May 20th, 12:30 PM

Developing a Whole Plant Artemisia annua Antimalarial Therapeutic: pACT

Pamela Weathers  
*Worcester Polytechnic Institute*

Nicole Jordan  
*Worcester Polytechnic Institute*

Praphapan Lasin  
*Worcester Polytechnic Institute*

*See next page for additional authors*

Follow this and additional works at: [http://escholarship.umassmed.edu/cts_retreat](http://escholarship.umassmed.edu/cts_retreat)

Part of the [Immunoprophylaxis and Therapy Commons](http://escholarship.umassmed.edu/cts_retreat), [Parasitic Diseases Commons](http://escholarship.umassmed.edu/cts_retreat), [Therapeutics Commons](http://escholarship.umassmed.edu/cts_retreat), and the [Translational Medical Research Commons](http://escholarship.umassmed.edu/cts_retreat)

Weathers, Pamela; Jordan, Nicole; Lasin, Praphapan; Towler, Melissa; Golenbock, Douglas T.; Elfawal, Mostafa; Reich, Nicholas; Acquaah-Mensah, George; and Rich, Stephen, "Developing a Whole Plant Artemisia annua Antimalarial Therapeutic: pACT" (2014).  
*UMass Center for Clinical and Translational Science Research Retreat*. 106.  
[http://escholarship.umassmed.edu/cts_retreat/2014/posters/106](http://escholarship.umassmed.edu/cts_retreat/2014/posters/106)

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Presenter Information
Pamela Weathers, Nicole Jordan, Praphapan Lasin, Melissa Towler, Douglas T. Golenbock, Mostafa Elfawal, Nicholas Reich, George Acquaah-Mensah, and Stephen Rich

Comments
Abstract of poster presented at the 2014 UMass Center for Clinical and Translational Science Research Retreat, held on May 20, 2014 at the University of Massachusetts Medical School, Worcester, Mass.

Creative Commons License
This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.
Title:
Developing a Whole Plant *Artemisia annua* Antimalarial Therapeutic: pACT.

Full name of all Authors:
1Weathers, Pamela, 1Jordan, Nicole, 1Lasin, Praphapan, 1Towler, Melissa, 2Golenbock, Douglas, 3Elfawal, Mostafa, 4Reich, Nicholas, 5Acquaah-Mensah, George, 3Rich, Stephen.

Institutional affiliations:
1Dept. Biology and Biotechnology, Healthcare Delivery Institute at WPI, Worcester, MA, 2Infectious Diseases and Immunology, U Mass Medical School, Dept. Worcester, MA, 3Lab Medical Zoology, Dept. Microbiology, U Mass, Amherst, MA, 4Division of Biostatistics and Epidemiology, School of Public Health and Health Sciences, U Mass, Amherst, 5School of Pharmacy, Massachusetts College of Pharmacy and Health Sciences, Worcester MA. E-mail:

Contact information:
Pam Weathers weathers@wpi.edu

Abstract:
The GRAS plant *Artemisia annua* L. produces the sesquiterpene lactone, artemisinin. The current therapy for malaria is artemisinin + an older drug: artemisinin combination therapy (ACT). In *Plasmodium chabaudi*-infected mice, dried leaves of *A. annua* are more potent than equal amounts of pure artemisinin and may also prevent artemisinin drug resistance from emerging. This whole plant therapy is pACT: plant-based artemisinin combination therapy. Pharmacokinetics in healthy and infected mice given either pure artemisinin or pACT is different and showed that > 40 fold more artemisinin enters the blood when plant material is present; plant matrix enhanced bioavailability into serum. Dried leaves as capsules or tablets given to African malaria patients were also efficacious. Flavonoids, phenolic acids, monoterpenes and other artemisinic metabolites found in the plant have mild antimalarial activity. Some may synergize with artemisinin to enhance its efficacy. In simulated digestion studies the effects of cellulose and gelatin capsules, sucrose, 4 oils, and 3 staple grains (rice, corn, and millet) were studied to determine their effect on AN and flavonoid release into the liquid phase of the intestinal stage of digestion. Compared to pACT alone: sucrose and oil enhanced release of flavonoids by 100%, but artemisinin was unaffected; both capsule types, and corn and millet meal significantly reduced artemisinin release, but had no effect on flavonoids. From field trials in MA, it was estimated that > 500,000 patients could be treated from plants grown on 1 ac of land. Analysis of 10 crops of the high artemisinin-producing WPI clone of *A. annua* grown under different field and lab conditions showed there was consistent production of artemisinin at about 1.4% DW. Together these results show how a simple herbal remedy could be used as an efficacious, inexpensive, controlled and sustainable orally delivered therapeutic for treating malaria and other artemisinin-susceptible diseases.

Acknowledgements
We thank Worcester Polytechnic Institute and University of Massachusetts Center for Clinical and Translational Science (CCTS-20110001) and the National Institutes of Health (grants R01-AI079293 and 2R15GM069562-03) for funding this project. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of General Medical Sciences or the National Institutes of Health.