



Exponent[®]
Engineering & Scientific Consulting

Heverton Dutra, Ph.D.

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Professional Profile

Dr. Dutra specializes in the development of molecular and biomarker-based in-vitro diagnostics (IVDs) and laboratory developed tests (LDTs) according to 21 CFR Part 820, and internationally recognized standards for both De Novo and 510(k) premarket submissions. Trained in cellular and molecular biology, he applies his interdisciplinary knowledge in immunology, infectious diseases, microbiology and virology to class II medical device total product life-cycle development, with experience in centralized laboratory testing (single-site IVD), point-of-care (PoC), and over-the-counter (OTC) markets. Dr. Dutra's proficiencies also include using various bioanalytical methods applied to medical entomology for developing innovative microbiology-based methods to control vector-borne disease transmission in the field.

Dr. Dutra is experienced in developing laboratory tests and IVD medical devices containing workflows for extraction and amplification of nucleic acids of infectious disease agents (bacteria, viruses, protozoans) present in complex matrices from humans and insects. Matrices include blood, urine, anterior nasal, vaginal and penile swabs, mosquitoes, ticks and other insects amplified through either non-isothermal (e.g., PCR, RT-qPCR, ddPCR), or isothermal (e.g., LAMP, SDA) methods, followed by their detection using traditional (e.g., fluorescence, lateral flow) or next-gen (e.g., CRISPR) approaches. He is also versed in utilizing protein analysis, imaging and cell culture techniques such as ELISA, Western blotting, IFA, FISH, confocal laser scanning microscopy and lentivirus/non-viral cell transfection techniques for answering biomarker and mechanism-of-action questions.

Before joining Exponent, Dr. Dutra worked as a core team member at Quanterix, Inc., where he led the design and execution of analytical verification activities of a neurology-focused ultrasensitive LDT for the early detection of Alzheimer's disease in blood samples. Dr. Dutra also consistently used his knowledge of quality and regulatory strategies to work cross-functionally and support the creation of regulatory documentation such as product requirements, product development, analytical verification and risk management plans, FMEAs, and technical protocols.

Dr. Dutra also led a team of assay development scientists at Sherlock Biosciences, Inc., for the development of an OTC molecular diagnostics device focused on sexual health, offering fast extraction-free sample-to-answer results for sexually transmitted infections caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. Dr. Dutra was deeply involved in the IVD medical device development from feasibility through assay optimization, device integration, and analytical verification and clinical validation phases of the design control process, following FDA regulatory requirements, ISO 13485, ISO 14791, and CLSI guidelines.

In addition to his industry work, Dr. Dutra's academic experience consisted in utilizing various bioanalytical methods for the creation of an innovative bacteria-based strategy for controlling the transmission of dengue, Zika and chikungunya viruses from mosquitoes to humans. His peer-reviewed

work, highlighted by major media outlets such as The New York Times, WSJ, and Forbes resulted in the first government-approved field releases of virus-resistant mosquitoes in Brazil, leading to a significant and sustained epidemiological reduction in mosquito-borne virus transmission in the areas selected, along with a global expansion of the project.

Academic Credentials & Professional Honors

Ph.D., Health Sciences, Oswaldo Cruz Foundation, 2017

Masters, Health Sciences, Oswaldo Cruz Foundation, 2014

Bachelors, Biology, Federal University of Ouro Preto, 2011

Honorable Mention: Best Ph.D. thesis - Coordination for the Improvement of Higher Education Personnel (CAPES), Brazilian Health Ministry, 2018.

Dr. Zigman Brener Medal – Contribution to the advancement of Science & Public Health in Brazil. Rene Rachou Institute – Oswaldo Cruz Foundation (FIOCRUZ) Minas, Brazil, 2018.

Bill and Melinda Gates Foundation grant (co-author) – Engineering Wolbachia for Malaria control, 2017.

PEW Charitable Trust Foundation Latin-American postdoctoral fellowship, 2017.

Dr. Antoniana Ursine Krettli Medal – Best published scientific manuscript of 2016. Rene Rachou Institute – Oswaldo Cruz Foundation (FIOCRUZ) Minas, Brazil, 2016.

Dr. Joao Carlos Pinto Dias Medal – Best published scientific manuscript of 2015. Rene Rachou Institute – Oswaldo Cruz Foundation (FIOCRUZ) Minas, Brazil, 2015.

Honorable Mention: Best published manuscript applied to the Brazilian Universal Healthcare System (SUS), 2015.

Bill and Melinda Gates Foundation grant (main author) – An artificial diet for Wolbachia-infected *Aedes aegypti*, 2015.

Academic Appointments

Postdoctoral Scholar / Assistant Research Professor, Pennsylvania State University, 2019-2022

Postdoctoral Fellow, Boston University, 2018-2019

Postdoctoral Fellow, Harvard University, 2017-2018

Prior Experience

Senior Scientist – Assay Development, Quanterix, Inc, 2024-2024

Scientist II / Senior Scientist – Assay Development, Sherlock Biosciences, Inc, 2022-2024

Professional Affiliations

Regulatory Affairs Professionals Society (RAPS)

Association for Diagnostics & Laboratory Medicine (ADLM)

Publications

Dutra HLC, Marshall DJ, Comerford B, McNulty BP, Diaz AM, Jones MJ, et al. Larval crowding enhances dengue virus loads in *Aedes aegypti*, a relationship that might increase transmission in urban environments. *PLoS Neglected Tropical Diseases* 2024; 18(9): e0012482.

Lau M-J, Dutra HLC, Jones MJ, McNulty BP, Diaz AM, Ware-Gilmore F, et al. Jamestown Canyon virus is transmissible by *Aedes aegypti* and is only moderately blocked by *Wolbachia* co-infection. *PLoS Neglected Tropical Diseases* 2023; 17(9): e0011616.

Novelo M, Dutra HLC, Metz HC, Jones MJ, Sigle LT, Frentiu FD, et al. Dengue and chikungunya virus loads in the mosquito *Aedes aegypti* are determined by distinct genetic architectures. *PLoS Pathogens* 2023; 19(4): e1011307.

Mejia AJ, Jimenez L, Dutra HLC. et al. Attempts to use breeding approaches in *Aedes aegypti* to create lines with distinct and stable relative *Wolbachia* densities. *Heredity* 2022; 129, 215–224.

Mejia, AJ, Dutra, HLC, Jones, MJ. et al. Cross-tissue and generation predictability of relative *Wolbachia* densities in the mosquito *Aedes aegypti*. *Parasites & Vectors* 2022; 15, 128.

Caragata, EP, Dutra, HLC, Sucupira, PHF, Ferreira, AGA, Moreira, LA. *Wolbachia* as translational science: controlling mosquito-borne pathogens. *Trends in Parasitology* 2021; 37(12), 1050-1067.

Dutra HLC, Ford SA, Allen SL, Bordenstein SR, Chenoweth SF, Bordenstein SR, et al. The impact of artificial selection for *Wolbachia*-mediated dengue virus blocking on phage WO. *PLoS Neglected Tropical Diseases* 2021; 15(7): e0009637.

Ware-Gilmore F, Sgrò CM, Xi Z, Dutra HLC, Jones MJ, Shea K, et al. Microbes increase thermal sensitivity in the mosquito *Aedes aegypti*, with the potential to change disease distributions. *PLoS Neglected Tropical Diseases* 2021; 15(7): e0009548.

Dutra HLC, Deehan MA, Frydman H. *Wolbachia* and Sirtuin-4 interaction is associated with alterations in host glucose metabolism and bacterial titer. *PLoS Pathogens* 2020; 16(10): e1008996.

Caragata EP, Rocha MN, Pereira TN, Mansur SB, Dutra HLC, Moreira LA. Pathogen blocking in *Wolbachia*-infected *Aedes aegypti* is not affected by Zika and dengue virus co-infection. *PLoS Neglected Tropical Diseases* 2019; 13(5): e0007443

Dutra, HLC, Rodrigues, SL, Mansur, SB. et al. Development and physiological effects of an artificial diet for *Wolbachia*-infected *Aedes aegypti*. *Scientific Reports* 2017; 7, 15687.

Pimenta, SO, Oliveira, CD, Sant'Anna RV, Dutra, HLC. et al., *Wolbachia* infection in *Aedes aegypti* mosquitoes alters blood meal excretion and delays oviposition without affecting trypsin activity. *Insect Biochemistry and Molecular Biology* 2017; 87, 65-74.

Dutra HLC, Caragata EP, Moreira LA. The re-emerging arboviral threat: Hidden enemies. *BioEssays* 2017; 39: 1600175.

Caragata, EP, Dutra HLC, O'Neill SL, Moreira LA. Zika control through the bacterium *Wolbachia pipiensis*. *Future Microbiology* 2016; 11(12), 1499–1502.

Dutra HLC, Lopes da Silva V, da Rocha Fernandes M. et al. The influence of larval competition on Brazilian *Wolbachia*-infected *Aedes aegypti* mosquitoes. *Parasites and Vectors* 2016; 9, 282.

Caragata EP, Dutra HL, Moreira LA. Inhibition of Zika virus by *Wolbachia* in *Aedes aegypti*. *Microbial Cell* 2016; Jun 27;3(7):293-295.

Dutra, HLC, Caragata EP, et al. *Wolbachia* blocks currently circulating Zika virus isolates in Brazilian *Aedes aegypti* Mosquitoes. *Cell Host & Microbe* 2016; Volume 19, Issue 6, 771 – 774.

Caragata EP, Dutra HLC, Moreira LA. Exploiting intimate relationships: controlling mosquito-transmitted disease with *Wolbachia*. *Trends in Parasitology* 2016; Volume 32, Issue 3, 207 – 218.

Dutra HLC, dos Santos LMB, Caragata EP, Silva JBL, Villela DAM, Maciel-de-Freitas R, et al. From Lab to Field: The Influence of Urban Landscapes on the Invasive Potential of *Wolbachia* in Brazilian *Aedes aegypti* Mosquitoes. *PLoS Neglected Tropical Diseases* 2015; 9(4): e0003689.

Peer Reviews

AMS | American Society for Microbiology

AMS | Applied and Environmental Microbiology

Nature | Communications Biology

Gates Open Research

Oxford Academic | Journal of Insect Science

AMS | mBio

MDPI | Insects

MDPI | International Journal of Environmental Research and Public Health

MDPI | Molecules

MDPI | Tropical Medicine and Infectious Disease

MDPI | Viruses

Springer Nature | Microbial Ecology

EDP Sciences | Parasite

Parasites and Vectors

PeerJ

PloS Neglected Tropical Diseases

PloS One

Elsevier | Veterinary Parasitology