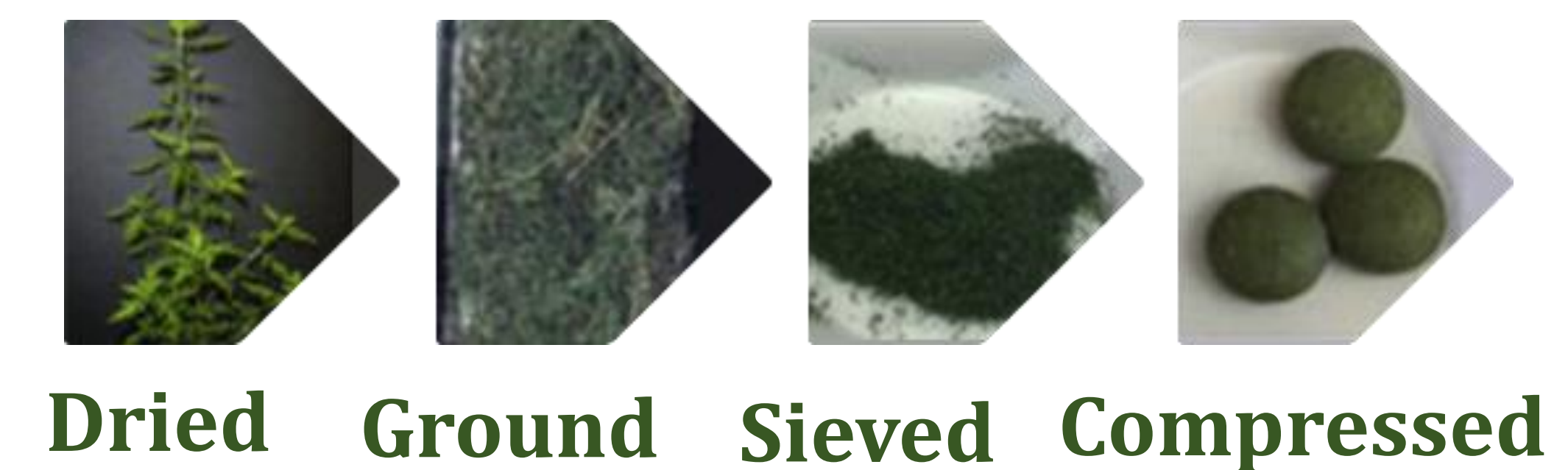
Description of Treatments

-  **ACT**= Artemisinin Combination Therapy, produced in bacterial plasmids or extracted from *A. annua*, combined with other antimalarials
-  **pACT**= Organic *A. annua*, edible tablet created from plant leaves
-  **Transgenic**= Metabolically engineered *A. annua*, also edible tablet created from plant leaves

Results and Discussion



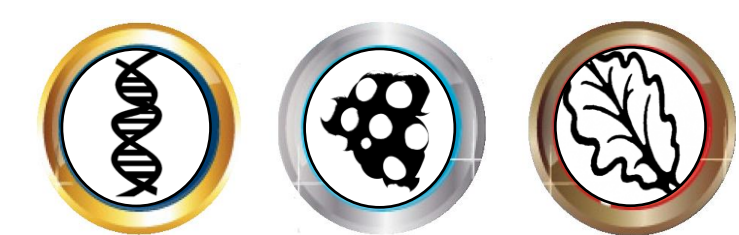
- pACT= best treatment option
- Clonally propagated yields 1.4% Artemisinin content consistently (4)
- Least likely for drug resistance
- Already accepted in developing countries
- \$0.10-\$0.30/ treatment (4)
- Production occurs in developing country
- Method shown below



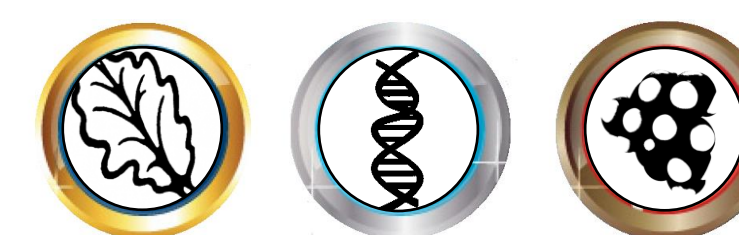
Analysis of Treatments

Sustainability

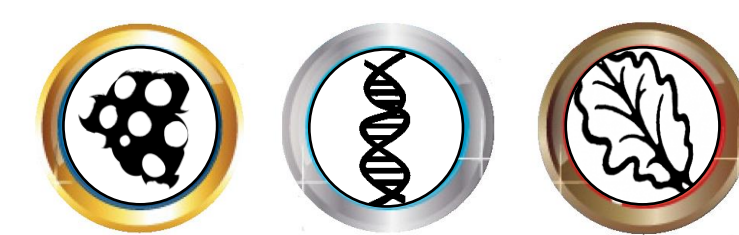
Effectiveness



Resistance



Artemisinin Content



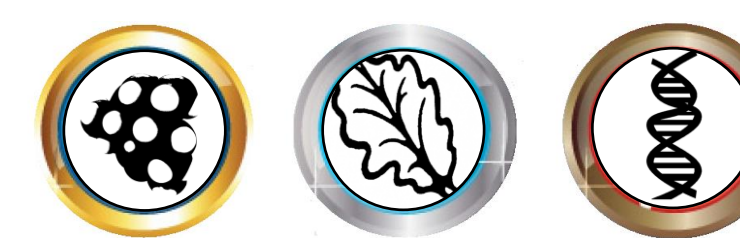
- Transgenic produces 7.65 times the amount of AN produced in pACT (3)
- ACT resistance rapidly compared to pACT (4)

Social Acceptability

Public Acceptance



WHO Approval



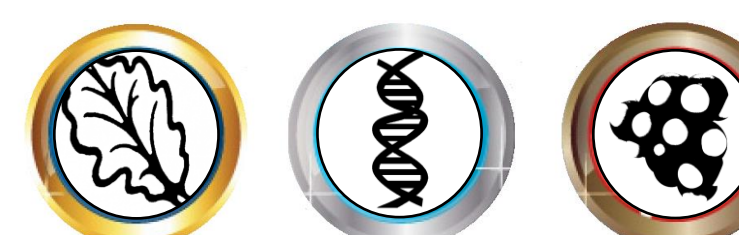
Delivery to Body



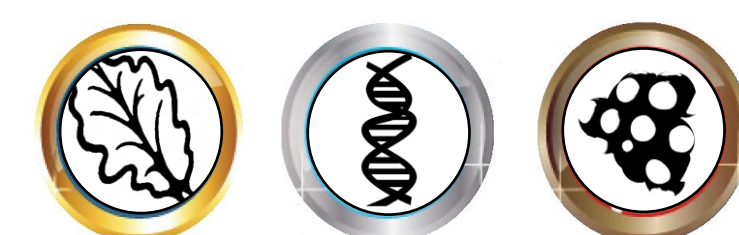
- WHO approves ACTs (5)
- pACTs already widely accepted in developing countries (4)

Economic Feasibility

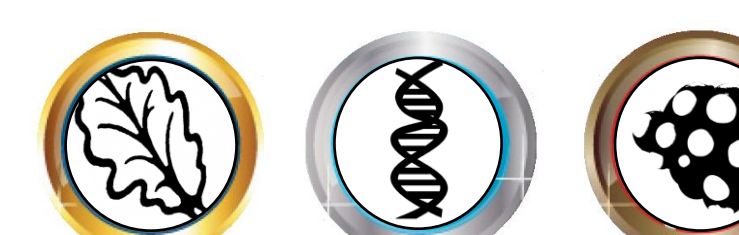
Production Method



Cost



Production Location



- pACT cost \$0.10- \$0.30 / treatment (4)
- ACT costs \$6 / treatment (6)
- pACT production could occur in developing country (4)
- ACT production is costly and nondomestic (6)

Measures for Attribution

Analyze mortality rates and incidence rates of malaria recorded by the WHO. Analyze the economic impact on a country based on GDP. Analyze if socially acceptable by people by studying compliance.

Acknowledgments

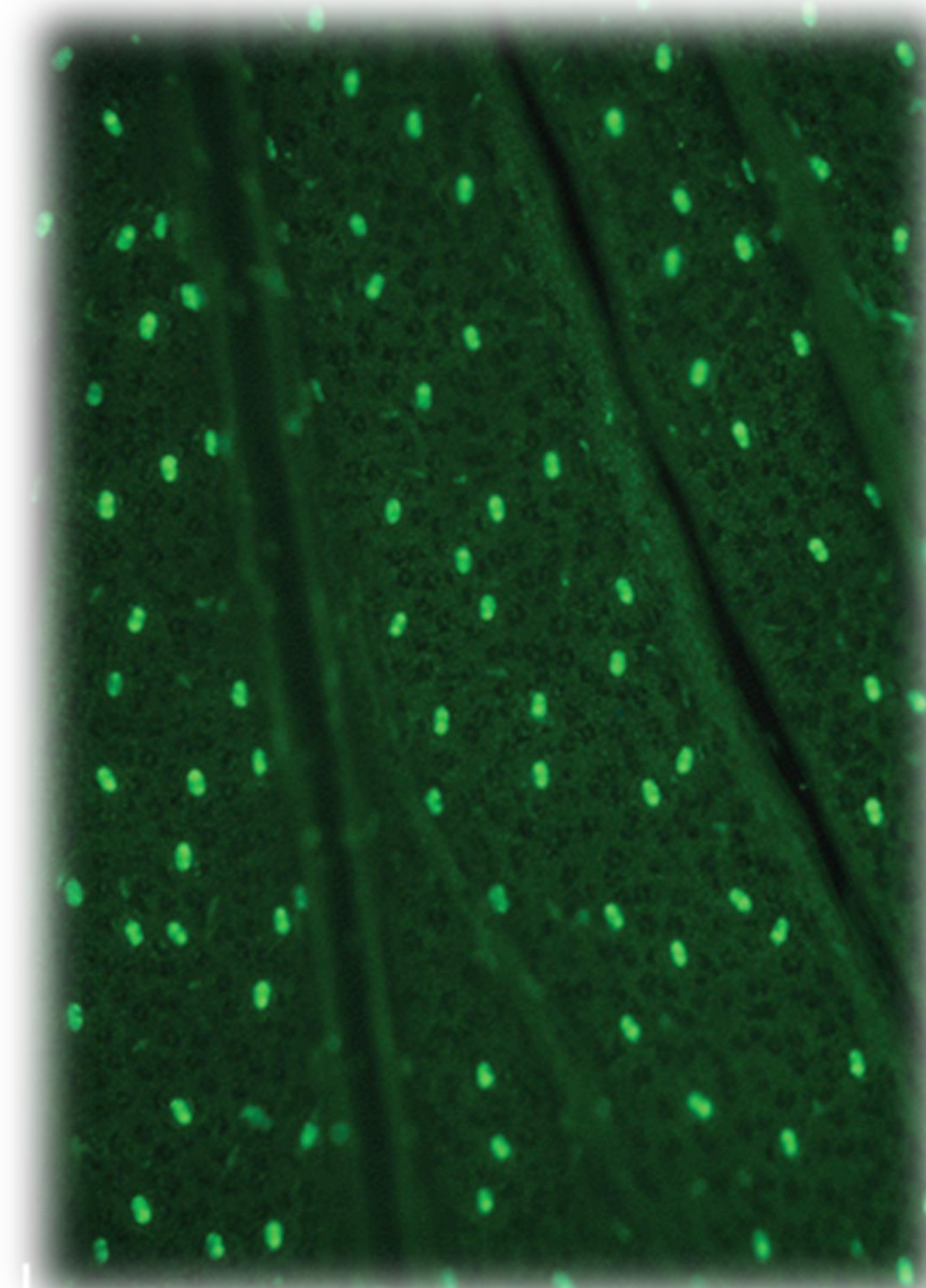
We would like to thank our professors Jill and Helen. We would also like to give a special thanks to Rebecca Zinno for her help with writing and research, Pamela Weathers for her insight on the *A. annua*, and Jim and Jess for their design skills.

References

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- <http://aobpla.oxfordjournals.org/content/2012/pls018/F2.medium.gif>



Artemisia annua



Glandular trichomes

Artemisinin is produced in the glandular trichomes of the *A. annua*.

Project Goals/Objectives

Determine the ideal treatment for malaria derived from the *A. annua* by analyzing the benefits and costs of ACTs, pACT and transgenic *A. annua*.

Why Malaria?

- Endangers **3 billion** people worldwide
- **90%** cases in Africa(2)
- **10%** reduction of GDP (1)



Injects the *Plasmodium falciparum* parasite (1)