

**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
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NAME Wilbur (Wil) Kears Milhous	POSITION TITLE Professor of Global Health & Associate Dean for Research, College of Public Health University of South Florida, Tampa, Florida		
eRA COMMONS USER NAME MILHOUSWK			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Clemson University, Clemson, SC	BS/MS	1972	Biology/Microbiology
University of North Carolina, Chapel Hill, NC	PhD	1983	Public Health
NIAID-Bethesda, CDC-Atlanta, Duke-Durham	Post Grad	1977-2000	Infectious Disease Micro

**A. Positions and Honors****Positions and Employment**

- 1973-75: Registered Specialist in Public Health and Clinical Microbiology, USA Hospital (300 beds), Ft Polk, LA.  
 1975-79: Clinical Microbiologist & Laboratory Officer, Womack Army Hospital (500 beds) Ft. Bragg, NC  
 1980-83: Grad Research Assistant, Burroughs Wellcome & Dept Parasitology & Lab Practice, UNC Chapel Hill, NC  
 1983-87: PI, Malaria Research Lab, Walter Reed Army Institute of Research (WRAIR), Washington, DC.  
 1987-90: Group Leader for Antimalarial Drug Development, WRAIR, Washington, DC.  
 1990- Associate Professor, Department of Preventive Medicine & Biometrics with Joint Appointments in Microbiology & Immunology and Clinical Pharmacology, Uniformed Services University of the Health Sciences, Bethesda, MD, Adjunct Assistant 1985-90.  
 1990-92: Chair, Department of Parasitology, WRAIR, Silver Spring, MD.  
 1992-95: Director, USA Medical Research Unit-Brazil, WRAIR Special Foreign Activity, Rio de Janeiro  
 1998-02 Director, for Experimental Therapeutics, Deputy Director (1995-97) WRAIR  
 2002-07 Research Coordinator, Military Infectious Disease Research Program; \$48 million 2002-07 ([midrp.org](http://midrp.org))  
 2007- Associate Research Dean, College of Public Health, University of South Florida

**Other Experience and Professional Memberships**

- 2007- Executive Scientific Advisory Committee (ESAC), Medicines for Malaria Venture (MMV)  
 2005- Chair, International Advisory Board, the Malaria Foundation International (MFI)  
 2004- Study Section Member, NIAID Drug Discovery & Mechanisms of Antimicrobial Resistance ZRG1 DDR 01  
 Special Emphasis Panels/Scientific Review Group (SRG) 2006/05 ZRG1 IDM-M (02), SRG 2006/05 ZAI1-AC-M-C1, SRG 2005/04 ZRG1 IDM-M (03)  
 2006- Stakeholder, Ten Years Strategy & Vision, Strategic and Discovery Research, UNDP WHO TDR  
 2004- Malaria Global R&D Alliance, Advisory Board Member  
 2005- Editorial Board, Experimental Parasitology  
 2001- Advisory Committee, Institute for One World Health (IOWH), San Francisco, CA  
 2003- Advisory Board, National Center for Natural Products Research, Ole Miss School of Pharmacy  
 1995- Diplomate, American Board of Medical Microbiology (ABMM) with specialization in Medical Parasitology  
 1992- Fellow, American Academy of Microbiology  
 1987- Senior Research Advisor, National Research Council  
 1999- Tafenoquine Global Advisory Panel & Steering Committee Member, Glaxo SmithKline  
 1998-02 Board of Advisors, NIAID MR4, American Type Culture Collection (ATCC)  
 1998-02 Medical Microbiology Consultant to the Surgeon General of the Army.  
 2001-05 Expert Advisory Panel in Tropical Diseases, US Pharmacopoeia  
 1999-04 Advisory Committee, Food and Drug Administration, FDA-CBER, Biological Therapeutics  
 1997-03 Steering Committee Member: Drug Discovery Research (DDR) WHO  
 1998-04 Associate Program Leader: NIAID/Fogerty International Cooperative Biodiversity Group (ICBG) Program

**Awards**

- 1993 Bailey K. Ashford Medal for Distinguished Work in Tropical Medicine, ASTMH  
 1998 The Gorgas Medal for Distinguished Work in Preventive Medicine, AMSUS  
 1992 Directors Award, Walter Reed Army Institute of Research  
 1989 "A" Proficiency Designator Award, Office of the Surgeon General  
 1988/2002 USA Research & Development Achievement Awards  
 1984 BG Greenberg Award for Excellence in Public Health Research, UNC Chapel Hill

**Recent Fogarty Supported Publications**

1. Happi CT, Gbotosho GO, Folarin OA, Milner D, Sarr O, Sowunmi A, Kyle DE, Milhous WK, Wirth DF, Oduola AM. Confirmation of emergence of mutations associated with atovaquone-proguanil resistance in unexposed *Plasmodium falciparum* isolates from Africa. *Malar J.* 2006 Oct 4;5:82.
2. Gbotosho GO, Ogundahunsi OA, Happi CT, Kyle DE, Gerena L, Milhous WK, Sowunmi A, Oduola AM, Salako LA. The effects of alpha-1-acid glycoprotein on the reversal of chloroquine resistance in *Plasmodium falciparum*. *Ann Trop Med Parasitol.* 2006 Oct;100(7):571-8.
3. Happi CT, Gbotosho GO, Folarin OA, Sowunmi A, Bolaji OM, Fateye BA, Kyle DE, Milhous W, Wirth DF, Oduola AM. Linkage disequilibrium between two distinct loci in chromosomes 5 and 7 of *Plasmodium falciparum* and in vivo chloroquine resistance in Southwest Nigeria. *Parasitol Res.* 2006 Dec;100(1):141-8. Epub 2006 Jul 28.
4. Happi CT, Gbotosho GO, Folarin OA, Bolaji OM, Sowunmi A, Kyle DE, Milhous W, Wirth DF, Oduola AM. Association between mutations in *Plasmodium falciparum* chloroquine resistance transporter and *P. falciparum* multidrug resistance 1 genes and in vivo amodiaquine resistance in *P. falciparum* malaria-infected children in Nigeria. *Am J Trop Med Hyg.* 2006 Jul;75(1):155-61.
5. Happi CT, Gbotosho GO, Folarin OA, Akinboye DO, Yusuf BO, Ebong OO, Sowunmi A, Kyle DE, Milhous W, Wirth DF, Oduola AM. Polymorphisms in *Plasmodium falciparum* dhfr and dhps genes and age related in vivo sulfadoxine-pyrimethamine resistance in malaria-infected patients from Nigeria. *Acta Trop.* 2005 Sep;95(3):183-93.
6. Happi CT, Gbotosho GO, Sowunmi A, Falade CO, Akinboye DO, Gerena L, Kyle DE, Milhous W, Wirth DF, Oduola AM. Molecular analysis of *Plasmodium falciparum* recrudescence malaria infections in children treated with chloroquine in Nigeria. *Am J Trop Med Hyg.* 2004 Jan;70(1):20-6.
7. Happi TC, Thomas SM, Gbotosho GO, Falade CO, Akinboye DO, Gerena L, Hudson T, Sowunmi A, Kyle DE, Milhous W, Wirth DF, Oduola AM. Point mutations in the pfcr1 and pfmdr-1 genes of *Plasmodium falciparum* and clinical response to chloroquine, among malaria patients from Nigeria. *Ann Trop Med Parasitol.* 2003 Jul;97(5):439-51.
8. Schuster BG, Jackson JE, Obijiofor CN, Okunji CO, Milhous WK, Losos E, Ayafor JF, Iwu MM, 2000. Drug development and conservation of biodiversity in West and Central Africa: a model for collaboration. *Pharmaceutical Biology* 37(Supplement):1-16.

**Additional Publications from Patents (8US, 4 European), 12 Book Chapters & 116 Peer Reviewed Manuscripts**

9. 7,084,132 & 6,906,098 Artemisinins with improved stability & bioavailability for therapeutic application
10. 7,101,902 2-guanidinylimidazolidinedione cmpds & methods of making & using thereof
11. 6,906,098 Mixed steroidal 1,2,4,5-tetraoxane compounds & methods of making & using thereof
12. 6,800,618 Chemosensitizing agents against chloroquine resistant malaria
13. 4,897,403 Antimalarial compositions and methods
14. 4,791,135 Novel antimalarial dihydroartemisinin derivatives
15. Li Q, Kozar MP, Shearer TW, Xie LH, Lin AJ, Smith KS, Si Y, Anova L, Zhang J, Milhous WK, Skillman DR. Pharmacokinetics, Safety, and Hydrolysis of Oral Pyrroloquinazolinodiamines Administered in Single and Multiple Doses in Rats. *Antimicrob Agents Chemother.* 2007 Jun 11
16. Li Q, Gerena L, Xie L, Zhang J, Kyle D, Milhous W. Development and validation of flow cytometric measurement for parasitemia in cultures of *P. falciparum* vitally stained with YOYO-1. *Cytometry A.* 2007 Feb 5; PMID: 17279569
17. Opsenica I, Terzic N, Opsenica D, Angelovski G, Lehnig M, Eilbracht P, Tinant B, Juranic Z, Smith KS, Yang YS, Diaz DS, Smith PL, Milhous WK, Dokovic D, Solaja BA. Tetraoxane antimalarials and their reaction with Fe(II). *J Med Chem.* 2006 Jun 29;49(13):3790-9. PMID: 16789736
18. Mui EJ, Jacobus D, Milhous WK, Schiehser G, Hsu H, Roberts CW, Kirisits MJ, McLeod R. Triazine Inhibits *Toxoplasma gondii* Tachyzoites In Vitro and In Vivo. *Antimicrob Agents Chemother.* 2005 Aug;49(8):3463-7.
19. Zhang Q, Guan J, Sacci J, Ager A, Ellis W, Milhous W, Kyle D, Lin AJ. Unambiguous synthesis and prophylactic antimalarial activities of imidazolidinedione derivatives. *J Med Chem.* 2005 Oct 6;48(20):6472-81.
20. Shearer TW, Kozar MP, O'neil MT, Smith PL, Schiehser GA, Jacobus DP, Diaz DS, Yang YS, Milhous WK, Skillman DR. In vitro metabolism of phenoxypropoxybiguanide analogues in human liver microsomes to potent antimalarial dihydrotriazines. *J Med Chem.* 2005 Apr 21;48(8):2805-13.
21. Ockenhouse CF, Magill A, Smith DC, Milhous WK. 2005. History of US Military Contributions to the Study of Malaria. *Military Med* 170:12-16.
22. Guan J, Zhang Q, Montip G, Karle J, Ditsa CA, Milhous WK, Skillman DR, Lin AJ. 2005. Structure identification and prophylactic antimalarial efficacy of 2-guanidinoimidazolidinedione derivatives. *Bioorg Med Chem.* 1;13(3):699-704.
23. Bhattacharjee AK, Hartell MG, Nichols DA, Hick RP, Stanton B, van Hamont JE, Milhous WK. 2004. Structure-activity relationship study of antimalarial indolo [2,1-b]quinazoline-6,12-diones (tryptanthrins). Three dimensional pharmacophore modeling and identification of new antimalarial candidates. *Euro J Med Chem* 39: 59-67.
24. Li Q, Lugt CB, Looareesuwan S and Milhous WK. 2004. Pharmacokinetic investigation of the therapeutics potential of artemotil (beta-arteether) in Thia patients with severe falciparum malaria *Am J Top Med Hyg* 71: 723-731.
25. Opsenica D, Angelovski G, Pocsfalvi G, Juranic Z, Zizak Z, Kyle D, Milhous WK, Solaja BA. 2003. Antimalarial and antiproliferative evaluation of Bis-Steroidal tetraoxanes. *Bioorg Med Chem.* 2003 Jul 3;11(13):2761-8.

26. Li QG, Mog SR, Si YZ, Kyle DE, Gettayacamin M, Milhous WK. Neurotoxicity and efficacy of arteether related to its exposure times and exposure levels in rodents. *Am J Trop Med Hyg.* 2002 May;66(5):516-25.
27. Solaja BA, Terzic N, Pocsfalvi G, Gerena L, Tinant B, Opsenica D, Milhous WK. Mixed steroidal 1,2,4,5-tetraoxanes: antimalarial and antimycobacterial activity. *J Med Chem.* 2002 Aug 1;45(16):3331-6.
28. Riel MA, Kyle DE, Bhattacharjee AK, Milhous WK. Efficacy of proton pump inhibitor drugs against *Plasmodium falciparum* in vitro and their probable pharmacophores. *Antimicrob Agents Chemother.* 2002 Aug;46(8):2627-32.
29. Ohrt C, Willingmyre GD, Lee P, Knirsch C, Milhous W. Assessment of azithromycin in combination with other antimalarial drugs against *Plasmodium falciparum* in vitro. *Antimicrob Agents Chemother.* 2002 Aug;46(8):2518-24.
30. Guan J, Kyle DE, Gerena L, Zhang Q, Milhous WK, Lin AJ. Design, synthesis, and evaluation of new chemosensitizers in multi-drug-resistant *Plasmodium falciparum*. *J Med Chem.* 2002 Jun 20;45(13):2741-8.
31. Riel MA, Kyle DE, Milhous WK. Efficacy of scopadulcic acid A against *Plasmodium falciparum* in vitro. *J Nat Prod.* 2002 Apr;65(4):614-5.
32. Opsenica D, Pocsfalvi G, Milhous WK, Solaja BA. 2002. Antimalarial peroxides: the first intramolecular 1,2,3,5-tetroxane *J Serb Chemi Soc* 67(7) 265-471.
33. Roberts CW, Roberts F, Lyons RE, Kirisits MJ, Mui EJ, Finnerty J, Johnson JJ, Ferguson DJ, Coggins JR, Krell T, Coombs GH, Milhous WK, Kyle DE, Tzipori S, Barnwell J, Dame JB, Carlton J, McLeod R. The shikimate pathway and its branches in apicomplexan parasites. *J Infect Dis.* 2002 Feb 15;185 Suppl 1:S25-36. Review.
34. Dietze R, Carvalho SF, Valli LC, Berman J, Brewer T, Milhous W, Sanchez J, Schuster B, Grogl M. 2001. Phase 2 trial of WR6026, an orally administered 8-aminoquinoline, in the treatment of visceral leishmaniasis caused by *Leishmania chagasi*. *Am J Trop Med Hyg.* 2001 Dec;65(6):685-9. PMID: 11791957
35. Milhous WK. 2001. Development of new drugs for prophylaxis of malaria. *Med Trop (mars)* 61: 48-50.
36. Iyer JK, Milhous WK, Cortese JF, Kublin JG, Plowe CV. 2001. *Plasmodium falciparum* cross-resistance between trimethoprim and pyrimethamine. *Lancet.* 2001 Sep 29;358(9287):1066-7.
37. Si YZ, Li QG, Mog SR and Milhous WK. 2001. Neurotoxic mechanism study of arteether and artelinic acid in rats with microdialysis. *Am J Trop Med Hyg* 65(3): 221 (2001).
38. Zhang P, Nicholson, Bujnicki JM, Su X, Brendle J, Ferdig M, Kyle, DE, Milhous WK and Chiang PK. 2001. Angiogenesis inhibitors specific for aminopeptidase 2 as drugs for malaria and leishmania. *J BioMed Sci* 1: 34-40.
39. Opsenica D, Pocsfalvi G, Juranic Z, Tinant B, Declercq JP, Kyle DE, Milhous WK, Solaja BA. 2000. Cholic acid derivatives as 1,2,4,5-tetraoxane carriers: structure and antimalarial and antiproliferative activity. *J Med Chem.* Aug 24;43(17):3274-82.
40. Jefford CW, Rosier, J-C and Milhous WK. 2000. Trioxanes, 1,2,4,5-tetroxanes and bicyclic endoperoxides. Implications for mode of action. *Heterocycles* 52: 1335-1353.
41. Vennerstrom JL, Dong Y, Andersen SL, Ager AL, Fu H-H, Miller RE, Miller, Wesche DL, Kyle DE, Gerena G, Walters SM, Wood JK, Edwards G, Holme AD, McLean WG, and Milhous WK. 2000. Synthesis and antimalarial activity of sixteen dispiro-1,2,4,5-tetraoxane analogs of WR148999: Alkyl substituted 7,8,15,16-tetraoxadispiro[5.2.5.2] hexadecanes. *J. Med. Chem.* 43(14), 2753-2758.
42. Sanchez J, Bendet J, Grogl, Peira-Lima J, Pang LW, Guimaraes R, Guedes RH, Abreu DG, Milhous WK, Green MD, Todd G. 2000. Malaria morbidity among Brazilian military personnel deployed to Angola. *J Travel Med* 7: 275-82.
43. Walsh DS, Looareesuwan S, Wilairatana P, Heppner DG Jr, Tang DB, Brewer TG, Chokejindachai W, Viriyavejakul P, Kyle DE, Milhous WK, Schuster BG, Horton J, Braitman DJ, Brueckner RP. Randomized dose-ranging study of the safety and efficacy of WR 238605 (Tafenoquine) in the prevention of relapse of *Plasmodium vivax* malaria in Thailand. *J Infect Dis.* 1999 Oct;180(4):1282-7. PMID: 10479159; UI: 99408853
44. Vennerstrom JL, Nuzum EO, Miller RE, Dorn A, Gerena L, Dande PA, Ellis WY, Ridley RG, Milhous WK. 8-Aminoquinolines active against blood stage *Plasmodium falciparum* in vitro inhibit hematin polymerization. *Antimicrob Agents Chemother.* 1999 Mar;43(3):598-602. PMID: 10049273; UI: 99169761
45. Vennerstrom JL, Ager AL Jr, Dorn A, Andersen SL, Gerena L, Ridley RG, Milhous WK. Bisquinolines. 2. Antimalarial N,N-bis(7-chloroquinolin-4-yl)heteroalkane-diamines. *J Med Chem.* 1998. Oct 22;41(22):4360-4.
46. Roberts F, Roberts CW, Johnson JJ, Kyle DE, Krell T, Coggins JR, Coombs GH, Milhous WK, Tzipori S, Ferguson DJ, Chakrabarti D, McLeod R. Evidence for the shikimate pathway in apicomplexan parasites. *Nature.* 1998 Jun 25;393(6687):801-5. PMID: 9655396
47. Zalis MG, Pang L, Silveira MS, Milhous WK, Wirth DF. Characterization of *Plasmodium falciparum* isolated from the Amazon region of Brazil: evidence for quinine resistance. *Am J Trop Med Hyg.* 1998 May;58(5):630-7
48. Oduola AM, Sowunmi A, Milhous WK, Brewer TG, Kyle DE, Gerena L, Rossan RN, Salako LA, Schuster BG. *In vitro* and *in vivo* reversal of chloroquine resistance in *Plasmodium falciparum* with promethazine. *Am J Trop Med Hyg.* 1998 May;58(5):625-9. PMID: 9598452; UI: 98258399
49. Roberts F, Roberts CW, Johnson JJ, Milhous WK, Kyle D, Tzipori S, Ferguson D, McLeod R. 1999. The shikimate pathway in apicomplexan parasites. *Nature* 397: 219-220.
50. DeAlcena, FEC, Junior CC, Durlacher RR, Boulous M, Milhous WK, Pang LW. 1997. Treatment of uncomplicated *falciparum* malaria with a combination of Atovaquone plus Proguanil in Brazilian adults. *J Inf Dis* 175-1544-47.

51. Adami YL, Milhous WK, Daniel-Ribeiro Claudio T, Ferreira-da-Cruz M. 1998. *In vitro* antimalarial activity of crude extracts of *Phothomorphe peltata* and *P. umbellata* (Piperaceae). *Tropical Med* 40:91-94.
52. Oduola AM, Omitowoju GO, Sowunmi A, Makler MT, Falade CO, Kyle DE, Fehintola FA, Ogundahunsi OA, Piper RC, Schuster BG, Milhous WK. *Plasmodium falciparum*: evaluation of lactate dehydrogenase in monitoring therapeutic responses to standard antimalarial drugs in Nigeria. *Exp Parasitol*. 1997 Nov;87(3):283-9. Vasconcelos KF, Marques C, Silveira M S, Pang L, Milhous WK, Wirth DF, Plowe CV, Zalis MZ. 1997. Mutations in *Plasmodium falciparum* DHFR and DHPS of isolates from the Amazon Region of Brazil. *Memorias do Instituto Oswaldo Cruz* 92: 145.
53. Milhous WK, Gerena L, Kyle DE, Oduola AM. *In vitro* strategies for circumventing antimalarial drug resistance. *Prog Clin Biol Res*. 1989;313:61-72. PMID: 2675118; UI: 89387193
54. Krogstad DJ, Gluzman IY, Kyle DE, Oduola AM, Martin SK, Milhous WK, Schlesinger PH. Efflux of chloroquine from *Plasmodium falciparum*: mechanism of chloroquine resistance. *Science*. 1987 Nov 27;238(4831):1283-5.
55. Lin AJ, Klayman DL, Milhous WK. Antimalarial activity of new water-soluble dihydroartemisinin derivatives. *J Med Chem*. 1987 Nov;30(11):2147-50. PMID: 3669021
56. Scheibel LW, Colombani PM, Hess AD, Aikawa M, Atkinson CT, Milhous WK. Calcium and calmodulin antagonists inhibit human malaria parasites (*Plasmodium falciparum*): implications for drug design. *Proc Natl Acad Sci U S A*. 1987 Oct;84(20):7310-4. PMID: 3313391
57. Martin SK, Oduola AM, Milhous WK. Reversal of chloroquine resistance in *Plasmodium falciparum* by verapamil. *Science*. 1987 Feb 20;235(4791):899-901. PMID: 3544220
58. Milhous WK, Weatherly NF, Bowdre JH, Desjardins RE. *In vitro* activities of and mechanisms of resistance to antifol antimalarial drugs. *Antimicrob Agents Chemother*. 1985 Apr;27(4):525-30. PMID: 3890727
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60. Milhous WK and Geary TG. 1991. Drug discovery and development. In: *Malaria Obstacles and Opportunities*. pp. 144-168. Eds. S. C. Oaks, V. S. Mitchell, G.W. Pearson & C. J. Carpenter, Washington, National Academy Press.

### **Research Support**

- Co-PI: Drug Resistance Networks in Kenya, Peru, Thailand, Ghana. DoD-GEIS GM0056\_07WR, \$800K, 2002-08
- Co-PI: Development of safer drugs for malaria and leishmaniasis in US troops, civilian personnel and travelers  
12 September-11 Oct 2009. \$1,916,303.00 ERMS # 07213002 PR: W23RYX7226N601
- Senior Advisor: Antimalarial Drug Resistance Workshops. Bill & Melinda Gates Foundation Global Health Program Conference Grant, Cambridge, UK and Amsterdam, Netherlands. 3/15/2006- \$158, 173
- Senior Advisor: Worldwide Antimalarial Drug Resistance Network (WARN). Bill & Melinda Gates Foundation Global Health Program Letter of Inquiry. 6/22/07- \$998,100 Pending
- Consultant: Harvard School of Public Health (see resulting publications above)
- Fogarty International Research Training Grant. "Training in Malaria Pathogenesis and Diversity in Africa" D43 TW001503 4/1/07 - 3/31/2010 \$133,950.
- Fogarty International Research Collaboration Award (FIRCA). "Molecular determinants of drug resistant malaria in Nigeria" NIH R03 TW006298. 1/15/2004-12/31/2006 (extended through 12/31/07).
- Senior Advisor and Co-PI: Optimization of Radical Curative and Causal Prophylactic Drugs, Medicines for Malaria Venture, Geneva, Switzerland; \$3 Million, 2006-7.
- Senior Advisor: Development of Third Generation Macrolides, Pliva Pharmaceutical, Zagreb, Croatia, and Medicines for Malaria Venture, Geneva, Switzerland; Funding and Agreement TBA, 2007.
- Senior Advisor: Lead Optimization and Pre-Clinical Studies of Imidazolidinedione Derivatives, Peer Reviewed Medical Research Program (PRMRP), \$3 Million, 2005-2007

### **Completed Research Support**

- Senior Advisor: NIAID Challenge Grant: Joint Ventures in Biomedicine and Biotechnology 1RC AI48874-01
- Senior Advisor: NIAID Challenge Grant: Joint Ventures in Biomedicine and Biotechnology 1RC AI48859-01.
- Associate Team Leader: NIAID/Fogarty International Cooperative Biodiversity Group Program TW00327
- PI: World Health Organization, Special Program for Research and Training in Tropical Diseases (TDR),  
Chemotherapy of Malaria, In Vitro Antimalarial Screen. 1984-2002
- Co-PI: Harvard University School of Public Health; Surveillance & Detection of Drug Resistant Malaria, NIAID International Center for Tropical Disease Research (ICIDR)
- PI: Human metabolism of Arteether, WHO-TDR
- Co-PI: Drug Combinations in Chemotherapy, WHO TDR CHEMAL
- PI: Analysis of Arteether and related drugs in chemical samples, WHO TDR
- Co-PI: Optimization of Sequencing Strategies for the Malaria Genome, Joint NIAID and DoD
- Co-PI: Characterization of West African isolates of falciparum malaria WHO TDR
- Co-PI: Drug Combinations in Chemotherapy, WHO TDR CHEMAL
- Co-PI: Pharmacokinetics and metabolism of arteether. WHO TDR CHEMAL