

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.

Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Lasimbang, Helen Benedict

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Chief Executive Officer, Hospital Universiti Malaysia Sabah.

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University Malaya, Kuala Lumpur	MMed (O&G)	1998	Obstetrics and Gynaecology
University Malaya, Kuala Lumpur	MBBS	1991	General medicine and surgery

**A. Personal Statement**

I have 12 years' experience working as a gynecologist with the Malaysian Ministry of Health. I have 20+ years of experience in doing research on various field of expertise ranging from maternal health to creating alcohol intervention tool-kit to empower indigenous communities. I am the Head of Development and Health Research Unit (DHRU), supported by the U.S. Agency for International Development (USAID), DHRU is an EcoHealth Alliance (EHA) – Universiti Malaysia Sabah (UMS) platform for multi-disciplinary research, publications and other collaborative activities in the scope of land-use change, disease-emergence and in related social and public health aspects. I was also the Professor in the Deputy Dean office for Postgraduate and Research, University Malaysia Sabah and currently the Chief Executive Officer Hospital Universiti Malaysia Sabah which will open November 2020 and will be part of the clinical studies planned for this project.

1. **Lasimbang HB**, Teo JBH, Tha NO, Amir LE (2018). Knowledge, Attitudes and Practice of Contraception by Doctors and Women in Kota Kinabalu, Sabah. **Borneo Journal of Medical Sciences** 12(1): 23-30
2. Awang H, Low WY, Tong WT, Tan LY, Cheah WL, **Lasimbang HB**, Hassan HM (2018). Differentials in sexual and reproductive health knowledge among east malaysian adolescents. **J. Biosoc. Sci.** 00, 1–10, Cambridge University Press, doi:10.1017/S0021932018000214.
3. Syva SH, Ampon K, **Lasimbang HB**, Fatimah SS (2017). Microenvironmental factors involved in human amnion mesenchymal stem cells fate decisions. **Journal of Tissue Engineering and Regenerative Medicine** 11(2): 311-320. <https://doi.org/10.4269/ajtmh.17-0081>.
4. Gumpil SL, Ampon K, **Lasimbang HB**, Fatimah SS, Kumar SV (2017). Comparison between fresh and cryopreserved Human Amnion Mesenchymal Stem Cells (HAMCs) in terms of series passaging, morphology and differentiation potential during long term culture. **Biomedical Research and Therapy** 4(5): 134-135.

**B. Positions and Honors****Positions and Employment**

1991 -92 Housemanship, Queen Elizabeth Hospital, Kota Kinabalu

1992 -94 Hospital Director, Papar Hospital, Papar

- 1994 -98 Post graduate trainee, Department of Obstetrics and Gynaecology, University Malaya, Kuala Lumpur. Department of Obstetrics and Gynaecology at Tengku Ampuan Rahimah Hospital, Klang, Selangor
- 1998 -99 Specialist, Obstetrics and Gynaecology at Maternity Hospital Kuala Lumpur.
- 1999 -02 Specialist/Consultant, Obstetrics and Gynaecology, Queen Elizabeth Hospital, Kota Kinabalu.
- 2003 -12 Resident Consultant, Obstetrics & Gynaecology, Sabah Medical Centre, Kota Kinabalu.
- 2012 -14 Head of RHD, Reproductive Health Department (RHD), University Malaysia Sabah.
- 2014 -15 Associate Professor, Deputy Dean Research and Postgraduate, University Malaysia Sabah.
- 2015 -17 Associate Professor, Deputy Dean Clinical Services, University Malaysia Sabah.
- 2016 - Head of Development and Health Research Unit (DHRU)
- 2017 -18 Associate Professor, Deputy Dean Postgraduate and Research, University Malaysia Sabah.
- 2018 - Chief Executive Officer Hospital Universiti Malaysia Sabah.

### **Other Experience and Professional Membership**

- 1999 -03 Committee member of Sabah Cancer Society
- 1999 - Life member of Sabah Cancer Society
- 1999 Member of Sabah Child Welfare Association
- 1999 - Member of Partners of Community Organisation (PACOS Trust)
- 2000 - Life member of Sabah Society
- 2003 -17 Life member of MERCY Malaysia
- 2003 -17 Chairperson of MERCY Malaysia, Sabah Chapter
- 2009 - Committee member of Intervention Group of Alcohol Misuse (IGAM), MERCY Malaysia
- 2011 -14 Ex-Officio member of MERCY Malaysia
- 2012 - Vice President of Kinabalu Running Club
- 2016 - Board of Director, EduLife Berhad
- 2016 - President, Association for the Prevention of Alcohol Misuse
- 2017 - Member of International Society of Quality of Life Studies
- 2017 - President of Persatuan Larian Berhalangan Sabah
- 2018 Organizing Chairperson, 1st Borneo Quality of Life Conference

### **Honors**

- 2012 Anugerah Kesatria Puteri Perubatan, IDEA Malaysia
- 2012 Talented Staff Award, School of Medicine, University Malaysia Sabah
- 2012 Sport Leadership Award, School of Medicine, University Malaysia Sabah
- 2012 Outstanding Dedication and Significance Contributions Award, MERCY Malaysia
- 2013 APC, University Malaysia Sabah
- 2013 Talented Staff Award, School of Medicine, University Malaysia Sabah
- 2013 Sport Leadership Award, School of Medicine, University Malaysia Sabah
- 2014 Augerah Sukan Untuk Semua (ASUS) 2014, Peringkat Negeri Sabah

## **C. Contribution to Science**

1. **Over 12 years of practicing and 20 years of research on women, reproductive and sexual health and improving diagnostics.** Extensive experience working with communities on reducing alcohol harm and other outreach programs. Ajak WA, Simat SF, Eng HS, **Lasimbang HB**, Lin TP (2017). Characterisation, Proliferation and differentiation potential of long term cultured Wharton's Jelly derived mesenchymal stem cells. **Biomedical Research and Therapy** 4 (S):133.

- a. Fiona Macniesia Thomas, Kumar V, Simat SF, **Lasimbang HB** (2017). Telomerase activity, telomerase length and P53 mutation detection on cellular senescence of Human Amnion Mesenchymal StemCells (HAMCs). **Biomedical Research & Therapy** 4 (S): 131.
- b. James S, Eckerman L, Shoesmith W, **Lasimbang HB**, Joseph A (2017). Using the diamond dialogue to explore community ambivalence towards changing alcohol use and strengthen community action. **J Addict Res Ther.** 8:4 (Suppl). doi: 10.4172/2155-6105-C1-030.
- c. **Lasimbang HB**, Tong WT, Low WY (2016). Migrant workers in Sabah, East Malaysia: The importance of legislation and policy to uphold equity on sexual and reproductive health and rights. **Best Pract. Res. Clin. Obstet. Gynaecol.** 32, 10. doi:10.1016/j.bpobgyn.2015.08.015 (IF: 2.291).

#### **D. Additional Information: Research Support and/or Scholastic Performance**

##### **Ongoing Research Support**

University Community Transformation Centre Lasimbang (PI)

Produk Minuman Halia untuk Meningkatkan Ekonomi dan Kesehatan Komuniti Daerah Tambunan

Role: PI

University Malaysia Sabah. "Knowledge, Attitude, and behaviour regarding of Comprehensive Sexuality Education among First Year Students of UMS"

Role: Co-researcher

United National Children Fund (UNICEF) Lasimbang (PI)

Maternal and child malnutrition in Sabah

Role: PI

University Malaysia Sabah Lasimbang (PI)

Effectiveness of community support training program for alcohol harm reduction

Role: PI

##### **Completed Research Support**

SGK0022-SKK-2015 Lasimbang (PI) 01/07/2015-30/06/2017

University Sabah Malaysia

Pap Smear reporting in tertiary hospital and maternal child health clinics of Kota Kinabalu, Sabah

Role: PI

FK-MHC/1(UMS-15) Lasimbang (PI) 01/12/2015-01/12/2017

University Sabah Malaysia

Alcohol Intervention Tool-kit: Empowering the Indigenous Communities of Sabah to Reduce Alcohol-related Harm

Role: PI

RACE0019-SKK-2014 Lasimbang (PI) 01/26/2015-01/25/2017

University Malaysia Sabah

Cellular NUtteraction Between Human Amnion Mesenchymal Stem Cells and Human Dermal Fibroblasts

Role: PI

**BIOGRAPHICAL SKETCH**

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NAME: Lee, Heng Gee

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Infectious Disease Consultant (Sabah State and Queen Elizabeth Hospital)

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Auckland, New Zealand	MBChB	03/2002	Bachelor of Medicine, Bachelor of Surgery
Royal College of Physicians of the United Kingdom	MRCP (UK)	03/2011	Internal Medicine
National University Hospital, Singapore	Infectious Disease Fellowship	03/2017	Infectious Disease

**A. Personal Statement**

I have 17 years of working experience as a clinician in the Malaysian Ministry of Health and the Sabah State Health Department. I am currently the Sabah State Infectious Disease Consultant and the Head of the Infectious Disease Unit in Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia. I was involved in the recruitment of patients for the USAID PREDICT Human Syndromic Surveillance in 2018.

**B. Positions and Honors****Positions and Employment**

2002 -10 Medical Officer, Sabah State Health Department, Ministry of Health of Malaysia  
2011 - Internal Medicine Specialist, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia  
2017 - Head of Infectious Disease Unit, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia  
2018 - Infectious Disease Consultant, Sabah State Health Department

**Other Experience and Professional Membership**

2011 - Member of the Royal College of Physicians, MRCP (UK), MRCP (London)  
2014 - Member of the Malaysian Society for HIV Medicine (MASHM)  
2017 - Associate Member of the Infectious Diseases Society of America (IDSA)  
2017 - Associate Member of the HIV Medicine Association (HIVMA)  
2017 - Member of the Malaysian Medical Association (MMA)

**Honors**

2005 Ministry of Health of Malaysia Excellent Service Awards  
2009 Ministry of Health of Malaysia Excellent Service Awards  
2015 Ministry of Health of Malaysia Excellent Service Awards

**C. Contributions to Science**

1. **USAID PREDICT Human Syndromic Surveillance in 2018.** Objective is to detect novel viruses that are causing diseases in patients without known etiology.

**2. Research on the etiologies of central nervous system infections in Kota Kinabalu, Sabah.**

- a. **Lee HG**, William T, Menon J, Ralph AP, Ooi EE, Hou Y, Sessions O, Yeo TW (2016). Tuberculous meningitis is a major cause of mortality and morbidity in adults with central nervous system infections in Kota Kinabalu, Sabah, Malaysia: an observational study. **BMC Infect. Dis.** 16: 296

**D. Additional Information: Research Support and/or Scholastic Performance**

Not applicable

**BIOGRAPHICAL SKETCH**

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Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Rajahram, Giri Shan

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Infectious Disease Physician

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Science University of Malaysia	MD	08/2006	Medicine
Royal College of Physician London	MRCP	07/2011	Medicine
Asia Pacific Society of Infection Control	Certification in Infection Control	06/2014	Tropical Medicine
Liverpool School of Tropical Medicine	DTM&H (with distinction)	02/2018	Tropical Medicine
Royal College of Physician London	Leadership Accreditation	06/2018	Leadership and Management

**A. Personal Statement**

I am an infectious disease consultant for Sabah State Health Department and an infectious disease physician working in the only tertiary referral center in Sabah, serving a population of 3 million people managing various complex and emerging infectious diseases. I am an integral partner from the Ministry of Health Malaysia, involved in collaborative research with partners from Menzies School of Health Research, Australia to further the understanding of epidemiology, pathophysiology and clinical management of zoonotic *plasmodium knowlesi* malaria. I have also been involved with local and international partners, examining emerging infectious disease threats in the region including the PREDICT project. Among others, I have authored scientific papers describing cases of *Streptococcus suis* and one of the few detailed post-mortem cases of fatal zika virus infections in an adult.

1. Cooper DJ, **Rajahram GS**, William T, Jelip J, Maohammad R, Benedict J, Alaza DA, Malacova E, Yeo TW, Grigg MJ, Anstey NM, Barber BE (2019). Plasmodium knowlesi malaria in Sabah, Malaysia, 2015-2017: ongoing increase in incidence despite near-elimination of the human-only Plasmodium species. **Clin Infect Dis.** pii: ciz237. doi: 10.1093/cid/ciz237.
2. **Rajahram GS**, Hale G, Bhatanagar J, Hui J, Thayyan R, William T, Kum Tong W, Tambayah PA, Yeo TW (2019). Postmortem evidence of disseminated Zika virus infection in an adult patient. **Int J Infect Dis.** pii: S1201-9712(19)30060-8. doi: 10.1016/j.ijid.2019.01.047.
3. **Rajahram GS**, Cooper DJ, William T, Grigg MJ, Anstey NM, Barber BE (2019). Deaths from Plasmodium knowlesi malaria: case series and systematic review. **Clinical Infectious Diseases** ciz011, <https://doi.org/10.1093/cid/ciz011>.
4. Grigg MJ, William T, Barber BE, **Rajahram GS**, Menon J, Schimann E, Piera K, Wilkes CS, Patel K, Chandna A, Drakeley CJ, Yeo TW, Anstey NM (2018). Age-Related Clinical Spectrum of Plasmodium knowlesi Malaria and Predictors of Severity. **Clinical Infectious Diseases** doi.org/10.1093/cid/ciy065.

## B. Positions and Honors

### Positions and Employment

Infectious Disease and General Med. Consultant Queen Elizabeth Hospital, Kota Kinabalu, Sabah  
Head of Unit, Infection Control, Queen Elizabeth Hospital 2, Sabah  
Deputy Head, Department of Medicine, Queen Elizabeth Hospital 2, Sabah  
Adjunct Clinical Lecturer University Malaysia Sabah  
Sabah State Technical Expert for Infection Control and Infectious Diseases  
Former Head of Unit Neurology, Queen Elizabeth Hospital  
Former Deputy Head, Department of Medicine Keningau Hospital

### Honors

2010 Excellent Service Award, Ministry of Health Malaysia  
2014 Malaysian Government Merit Scholarship, for Infectious Disease Training  
2014 Travel Grant, Asia Pacific Malaria Elimination Network (APMEN)  
2016 Travel Grant, National Institute of Health, United States of America  
2016 Excellent Service Award, Ministry of Health Malaysia  
2017 Travel Grant, Malaysia Society of HIV Medicine, Malaysia  
2017 Travel Grant, Asia Pacific AIDS and Co-Infection Conference  
2017 Merit Scholarship Award Liverpool School of Tropical Medicine, United Kingdom  
2018 Honorary Fellow, Menzies School of Health Research  
2019 Endeavor Executive Leadership Award by the Government of Australia

## C. Contributions to Science

1. **Advancing the understanding of epidemiology, pathophysiology and clinical management of *plasmodium knowlesi* malaria**, an emerging zoonotic malaria in collaboration with international partners from Menzies, which has resulted in publications and policy changes both nationally in Malaysia and international in World Health Organization (WHO) guidelines in clinical management of *plasmodium knowlesi* malaria.
  - a. Grigg MJ, William T, Barber BE, GS Rajahram et al (2018). Artemether-lumefantrine versus chloroquine for the treatment of uncomplicated Plasmodium knowlesi malaria in Sabah, Malaysia (CAN KNOW): an open-label randomized controlled trial. *Clinical Infectious Diseases* 66(2):229–236, DOI: 10.1093/cid/cix779.
  - b. Grigg MJ, William T, Menon J, Barber BE, Wilkes CS, GS Rajahram et al. Age-related clinical spectrum of malaria in children and adults infected with Plasmodium knowlesi compared with human-only Plasmodium species: A prospective district hospital study in Sabah; *Clinical Infectious Diseases*, ciy065, Mac 2018 <https://doi.org/10.1093/cid/ciy065>.
  - c. Barber BE, Rajahram GS, William T, Yeo TW, Anstey NJ (2017). World Malaria Report: Time to acknowledge knowlesi malaria. *Malaria Journal* 16:135 DOI: 10.1186/s12936-017-1787.
  - d. Rajahram GS, Hameed AA, Menon J, William T (2017). Case Report: Two Human Streptococcus Suis Infections in Borneo, Sabah, Malaysia. *BMC Infectious Diseases* 17:188 DOI 10.1186/s12879-017-2294.
2. **Community engagement and participation.** Dr Rajahram is the Vice-President Medical Society of Queen Elizabeth Hospital and the Treasurer of Infectious Disease Society of Sabah. He makes regular public speaking appearances on Infectious Disease and Tropical Medicine locally and nationally for both health professionals and general public. He is also involved as Medical Coordinating Director for the Mobile Court Initiative which serves remote and difficult to access areas in Sabah with multi-agency service provision an initiative by Rtd Chief Justice of Malaysia, Tan Sri Richard Malanjum.

- a. Tan JS, Ambang T, Azlina A-A, **Rajahram GS**, Wong KT, Goh KJ (2016). Congenital myasthenic syndrome due to novel CHAT mutations in an ethnic kadazandusun family. **Muscle & Nerve** 53(5):822-6. doi: 10.1002/mus.25037.
  - b. Lim KS, Tan AH, Lim CS, Chua KH, Lee PC, Ramli N, **Rajahram GS**, Hussin FT, Wong KT, Bhattacharjee MB, Ng CC (2015). R54C mutation of NOTCH3 gene in the first Rungus family with CADASIL. **PLoS One** 13;10(8):e0135470. doi: 10.1371/journal.pone.0135470.
- 3. Professional involvement.** Dr Rajahram was Convenor of the 3<sup>rd</sup> and upcoming 4<sup>th</sup> Borneo Scientific Meeting on Tropical Infectious Diseases 2019 and organizing organising committee member for the first two meetings. He has contributed as an author in clinical cases of *plasmodium knowlesi* malaria in Medical Parasitology a Textbook, R Mahmud, Y Lim, A Amir; Springer International Publication 2017 ISBN 978-3-319-68794-0. He is also involved in contributing to the Malaysian National HIV guidelines; Chapter on Treatment Failure (2018), (b) (4)
- a. **Rajahram GS**, Barber BE, William T, Grigg MJ, Menon J, Yeo TW, Anstey NM (2016). Falling Plasmodium knowlesi malaria death rate among adults despite rising incidence, Sabah, Malaysia, 2010-2014. **Emerg. Infect. Dis.** 22(1).
  - b. Grigg MJ, William T, Menon J, Barber BE, Wilkes CS, **Rajahram GS**, Edstein MD, Auburn S, Price RN, Yeo TW, Anstey NM (2016). Efficacy of artesunate-mefloquine against high-grade chloroquine-resistant Plasmodium vivax malaria in Malaysia: an open-label randomised controlled trial. **Clin. Infect. Dis.** doi:10.1093/cid.
  - c. **Rajahram GS**, Barber BE, Tan WW, Yeo T, William T (2013). Case Report: Fatal Plasmodium knowlesi malaria following an atypical clinical presentation and delayed diagnosis. **Med J Malaysia** 68(1):71-72.
  - d. **Rajahram GS**, Barber BE, William T, Menon J, Anstey NM, Yeo TW (2012). Deaths due to Plasmodium knowlesi malaria in Sabah, Malaysia: association with reporting as Plasmodium malariae and delayed parenteral artesunate. **Malaria Journal** 11:284.
  - e. **International standing:** Co-opted invited observer for WHO Expert Consultation Meeting, Kota Kinabalu, Sabah, 2017 and invited panelist to the Environment & Social Ecology of Human Infectious Diseases (ESEI), Medical Research Council (UK) Showcase Event at Royal Society in London, March 2018.

**D. Additional Information: Research Support and/or Scholastic Performance**

n/a



**BIOGRAPHICAL SKETCH**

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Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Sekaran, Jayaseelan

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Senior Medical Officer

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University Malaya, Malaysia	BMMS	2006	Medicine
Irish College of General Practitioners, Seremban, Malaysia	LFOM	On-going	Occupational Medicine

**A. Personal Statement**

I have been running the Lintang Health Clinic in Sungai Siput for Orang Asli populations in the District of Kuala Kangsar since 2016. I worked with Tom Hughes and EcoHealth Alliance on the PREDICT project as the community POC to help liaise with the communities, identify participants, and manage the District Health team to collect samples. I am also responsible for returning results from this study to the participants. I have an interest in Infectious Disease and feel that the population I sever will strongly benefit from this study.

**B. Positions and Honors****Positions and Employment**

2006 -07 Housemanship, Teluk Intan Hospital, Perak, Malaysia.

2007 -16 Senior Medical Officer, Teluk Intan Hospital, Perak, Malaysia. Internal medicine.

2016 - Senior Medical Officer, Lintang Health Clinic, Kuala Kangsar District Health Office, Perak, Malaysia

**Other Experience and Professional Membership**

2018 Volunteer Treating Doctor, Refugee Relief Mission to Cox Bazaar, Bangladesh

2018 Team Leader, Forward Medical Team and Mobile Clinic, Tsunami Mission to Palu, Sulawesi, Indonesia

**Honors**

2019 Outstanding Award for Relief Mission, Islamic Medical Association of Malaysia

**C. Contributions to Science****1. Examining neural tube defects in relation to nutrition.**

- a. J.J. Ho, L. Vyveganathan and **J. Sekaran**. Consumption of cereal flour in a Malaysian population: Flour fortification to prevent neural tube defect may be feasible in a rice-eating country. **Ecology of Food and Nutrition**. 2006 (45): 53-60.

**D. Additional Information: Research Support and/or Scholastic Performance**

n/a

**BIOGRAPHICAL SKETCH**

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Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Tan, Cheng Siang

eRA COMMONS USER NAME (credential, e.g., agency login): cstan

POSITION TITLE: Senior Lecturer, Head

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Universiti Putra Malaysia, Malaysia	B.S. (hons)	09/2000	Biotechnology (Bacteriology, AMR)
Universiti Malaysia Sarawak, Malaysia	NSF Fellowship	12/2003	Virology (HFMD/EV71)
Universiti Malaysia Sarawak, Malaysia	M.S.	09/2004	Virology (HFMD/EV71)
Newcastle University, United Kingdom	Ph.D.	05/2012	Virology (hRSV)
Ministry of Public Health, Thailand	SEAOHUN Fellowship 2017	12/2017	One Health

**A. Personal Statement**

I have nearly 20 years of laboratory experience on human viruses. I have started off with the sentinel surveillance of Hand, foot and mouth Disease (HFMD) from 2000-2004 providing molecular screening on swabs obtained from public hospitals and sentinel clinics. Results were made available to the Department of Public Health and State's Disaster Management Committee for outbreak management. I was tasked to develop a serological assay for the detection of Enterovirus 71. I have received the prestigious National Science Fellowship (NSF) Award from the Ministry of Science, Technology and Environment for my work on EV71 in Sarawak. I was also involved with the screening of suspected SARS-CoV specimens from Sarawak General Hospital (SGH) using molecular techniques but fortunately none were confirmed positive during that time. No manuscript was published on the work on SARS-CoV due to negative results but the experience of donning and doffing extra amount of PPE, setting up administrative and the maximizing the use of engineering controls to work safety in the laboratory become an invaluable experience for a virologist such as myself. Thereafter, I pursued my doctorate degree in Newcastle University, UK under the supervision of Emeritus Professor Geoffrey Toms. My project was to study the protective nature of maternal antibodies against human respiratory syncytial virus (RSV). I have to work closely with the research nurse to obtain in nasopharyngeal swabs and blood serum from hRSV infected infants. All work related with my MSc and PhD were tissue culture, molecular biology and serology intensive. Whilst heading the Centre for Tropical and Emerging Diseases, I have worked closely with zoologists from my UNIMAS to study the seroprevalence of hantavirus in both rodents captured from residential and forested areas of Sarawak. The work involved setting up traps in strategic locations, capturing the animal, obtaining specimens and ethically euthanizing the animal. I have collaborated with Southampton University, UK funded by Newton Fund to study the nasal carriage of *Streptococcus pneumoniae* in the Malaysian population in hope to provide disease burden data to influence the adoption of the pneumococcal vaccine in Malaysia. The newest project is

in Human Papillomavirus (HPV) and cervical cancer. We are trying to define the molecular epidemiology of HPV in Sarawak and at the same time provide HPV DNA test for the rural communities. The work involves explaining the study to the women, obtaining informed consent and obtaining the specimen. Participating women are also visually screened for cervical intraepithelial neoplasia (CIN) using visual inspection using acetic acid (VIA). This work is still at its infancy and 2 manuscripts are already in the pipeline. Recently, we have acquired the careHPV system (Qiagen), packed it in boxes and took a flight to Bario, a remote town at the northeast of Sarawak and set the portable laboratory there to screen the women for HPV infection and also providing them with cervical examination.

1. **Tan CS**, Cardoso MJ (2007). High-titred neutralizing antibodies to human enterovirus 71 preferentially bind to the N-terminal portion of the capsid protein VP1. **Archives of virology** 152(6) 1069-1073.
2. Perera D, Podin Y, Akin W, **Tan CS**, Cardoso MJ (2004). Incorrect identification of recent Asian strains of Coxsackievirus A16 as human enterovirus 71: improved primers for the specific detection of human enterovirus 71 by RT PCR. **BMC infectious diseases** 4 (1):11.
3. Hamdan NE, Ng YL, Lee WB, **Tan CS**, Khan FA, Chong YL (2017). Rodent species distribution and hantavirus seroprevalence in residential and forested areas of Sarawak. **Malaysia Tropical Life Sciences Research** 28 (1):151-159.
4. Tricarico, S, McNeil HC, Cleary DW, Head MG, Lim V, Yap IKS, Wie CC, **Tan CS**, Norazmi MN, Aziah I, Cheah ESG, Faust SN, Jefferies JMC, Roderick PJ, Moore M, Yuen HM, Newell ML, McGrath N, Doncaster CP, Kraaijeveld AR, Webb JS, Clarke SC (2017). Pneumococcal conjugate vaccine implementation in middle-income countries." **Pneumonia** 9(1): 6.

## **B. Positions and Honors**

### **Positions and Employment**

- 2000 -04 National Science Fellow, Universiti Malaysia Sarawak  
2004 -06 Chemistry educator, Lodge Private School  
2006 -12 Lecturer, Universiti Malaysia Sarawak  
2012 - Senior lecturer, Universiti Malaysia Sarawak

### **Honors**

- 2014 Excellence Award, Universiti Malaysia Sarawak  
2016 Affiliate Young Scientists Network-Academy Science of Malaysia  
2017 Certified Professional of the Month, International Federations of Biosafety Associations (IFBA)  
2017 SEAOHUN Fellow  
2018 Registered Biosafety Professional (RBP), Malaysian Biosafety and Biosecurity Association

## **C. Contributions to Science**

1. **Ventilation engineering.** In collaboration with our Faculty of Engineering, our team have reengineered to air inlet in the type2 Class A2 Biosafety Cabinet (BSC) which will lengthen the lifespan of the HEPA filter in the BSC and distribute the air pressure more evenly on the HEPA filter while in operation.
2. **Developed and filed a patent protection on an algorithm to measure the antibiotic's inhibition zone,** consulting the database and provide instant results by the use of a standard mobile phone. This product has won Gold Medal in UNIMAS Innovation and Technology Expo 2016 and Silver Medal in the 28<sup>th</sup> International Invention, Innovation and Technology Exhibition 2017. *Patent pending.*
3. **Pioneering biosafety and biosecurity in Malaysia.** My contribution is internationally recognized and was awarded the Certified Professional of the Month in 2017 by the International Federation of Biosafety Associations. I currently hold 4 of 5 professional certification from IFBA, deemed the most certified biorisk management professional in Malaysia. I am also the national biorisk management trainer and conduct the annual Malaysian Advanced Biosafety Officer Training (MABOT) funded by CRDF Global, supported by

Sandia National Laboratories and Department of State, US. I have worked closely with the Ministry of Health Malaysia and the Ministry of Defense Malaysia to develop the national biosafety and biosecurity guidelines and policies.

- a. Ibrahim MD, Mohtar MZ, Alias AA, Wong LK, Yunos YS, Rahman MRA, Zulkharnain A, **Tan CS**, Thayan R (2017). Airflow optimization for energy efficient blower of biosafety cabinet class II A2. **Journal of Physics: Conference Series** 822(1)012022.
- b. Zalini Y, et al. (2018). National Laboratory Biosecurity Assessment and Monitoring Checklist (in the framework of the biological weapons convention) STRIDE, Ministry of Defense Malaysia. P. 1-31.
- c. Biosafety and Biosecurity Sub-committee, Laboratory Technical Advisory Committee (LTAC) (2015) Malaysia Laboratory Biosafety and Biosecurity Policy and Guideline, Ministry of Health Malaysia. 1-26.
- d. <https://www.internationalbiosafety.org/index.php/professional-certification/ifba-professional-certifications/certified-professional-of-the-month/581-cheng-siang-tan>
- e. Ryu S., Kim B. I., Lim JS., Tan C.S. and Chun BC. (2017) One Health Perspectives on Emerging Public Health Threats. *J Prev Med Public Health* 50(6):411-414.

#### **D. Additional Information: Research Support and/or Scholastic Performance**

##### **Completed Research Support (last 3 years only)**

F05/SGS/1638/2018 2018

Special Grant Scheme (SGS), Universiti Malaysia Sarawak internal grant

A study on the epidemiology of HPV subtypes among women with abnormal pap smears in Sarawak General Hospital

F05/SpGS/1564/2017 2017

Special Grant Scheme (SGS), Universiti Malaysia Sarawak internal grant

Bioprospecting of bacteriolytic bacteriophages infecting *Pseudomonas aeruginosa*

RAGS/ST01(1)/1314/2015(08) 2015

Research Acculturation Grant Scheme (RAGS), Ministry of Higher Education, Malaysia

A pilot study of bacterial diversity related to periodontal disease among Sarawak children

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Anwarali Khan, Faisal Ali

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Lecturer

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Universiti Malaysia Sarawak	B.S. (Hons)	05/2004	Biotechnology
Texas Tech University	M.S.	05/2008	Zoology
Texas Tech University	Ph.D.	05/2013	Zoology

**A. Personal Statement**

I am interested in the systematics and molecular evolution of Southeast Asian mammals, particularly bats. I aim to understand the diversity of several genera in these groups, looking for common patterns in their distributions and origins. This allows me to understand the extent to which biogeography of Southeast Asia has shaped the genetic diversity of mammals in this region. Currently, my lab is examining the evolution of Roundleaf bats, Horseshoe bats, and several groups of rodents. We are studying multiple transmission lines (paternal, maternal and autosomal markers) along with behavioral characteristic such as echolocation, and we are using geometric morphometric technique to identify taxonomic units. My hope is that this research will provide a better understanding of the mode of evolution and diversification for bats and rodents in Southeast Asia. I am also keen to move forward with the advancement of the genomic field, by incorporating bioinformatics to better utilize natural history collections. I hope to use this new tool to better understand the microbial fauna carried by mammalian hosts.

1. Runting RK, Griscom BW, Struebig MJ, Satar M, Meijaard E, Burivalova Z, Cheyne SM, Deere NJ, Game ET, Putz FE, Wells JA, Wilting A, Ancrenaz M, Ellis P, **Khan FAA**, Leavitt SM, Marshall AJ, Possingham HP, Watson JEM, Venter O (2019). Larger gains from improved management over sparing–sharing for tropical forests. **Nature Sustainability** 2(1), 53-61.
2. Mazlan N, Abd-Rahman MR, Tingga RCT, Abdullah MT, **Khan FAA** (2019). Population Genetics Analyses of the Endangered Proboscis Monkey from Malaysian Borneo. **Folia Primatologica** 90(3), 139-152.
3. Murray SW, **Khan FAA**, Kingston T, Zubaid A, Campbell P (2018). A new species in the *Hipposideros bicolor* group (Chiroptera: Hipposideridae) from Peninsular Malaysia. **Acta Chiropterologica** 20:1, 1-29.
4. **Khan FAA**, Phillips CD, Baker RJ (2013). Timeframes of Speciation, Reticulation, and Hybridization in the Bulldog Bat Explained Through Phylogenetic Analyses of All Genetic Transmission Elements. **Systematic Biology** 63(1):96–110.

**B. Positions and Honors**

## **Positions and Employment**

- 2004 -06 Tutor, Universiti Malaysia Sarawak, Sarawak, Malaysia  
2008 -13 Teaching Assistant, Texas Tech University, Lubbock TX  
2013 - Lecturer, Universiti Malaysia Sarawak, Sarawak, Malaysia  
2013 - Research Associate, Museum of Texas Tech, Texas Tech University, Lubbock, TX  
2014 - Research Fellow, Universiti Malaysia Terengganu, Malaysia  
2016 - Principal at Rafflesia Student Residential College, UNIMAS  
2017 -18 Deputy Dean (Student Affair and Alumni), FRST, UNIMAS  
2018 Deputy Director (Department of Alumni Relation), Centre for Student Development, UNIMAS

## **Other Experience and Professional Membership**

- 2006 - Life Member, American Society of Mammalogists  
2006 - Life Member, Texas Society of Mammalogists  
2011 Southeast Asia Bat Conservation Research Unit-member (SEABCRU) – member/Steering Committee.  
2006 -12 Genetic Society of Malaysia, (PGM) (membership no: PGM 0835) – life member.  
Texas Tech University Association of Biologist (TTUAB) – member (January 2006-May 2013), Vice President for 2007 – 2008 sessions., Board of Directors – 2010-2012  
2016 Young Scientist Network-Academy Sciences Malaysia 2016 (YSN-ASM2016)  
2013- Associate Editor: Borneo Journal of Resource Science and Technology (UNIMAS Publisher)  
2015 -17 Reviewer (Member in Editorial Board) - Journal of Wildlife and Parks  
2016- Subject Editor (Mammals): Checklist-the journal of biodiversity data  
2015- Southeast Asia Section: IUCN Bat Specialist Group Newsletter  
2018- Review Editor: Journal of Bat Research and Conservation

## **Honors**

- 2016 - Young Scientist Network-Academy Sciences Malaysia 2016 (YSN-ASM2016) (1st December 2016 - 31 December 2019)  
2016 Excellence Service Award 2015 / Anugerah Perkhidmatan Cemerlang 2015, UNIMAS  
2015 UNIMAS Research and Development Expo 2015  
1. Value of acoustic measures in identifying cryptic bat species: A Myth or reality? (Silver) – Prepared acoustic call CD, Website for echolocation calls, Prepared echolocation field guide book for bats of Malaysia  
2. Connecting wildlife survey to tourism through LIDAR images: Wind Cave field guide (Bronze) – Prepared website for wind cave 3D maps  
3. Value of acoustic survey in detecting elusive Tarsier: Description of their call and genetic structure (Bronze) – Prepared website with distribution and genetic data  
2012 Texas Tech Association of Biologist Symposium Award  
Organized by TTUAB at Texas Tech University, Lubbock, USA  
Best presentation in Systematics and Evolution – 1st place (USD 200)  
2010 Michelle C. Knapp Memorial Scholarship 2010  
Recognition on mammalogy studies and field work (USD 500)  
2010 Helen Hodges Educational Charitable Trust Scholarship  
Recognition on academic and research achievement (USD 1250)  
2010 Texas Society of Mammalogists Award  
Best presentation on studies pertaining to mammalian cytology, evolution, and systematics – (USD 100)  
2008 Seventh Annual Graduate Student Research Poster Award

- Organized by Graduate School at Texas Tech University  
Best poster award – 3rd place (USD 75)
- 2007 First International South East Asia Bat Conference Award  
Best presenter award – Books
- 2007 British Ecological Society Grant  
To attend the First International South East Asia Bat Conference at Phuket, Thailand-Registration and hotel fee paid
- 2007 TTUAB Graduate Forum Award  
Organized by TTUAB at Texas Tech University, Lubbock, USA  
Best presentation in Systematics and Evolution – 3rd place (USD 100)
- 2004 Malaysian Ministry of Higher Education Scholarship  
For both Masters and PhD study at Texas Tech University, Lubbock, Texas, USA. Scholarship covers tuition fee and living allowance for six years.

### C. Contributions to Science

1. **Studies on the systematics and evolution of mammals.** Different climatic conditions and geologic settings have been seen as the major signature in promoting diversification in mammals. Different types of molecular techniques allow us to capture this variation and understand when all of this happens. Further, new analyses allow us to test for the potential pitfall in analyzing data from different group of mammals. The following manuscripts are the flagship manuscripts for the last 5 years.
  - a. Esselstyn JA, Evans BJ, Sedlock JL, **Khan FAA**, Heaney LR (2012). Single-locus species delimitation: A test of the mixed Yule-coalescent model, with an empirical application to Philippine round-leaf bats. **Proceedings of Royal Society of London**. 279:3678-3686.
  - b. **Khan FAA**, Solari S, Swier VJ, Larsen PA, Abdullah MT, Baker RJ (2010). Systematics of Malaysian woolly bats (Vespertilionidae: *Kerivoula*) inferred from mitochondrial, nuclear, karyotypic, and morphological datasets. **Journal of Mammalogy**. 19(5):1058-1072.
2. **Assessing bat diversity across Malaysia.** The actual bat diversity in Malaysia may be underestimated, as there are several new species recently described which were unknown due to their cryptic morphology. New species are the result of incorporating: molecular methods with greater resolution, electronically recorded acoustic calls, and efficient field techniques such as harp traps, to properly describe species diversity and status. Different hypotheses have been proposed to facilitate speciation processes in Southeast Asian bats (e.g. geographic isolation, habitat fragmentation, adaptation to different echolocation calls, etc.).
  - a. **Khan FAA**, Shazali N, Latip N, Azhar I (2019). Into the Heart of Borneo: Mammals of Upper Baleh, Sarawak. **Journal of Sustainability Science and Management** 14(2).
  - b. Murray SW, **Khan FAA**, Kingston T, Zubaid A, Campbell P (2018). A new species in the *Hipposideros bicolor* group (Chiroptera: Hipposideridae) from Peninsular Malaysia. **Acta Chiropterologica** 20:1, 1-29.
  - c. Morni MA, Tahir NF, Rosli QS, William-Dee J, Azhar I, Azuan R, Zahidin MA, Abdullah MT, **Khan FAA** (2016). New record of the endemic *Rhinolophus chiewkweeae* (Chiroptera: Rhinolophidae) to the east coast of Peninsular Malaysia in Terengganu with noteworthy records on their ecology, genetics, and taxonomy. **Raffles Bulletin of Zoology** 64: 242–249.
  - d. Lim L, Csorba G, Wong CM, Zubaid A, Rahman SPH, Kumaran JV, **Khan FAA**, Huang JCC, Najimudin N, Görföl T (2016). The systematic position of *Hypsugo macrotis* (Chiroptera: Vespertilionidae) and a new record from Peninsular Malaysia. **Zootaxa** 4170(1): 169-177.
3. **Studies on the mammalian ecology.** Understanding mammalian ecology is vital in order to develop effective conservation plans. My research group has actively looked into using techniques such as direct observation and LIDAR technology. The information collected from these techniques provides critical long-term

management data that is used to monitor the well-being of mammals. We also collaborate with other research groups to better understand the impacts of logging on mammals in Borneo.

- a. Mohd-Ridwan AR, Tahir NF, Eshak MH, Csorba G, Görföl T, **Khan FAA**, Mohd-Azlan J (2018). Bats Assemblage and Lunar Phase Effect on Bat Activity at Mixed Dipterocarp Forest, Gunung Gading National Park, Sarawak, Borneo. **Sains Malaysiana** 47(7)(2018): 1349–1357. <http://dx.doi.org/10.17576/jsm-2018-4707-01>.
- b. Rajasegaran P, Shazali N, **Khan FAA** (2018). Microclimate and Physiological Effects in the Roosts of Cave Dwelling Bats: Implications in the roost selection and the conservation in Sarawak, Malaysian Borneo. **Zoological Science** 35(6):521-527.
- c. Shazali N, Chew TH, Shamsir MS, Tingga RCT, Mohd-Ridwan AR, **Khan FAA** (2017). Accessing Bat Roosts using LiDAR System at Wind Cave Nature Reserve in Sarawak, Malaysian Borneo. **Acta Chiropterologica** 19(1): 199-210.

#### **D. Additional Information: Research Support and/or Scholastic Performance**

##### **Ongoing Research Support**

Royal Society and ASM/MIGHT (Royal Society-Newton Mobility Grant) 2017 - 2020  
Applying DNA sequencing to guano deposits to assess the ecological consequences of forest loss  
Role: PI

UMS-UNIMAS Collaboration Research Grant 2017 - 2019  
Proboscis monkey assessment through predictive abundance modeling and microbiome analysis on populations from disturbed and fragmented habitat landscapes in Sabah and Sarawak, Malaysian Borneo (UMS-UNIMAS)  
Role: PI

(b) (4) 2018 - 2020  
The potential of utilizing Visual Technologies as a research practice in zoological studies via Practice-led investigation: a Case study on Bat's Behavior and Characteristic  
Role: Co-PI

Ministry of Education (MoE) (Fundamental Research Grant Scheme) 2017 - 2019  
Diversity and Molecular Characterization of Fungal Communities in Speleothem, cavern water, dead arthropods, and bat guano substrates from Limestone Caves of Malaysian Borneo  
Role: Co-PI

##### **Completed Research Support (last 3 years only)**

Ministry of Education (Niche Research Grant Scheme) 2014 - 2018  
Biodiversity of Western Sarawak – Life from Headwaters to the Coast  
Species of conservation importance – phylogeny and ecology  
Role: Co-PI

Ministry of Education (Niche Research Grant Scheme) 2014 - 2018  
Biodiversity of Western Sarawak – Life from Headwaters to the Coast  
Species response to landscape change in Western Sarawak Ministry of Education (Niche Research Grant Scheme)  
Role: Co-PI



**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Hamzah, Nadia Diyana

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Medical Officer

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
UCSI University, Kuala Lumpur	MD	2015	General Medicine
Hospital Umum Sarawak	Resident	2018	Housemanship

**A. Personal Statement**

I am a Medical Officer that is passionate about community health, and serves rural communities that do not have as much access to medical care as suburban and urban areas. While serving the rural communities as Medical Officer, I have overseen educational programs at the local schools focusing on preventative medicine and community health.

**B. Positions and Employment**

2018 - Medical Officer (Rural Area Service)

**C. Contribution to Science**

**1. Providing medical support to rural areas.** I frequently attend emergency calls in the local communities I serve and leverage evidence-based expertise to interpret patient symptoms and test results.

**D. Additional Information: Research Support and/or Scholastic Performance**

n/a

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Ahmed, Kamruddin

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Director & Professor

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Dhaka	M.B.B.S.	01/1986	Medicine
Institute of Tropical Medicine, Nagasaki University	D.T.M.	08/1988	Tropical Medicine
Nagasaki University	Ph.D.	03/1992	Microbiology

**A. Personal Statement**

During my carrier in the academia I have gained research experiences on different aspects of infectious diseases, and the scientific management experiences to support this proposed work that involves international interdisciplinary teams working on field surveillance in wild mammals, human behavioral risk surveys and clinical sampling, development of novel diagnostic approaches, and viral characterization *in vitro* and *in vivo*. I am Professor, Department of Pathobiology and Medical Diagnostics, and Director, Borneo Medical and Health Research Centre, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah that involves in teaching and conducts research on communicable diseases, outbreak investigations and ethnomedicine. My research background is focused on understanding the epidemiology, pathogenesis, and diagnostics of infectious agents particularly emerging infectious diseases. This includes etiology of viral diarrhea and encephalitis; molecular epidemiology of viruses from diarrhea, encephalitis and rabies; identifying novel virus or virus variants in humans and animals; zoonotic infections such as rabies, leptospirosis and brucellosis; developing new diagnostics for rabies and biomarker for encephalitis.

1. Matsumoto T, Sato M, Nishizono A and **Ahmed K\*** (2019) A novel bat-associated circovirus identified in northern Hokkaido, Japan. **Arch. Virol.** Doi:10.1007/s00705-019-04286-x.
2. Yahiro T, Takaki M, Chandrasena TGAN, Rajindrajith S, Iha H and **Ahmed K\*** (2018) Human-porcine reassortant rotavirus generated by multiple reassortant events in a Sri Lankan child with diarrhea. **Infect. Gen. Evol.** 65: 170-186.
3. Yahiro T, Wangchuk S, Tshering K, Bandhari P, Zangmo S, Dorji T, Tshering K, Matsumoto T, Nishizono A, Soderlund-Venermo M and **Ahmed K\*** (2014) Novel human bufavirus genotype 3 in children with severe diarrhea, Bhutan. **Emerg. Infect. Dis.** 20: 1037-1039.
4. Matsumoto T, **Ahmed K\***, Wimalaratne O, Nanayakkara S, Perera D, Karunanayake D and Nishizono A (2011) Novel sylvatic rabies virus variant in endangered golden palm civet, Sri Lanka. **Emerg. Infect. Dis.** 17: 2346-2349.

**B. Positions and Honors****Positions and Employment**

1986 -87 In-service Trainee, Mymensingh Medical Colloge Hospital, Bangladosh

- 1987 -88 Medical Officer, Samorita Hospital, Dhaka, Bangladesh  
1988 Visiting Scientist, Dept. of Internal Medicine, Institute of Trop. Med., Nagasaki University, Japan  
1992 -95 Guest Research Fellow, Dept. of Internal Medicine, Institute of Trop. Med., Nagasaki University, Japan  
1995 Lecturer (CoE), Dept. of Internal Medicine, Institute of Trop. Med., Nagasaki University, Japan  
1995 -97 Assistant Professor, Dept. of Microbiology, Faculty of Medicine, Kuwait University, Kuwait.  
Consultant Microbiologist, Dept. of Microbiology, Mubarak Al-Kabir Hospital, Kuwait  
1997 -98 Lecturer (CoE), Dept. of Internal Med., Institute of Trop. Med., Nagasaki University, Japan  
1998 -01 Research fellow, Dept. of Internal Med., Institute of Trop. Med., Nagasaki University, Japan  
2001 -04 Visiting Associate Professor, Dept. of Mole, Bio. and Genetics, Bilkent University, Turkey  
2004 -06 Lecturer, Division of Molecular Epidemiology, Department of Molecular Microbiology and Immunology, Nagasaki University School of Medicine, Nagasaki, Japan  
2006 -16 Associate Professor, Department of Microbiology, Faculty of Medicine (Research Promotion Institute), Oita University, Japan  
2016 - Professor, Department of Pathobiology and Medical Diagnostics, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia  
2017 - Director, Borneo Medical and Health Research Centre, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

#### **Other Experience and Professional Membership**

- 2014 - Member Editorial Board, Tropical Medicine and Health (TMH), published by the Japanese Society of Tropical Medicine  
2018 - Member Editorial Board, Borneo Journal of Medical Sciences (BJMS), published by Universiti Malaysia Sabah  
2016 -17 Member, Research Clinic Series 2016 and 2017 Screening Panel  
2016 Member, Human Genome and Clinical Genetics Laboratory Project Monitoring Team 2016  
2016 Member, MD Curriculum Review Panel 2016 for MM60130-Transformative year  
2015 -16 Fellow, Development and Health Research Unit  
2016 -18 Fellow, Research and Publication Cluster  
2016 -17 Fellow, Tuberculosis Unit, Faculty of Medicine and Health Sciences

#### **Honors**

- 1992 -93 Recipient of Inoue Fellowship from Inoue Science Foundation, Tokyo, Japan  
1994 -95 Recipient of JSPS Fellowship for Foreigners from Japan Society for the Promotion of Science, Japan  
1998 - Fellow of Australasian College of Tropical Medicine from Australasian College of Tropical Medicine, Queensland, Australia  
2010 - Executive Board Member of Japanese Society of Tropical Medicine from January.  
2016 -17 Leadership in Research Award from the Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah  
2016 -17 Dean's Special Award from the Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah  
2016 -18 Publication Award from the Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah  
2018 Gold Medal, Research and Design Completion of Universiti Malaysia Sabah in Research, Health and Medical Sciences.  
2018 Outstanding Research Award, Faculty of Medicine and Health Sciences, Universiti Malaysia, Sabah.

## C. Contribution to Science

**1. Research on the molecular epidemiology of rabies virus in Asian countries.** Rabies is the most fatal among all the infectious diseases with 100% mortality rate, however 100% protective if vaccine is used properly. Therefore proper epidemiology, strains detection in different animals and variants detection is of utmost importance. Although rabies death toll is highest in Asian countries however studies are scarce from this region. My group studied the molecular epidemiology in Thailand, Bangladesh, Bhutan, Laos and Sri Lanka. We found a wide range of genotypes of rabies viruses are circulating in not only dogs but among cats and a wide range of wild animals. Rabies in bat is well recognized in the Americas however we first time confirmed rabies in an Asian bat. We also detected rabies for the first time in civet. We also showed that the strain is a variant of circulating rabies virus indicating genetic changes are occurring which may jeopardize vaccination.

- a. Matsumoto T, Nanayakkara S, Perera D, Ushijima S, Wimalaratne O, Nishizono A, **Ahmed K\*** (2017) Terrestrial animal-derived rabies virus in a juvenile Indian flying fox in Sri Lanka. **Jpn. J. Infect. Dis.** 70: 637-695.
- b. **Ahmed K\***, Phommachanh P, Vorachith P, Matsumoto T, Lamaningao P, Mori D, Takaki M, Douangngeum B, Khambounheuang B and Nishizono A (2015) Molecular epidemiology of rabies viruses circulating in two rabies endemic provinces of Laos, 2011 – 2012: regional diversity in Southeast Asia. **PLoS Negl. Trop. Dis.** 9(3): e0003645.
- c. Karunanayake D, Matsumoto T, Wimalaratne O, Nanayakkara S, Perera D, Nishizono A and **Ahmed K\*** (2014) Twelve years of rabies surveillance in Sri Lanka, 1999–2010. **PLoS Negl. Trop. Dis.** 8: e3205.
- d. Jamil KM, **Ahmed K\***, Hossain M, Matsumoto T, Ali MA, Hossain S, Hossain S, Islam A, Nasiruddin M and Nishizono A (2012) Arctic-like rabies virus, Bangladesh. **Emerg. Infect. Dis.** 18: 2021-2024.

**2. Detection of animal-human reassortant of rotaviruses in human infections.** Rotavirus gastroenteritis was designated as the first emerging infectious disease. Although there is species specificity regarding the genotype distribution of rotavirus, however, in several instances strains can jump from animals to humans or can form human-animal reassortant virus. These strains are challenge for the current rotavirus vaccination strategy. We have documented several events of human-animal reassortants during our research in several Asian countries.

- a. Yahiro T, Takaki M, Chandrasena TGAN, Rajindrajith S, Iha H and **Ahmed K\*** (2018) Human-porcine reassortant rotavirus generated by multiple reassortant events in a Sri Lankan child with diarrhea. **Infect. Gen. Evol.** 65: 170-186.
- b. **Ahmed K\***, Anh DD and Nakagomi O (2007) Rotavirus G5P[6] in a child with diarrhea, Vietnam. **Emerg. Infect. Dis.** 13: 1232-1235.
- c. **Ahmed K.** Nakagomi T and Nakagomi O (2007) Molecular identification of a novel G1 VP7 gene carried by a human rotavirus with a super-short RNA pattern. **Virus Genes.** 35: 141-145.
- d. Uchida R, Pandey BD, Sherchand JB, **Ahmed K**, Yokoo M, Nakagomi T, Cuevas LE, Cunliffe NA, Hart CA and Nakagomi O (2006) Molecular epidemiology of rotavirus diarrhea among children and adults in Nepal: detection of G12 strains with P[6] or P[8] and a G11P[25] strain. **J. Clin. Microbiol.** 44: 3499-3505.

**3. Improved diagnostic kits for zoonotic infections.** Diagnosis of diseases is hampered by unavailability of user friendly, economical, rapid and robust diagnostic kits in the remote areas of Asia and Africa where the zoonotic diseases are more. Every year about 55,000 people die of rabies however it is known that many cases go undiagnosed because of the lack of diagnostic facilities in many areas. My group developed immunochromatography kit for diagnosis of rabies which is easy to use, robust and with high sensitivity and specificity. In many developing countries host response after vaccination cannot be evaluated due to the

unavailability of cell culture facilities. We also developed an immunochromatography based kit to detect the level of neutralizing antibody after rabies vaccination to determine whether the immune response is protective.

- a. Nishizono A, Yamada K, Khawplod P, Shiota S, Perera D, Matsumoto T, Wimalaratne O, Mitui MT, **Ahmed K** (2012) Evaluation of an improved rapid neutralizing antibody detection test (RAPINA) for qualitative and semiquantitative detection of rabies neutralizing antibody in humans and dogs. **Vaccine**. 30: 3891-3896.
- b. **Ahmed K\***, Wimalaratne O, Dahal N, Khawplod P, Nanayakkara S, Rinzin K, Perera D, Karunanayake D, Matsumoto T and Nishizono A (2012) Evaluation of a monoclonal antibody-based rapid immunochromatographic test for the direct detection of rabies virus in the brain of humans and animals. **Am. J. Trop. Med. Hyg.** 86: 736-740.
- c. Shiota S, Mannen K, Matsumoto T, Yamada K, Yasui T, Takayama K, Kobayashi Y, Khawplod P, Gotoh K, **Ahmed K**, Iha H and Nishizono A (2009) Development and evaluation of a rapid neutralizing antibody test for rabies. **J. Virol. Methods**. 161: 58-62.

**4. Detection of novel virus.** A large number of viruses in animals and humans have not yet been discovered. However, these viruses in animals have the potential to spill over to humans and cause infections. There are several infectious diseases in humans where the etiology is unknown. We discovered one novel virus in bat which has the potential to spill over to humans. We also identified novel viruses causing infections in humans.

- a. Matsumoto T, Sato M, Nishizono A and **Ahmed K\*** (2019) A novel bat-associated circovirus identified in northern Hokkaido, Japan. **Arch. Virol.** Doi:10.1007/s00705-019-04286-x.
- b. Phan TG, Mori D, Deng X, Rajindrajith S, Ranawaka U, Ng TFF, Bucardo-Rivera F, Orlandi P, **Ahmed K**, Delwart E (2015) Small circular single stranded DNA viral genomes in unexplained cases of human encephalitis, diarrhea, and in untreated sewerage. **Virol.** 482: 98-104.
- c. Yahiro T, Wangchuk S, Tshering K, Bandhari P, Zangmo S, Dorji T, Tshering K, Matsumoto T, Nishizono A, Soderlund-Venermo M and **Ahmed K\*** (2014) Novel human bufavirus genotype 3 in children with severe diarrhea, Bhutan. **Emerg. Infect. Dis.** 20: 1037-1039.
- d. Mori D, Ranawaka U, Yamada K, Rajindrajith S, Miya K, Perera HKK, Matsumoto T, Dassanayake M, Mitui MT, Mori H, Nishizono A, Söderlund-Venermo M, **Ahmed K\*** (2013) Human bocavirus in patients with encephalitis, Sri Lanka, 2009–2010. **Emerg. Infect. Dis.** 19: 1859-1862.

#### **D. Additional Information: Research Support and/or Scholastic Performance**

##### **Ongoing Research Support**

FRGS0457-2017	Ahmed (PI)	08/2017 – 08/2020
Fundamental Research Grant from Malaysian Ministry of Higher Education		
A study on the evolution of novel rotavirus with virulence traits and high transmissibility circulating among the children with diarrhea in Sabah.		
Role: PI		
TRGS009-2016	Zainal (PI)	12/2016 – 11/2019
Transdisciplinary Research Grant from Malaysian Ministry of Higher Education		
Whole genome sequence analyses to find out the relationship of <i>Mycobacterium tuberculosis</i> strains circulating in Sabah to understand the spread of tuberculosis.		
Role: Co-PI		
TRGS008-2016	Zainal (PI)	12/2016 – 11/2019
Transdisciplinary Research Grant from Malaysian Ministry of Higher Education		
Evaluating molecular diagnosis of <i>Mycobacterium tuberculosis</i> for formulating policy of tuberculosis diagnosis in Sabah.		
Role: Co-PI		

**BIOGRAPHICAL SKETCH**

NAME: Yeo, Tsin Wen

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Associate Professor, Infectious Diseases Physician

**EDUCATION/TRAINING:**

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
National University of Singapore	MBBS	05/1993	Bachelor of Medicine and Surgery
University of Hawaii Residency Program	ABIM Certificate	05/2001	Adult Internal Medicine
University of Utah	ABIM Certificate	05/2004	Infectious Diseases
Charles Darwin University	Ph.D.	11/2008	Malaria and Infectious Diseases

**A. Personal Statement:**

I am an infectious diseases clinician-scientist based in Singapore and my research is focused on diagnosis, epidemiology, pathogenesis and clinical management of tropical and emerging infectious diseases. My research has been conducted in the field in low and middle income countries in South East Asia including Indonesia, Myanmar, Malaysian Borneo and Bangladesh as well as in Tanzania, Africa. In Indonesia, Bangladesh and Tanzania, my research has been conducted on clinical management and vascular pathogenesis of malaria including drug-resistant parasites in district hospitals and outpatient clinics. These studies were done in collaboration with the Indonesian Ministry of Health, Oxford University and Duke University. In Myanmar, the research has been conducted with the National Tuberculosis Reference Laboratory on the molecular epidemiology, transmission, diagnosis, and clinical therapeutics of multi-drug resistant tuberculosis in Yangon. In Malaysian Borneo, I have collaborated with the Malaysian Ministry of Health and the London School of Hygiene and Tropical Medicine on a novel emerging zoonotic malaria, *Plasmodium knowlesi*, which is increasing in incidence and is now the most common cause of malaria in Malaysia due to changes in land use. These studies have included multi-disciplinary studies involving entomologists, social scientists, geospatial experts, parasitologists and economists. Results from several of these studies have been used in the development of World Health Organization guidelines for malaria. In Malaysian Borneo, I have also collaborated on multiple clinical studies on central nervous system infections (including encephalitis) in both adults and children, as well as studies to delineate the etiologies of acute undifferentiated febrile illness in adults.

In Singapore, I am currently a clinician scientist, practicing adult infectious disease physician and designated lead researcher for emerging viral and infectious disease at the National Centre for Infectious Diseases, the designated facility for management of outbreaks. I have been involved in the national response and research related to the Zika outbreak in Singapore in 2016 and well as the travel related case of Monkeypox in 2019. I currently also have ongoing research projects looking at the pathogenesis and clinical management of dengue in Singapore and Malaysia. I am also the deputy director of the research training office of the National Centre for Infectious Diseases, whose role is to co-ordinate pandemic research in Singapore.

## B. Positions and Honors

### Positions and Employment

- 1993 -98 Medical Officer, Ministry of Health, Singapore  
1998 -01 Internship and Residency in University of Hawaii Internal Medicine Residency Program  
2001 -04 Fellowship in Infectious Disease at the University of Utah Medical Center  
2004 -08 PhD student at Menzies School of Health Research/ Charles Darwin University from (Supervisor Professor Nicholas Anstey)  
2008 - Senior Research Fellow at Menzies School of Health Research, Australia  
2010 -14 Infectious Diseases Physician, Royal Darwin Hospital, Australia,  
2014 - Associate Professor, Lee Kong Chian School of Medicine, Singapore  
2014 - Infectious Disease Physician, National Centre for Infectious Diseases, Singapore

### Other Experience and Professional Membership

- Member, Infectious Diseases Society of America  
Member, American Society of Tropical Medicine and Hygiene  
Member, Singapore Infectious Society  
Member, Australian Society of Infectious Diseases  
Research Theme Leader, Emerging Viral and Infectious Disease Research, National Centre for Infectious Diseases, Singapore  
Deputy Director of Research Training Office, National Centre for Infectious Diseases, Singapore  
Member, Singapore Ministry of Health Infectious Disease Research Taskforce

### Awards and Honors

- 2001 Award for Best Resident, University of Hawaii Internal Medicine Residency Program  
2006 Young Investigator Travel Award from the American Society of Tropical Medicine and Hygiene  
2011 Northern Territory Research and Innovation Awards-Chief Ministers Award, Australia  
2016 Clinician Scientist Award, Ministry of Health, Singapore

## C. Contributions to Science

### **1. Research on the epidemiology, risk factors, clinical management of the emerging zoonotic malaria, *Plasmodium knowlesi*.**

In collaboration with Malaysian investigators, we have detailed the increasing incidence of human knowlesi malaria in Malaysian Borneo with currently over 3000 cases annually, despite the near elimination of the human malarias such as *P. falciparum* and *P. vivax*. Collaborating with investigators, I have also been detailing the rise of this parasite in other areas of South East Asia including Sumatra, Indonesia. In an inter-disciplinary study with other scientists, we have also detailed that change in land use and local ecology leading to a change in simian and vector behavior is a main driver of the increasing incidence. Clinical studies including randomized controlled trials have also led to rigorous data for evidence based clinical management of complicated and uncomplicated knowlesi malaria. The results from these studies have also been used in World Health Organization guidelines on the management of malaria.

- a. Barber BE, William T, Grigg MJ, Menon J, Auburn S, Marfurt J, Anstey NM, **Yeo TW** (2013). A prospective comparative study of knowlesi, falciparum and vivax malaria in Sabah, Malaysia: high proportion of severe disease from Plasmodium knowlesi and *P. vivax* but no mortality with early referral and artesunate therapy. **Clinical Infectious Diseases** 56: 383-97.
- b. William T, Menon J, Rajahram G, Chan L, Ma G, Donaldson S, Khoo S, Frederick C, Jelip J, Anstey NM, **Yeo TW** (2011). Severe Plasmodium knowlesi malaria in a tertiary care hospital, Sabah, Malaysia. **Emerging Infectious Diseases** 17; 1248-55.
- c. Grigg MJ, William T, Menon J, Dhanaraj P, Barber BE, Wilkes CS, von Seidlein L, Rajahram GS, Pasay C, McCarthy JS, Price RN, Anstey NM, **Yeo TW** (2016). Artesunate-mefloquine vs chloroquine for

treatment of uncomplicated Plasmodium knowlesi malaria in Malaysia (ACT-KNOW): an open-label randomized controlled trial. **Lancet Infectious Disease** 16:180-8.

## 2. Delineating the Role of the Host Vascular Endothelium on the Pathogenesis of Malaria and Dengue.

I have done clinical and translational research to further characterize the role of the host vascular endothelium on the pathogenesis of severe disease in falciparum, vivax and knowlesi malaria. This has led to several novel findings which have led to translational studies of adjunctive agents to attenuate vascular damage and dysfunction in critical infections such as malaria and dengue. These findings have recently also been shown by other investigators to be relevant in other viral hemorrhagic pathogens such as Ebola.

- a. **Yeo TW**, Lampah DA, Gitawati R, Tjitra E, Kenangalem E, McNeil Y, Darcy C, Lopansri B, Granger DL, Weinberg JB, Price RN, Duffull SB, Celermajer DS, Anstey NM (2007). Impaired nitric oxide bioavailability and L-arginine reversible endothelial dysfunction in adults with falciparum malaria. **Journal of Experimental Medicine** 204:2693-2704.
- b. **Yeo TW**, Weinberg JB, Lampah DA, Kenangalem E, Bush P, Chen Y, Price RN, Young S, Zhang HY, Millington D, Granger DL, Anstey NM (2019). Glycocalyx Breakdown is Associated with Severe Disease and Fatal Outcome in Plasmodium falciparum Malaria. **Clin Infect Dis**
- c. Tang TH, Alonso S, Ng LF, Thein TL, Pang VJ, Leo YS, Lye DC, **Yeo TW** (2017). Increased Serum Hyaluronic Acid and Heparan Sulfate in Dengue Fever: Association with Plasma Leakage and Disease Severity. **Scientific Reports** 10;7:46191.

## D. Additional Information: Research Support and/or Scholastic Performance

### Ongoing Research Support

National Medical Research Council, Singapore

2016-2020

Clinician-Scientist Award

The Role of the Endothelial Glycocalyx, Mast Cells and Vascular Nitric Oxide in the Pathogenesis of Dengue.

National Research Foundation

2018-2022

Singapore MIT Alliance for Research and Technology

Antimicrobial Resistance Interdisciplinary Research Group

This is a translational research program with 17 named investigators aimed at addressing the growing threat of resistance to antimicrobial drugs.

Ministry of Education, Singapore

Tier 1 Grant,

Co-Investigator on Tier 1 grant with Prof Peter Preiser and Assoc Prof Zbynek Bozdech from School of Biological Sciences, NTU. Molecular mechanisms driving the adaptation of Plasmodium knowlesi to humans

National Health Medical Research Council of Australia      Yeo (CI-B)

2016-2019

A multi-center double-blind RCT on community-acquired pneumonia in Indigenous children and a developing country: Improving clinical outcomes and identifying systemic biomarkers

NIH RO1AI116472-01

William (PI)

2015-2019

Incidence, Epidemiology and Clinical Features of *Plasmodium knowlesi* malaria in Sabah, East Malaysia  
Role: Co-I

### Completed Research Support (last 3 years only)

Ministry of Health, Singapore Infectious Diseases Initiative

Bridging Grant

The Viral Determinants of Acute Encephalitis in Children in Sabah, Malaysia



National Health Medical Research Council of Australia Targeting microvascular dysfunction in severe malaria	Yeo (CI-B)	2016-2018
NIH 5RO1AI041764-12 Arginine, Nitric Oxide and Severe Malaria Role: Clinical Investigator	Weinberg (PI)	2016-2018
NIH 1RO1HL130763-01 Nitric Oxide and Microvascular Dysfunction in Severe Malaria	Yeo (Co-PI)	2016-2018

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Hickey, Andrew Christopher

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: USPHS O-4, Research Science Officer

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Colorado State University; Fort Collins, C	B.S.	05/2001	Environmental Health and Political Science
Emory University; Atlanta, GA	M.P.H.	05/2003	Epidemiology
Uniformed Services University of the Health Sciences; Bethesda, MD	Ph.D.	05/2010	Emerging Infectious Diseases (Virology)
Boston University/National Emerging Infectious Diseases Laboratory; Boston, MA	Postdoctoral	04/2013	Emerging Infectious Diseases (Virology)

**A. Personal Statement**

The HIV/STD Research Program (HSRP) is a joint enterprise of the US CDC and Thailand Ministry of Public Health. HSRP investigates clinical and behavioral interventions to reduce HIV and STI transmission among men who have sex with men (MSM) and transgender women (TGW) at high risk of acquisition. HSRP's Laboratory section provides both clinical laboratory and microbiology capacity for clinical trials/investigations as well as original investigations focused on HIV/STI prevention. I started my current role in Bangkok, Thailand in May 2016, where I oversee laboratory operations, provide scientific oversight/guidance, mentor staff, support publication/presentation of results, and coordinate operations/analysis within HSRP and our collaborators. I have led HSRP laboratory activities for all network studies for the past three years, including MTN-026 and HPTN-083. Prior to joining HSRP, I developed and managed multi-site and international research studies leading to publication. I have more than 10 years of laboratory research experience in molecular techniques, microbiology, virology, and *in vivo* studies. Much of my research focused on the development and characterization of clinical interventions/medical countermeasures for emerging viral diseases, including *in vivo* efficacy testing. I provided scientific mentorship laboratory personnel and oversight for research and public health laboratory programs during the response to infectious disease, including the introduction of a novel diagnostic for clinical practice. I contributed (first or co-authorship) to published 17 research articles (additional publications in preparation) and more than 16 professional presentations. I have a strong interest in translational research of clinical interventions for infectious diseases, particularly viral diseases. I have the motivation, experience, and training to successfully execute the laboratory studies as well as contribute to the scientific development of the proposed project.

## **B. Positions and Honors**

### **Positions and Employment**

- 2006 -09 PhD Candidate, Henry M. Jackson Foundation for the Advancement of Military Medicine/Uniformed Services University of the Health Sciences, Bethesda, MD
- 2009 -13 Postdoctoral Fellow, Boston University School of Medicine/National Emerging Infectious Diseases Laboratory, Boston, MA
- 2013 -16 Biosurveillance Analyst, National Biosurveillance Integration Center, DHS, Washington, DC
- 2016 - Chief, HIV/STD Laboratory Research Section, HIV/STD Research Program, Thailand MOPH –US CDC Collaboration (TUC) Bangkok, Thailand; 2018-present: Lead Silom Community Clinic (non-network component) CRS

### **Other Experience and Professional Memberships**

- 2006 - American Association for the Advancement of Science (AAAS)
- 2006 - American Society for Microbiology (ASM)
- 2006 - American Society of Virology (ASV)
- 2013 -16 Viral Hemorrhagic Fevers Integrated Program Team, Public Health Emergency Medical Countermeasures Enterprise, Assistant Secretary for Preparedness and Response, HHS
- 2014, 15 International Society for Disease Surveillance Annual Conference
- 2014 -16 Emerging Infectious Diseases Workgroup, Public Health Emergency Medical Countermeasures Enterprise, Assistant Secretary for Preparedness and Response, HHS
- 2015 Novel Medical Countermeasures Development Targeting Filovirus Pathogenesis and Resistance Study Section, Defense Threat Reduction Agency
- 2015 -16 Smallpox Integrated Program Team, Public Health Emergency Medical Countermeasures Enterprise, Assistant Secretary for Preparedness and Response, HHS

### **Honors**

- 2003 Achievement Medal for achieving Immigration Health Service program objectives, USPHS
- 2005 Unit Commendation Medal for infectious disease surveillance and case referrals, USPHS
- 2014 Citation for improving NBIC biosurveillance reporting, USPHS
- 2014 Unit Commendation Medal for USPHS Ensemble, USPHS
- 2014 Commendation Medal for national and international subject matter analysis support, USPHS
- 2015 Commendation Medal for West Africa Ebola response, USPHS
- 2016 Humanitarian Assistance Award (Monrovia Medical Unit), Assoc. of Military Surgeons of the US
- 2017 National Center for Immunization and Respiratory Diseases, CDC, Certificate of Excellence
- 2017 Certificate of Appreciation - EGASP and Support to CDC Thailand, U.S. Department of State
- 2018 Certificate of Appreciation - HSRP laboratory and global leadership in HIV prevention research, U.S. Department of State, U.S. Embassy Bangkok
- 2018 Excellence in Laboratory Quality, U.S. Department of State, U.S. Embassy Bangkok
- 2019 Excellence in Laboratory Quality, Division of HIV/AIDS Prevention, U.S. Centers for Disease Control and Prevention
- 2019 Best laboratory performance, 2018 – HPTN-083, HIV Prevention Trials Network

## **C. Contributions to Science**

- 1. The development of non-human primate (NHP) models for emerging viral infections to study acute infection and evaluate experimental medical countermeasures.** This research path began with Hendra and Nipah viruses; as the NHP model was required to meet the criteria established under the FDA two-animal rule for medical countermeasures to highly-pathogenic viruses. I developed and performed the molecular studies to characterize Nipah virus pathogenesis in NHPs, the first NHP model for a Henipavirus, as well as molecular assays used to develop the NHP model of Hendra virus infection. I managed and

performed a long-term study of the humoral responses to flaviviruses. This was the first NHP study examining antibody persistence over an extended period as well as only report to directly compare the acute infection and humoral responses to all four Dengue virus serotypes. I directed and performed an *in vivo* efficacy study of a novel EV-71 virus-like particle vaccine developed by our collaborators. These projects contributed novel tools for characterizing acute infection, further characterized host responses to these infectious agents, and established reproducible models for important viral illnesses.

- a. Lim PY\*, **Hickey AC\*** (*\*authors contributed equally*), Jamiluddin MF, Hamid S, Kramer J, Santos R, Bossart KN, Cardoso MJ (2015). Immunogenicity and performance of an enterovirus 71 virus-like-particle vaccine in nonhuman primates. **Vaccine** 33(44):6017-24.
- b. **Hickey AC**, Koster JA, Thalmann CM, Hardcastle K, Tio PH, Cardoso MJ, Bossart KN (2013). Serotype-specific host responses in rhesus macaques after primary dengue challenge. **Am J Trop Med Hyg.** 89(6):1043-57.
- c. Geisbert TW, Daddario-DiCaprio KM, **Hickey AC**, Smith MA, Chan YP, Wang LF, Mattapallil JJ, Geisbert JB, Bossart KN, Broder CC (2010). Development of an acute and highly pathogenic nonhuman primate model of Nipah virus infection. **PLoS One** 5(5):e10690.
- d. Rockx B, Bossart KN, Feldmann F, Geisbert JB, **Hickey AC**, Brining D, Callison J, Safronetz D, Marzi A, Kercher L, Long D, Broder CC, Feldmann H, Geisbert TW (2010). A novel model of lethal Hendra virus infection in African green monkeys and the effectiveness of ribavirin treatment. **J Virol.** 84(19):9831-9.

**2. The development of an experimental sub-unit vaccine and antibody therapeutic for Hendra and Nipah viruses, two highly-lethal emerging viruses.** The sub-unit G vaccine and monoclonal antibody therapy are the the most well-characterized experimental countermeasure and furthest advanced in the development process. The sub-unit Henipavirus G vaccine has been deployed as a standard equine vaccine in Australia and the monoclonal antibody has now been administered, under FDA's compassionate use provision, to more than 11 individuals exposed to Hendra virus.

- a. Bossart KN, Rockx B, Feldmann F, Brining D, Scott D, LaCasse R, Geisbert JB, Feng YR, Chan YP, **Hickey AC**, Broder CC, Feldmann H, Geisbert TW (2012). A Hendra virus G glycoprotein subunit vaccine protects African green monkeys from Nipah virus challenge. **Sci Transl Med.** 4(146):146ra07.
- b. Bossart KN, Geisbert TW, Feldmann H, Zhu Z, Feldmann F, Geisbert JB, Yan L, Feng YR, Brining D, Scott D, Wang Y, Dimitrov AS, Callison J, Chan YP, **Hickey AC**, Dimitrov DS, Broder CC, Rockx B (2011). A neutralizing human monoclonal antibody protects african green monkeys from hendra virus challenge. **Sci Transl Med.** 3(105):105ra3.
- c. Bossart KN, Zhu Z, Middleton D, Klippel J, Cramer G, Bingham J, McEachern JA, Green D, Hancock TJ, Chan YP, **Hickey AC**, Dimitrov DS, Wang LF, Broder CC (2009). A neutralizing human monoclonal antibody protects against lethal disease in a new ferret model of acute nipah virus infection. **PLoS Pathog.** 5(10):e1000642.

**3. I developed the largest monoclonal antibody panel specific for Henipavirus Attachment (G) Glycoproteins and used the panel to identify protective epitopes as well as structural features associated with the viral fusion mechanism.** These monoclonal antibodies were developed using the same soluble Henipavirus G determinants included in experimental Henipavirus subunit vaccine(s) and were used to demonstrate a conserved antigenic structure between the soluble and native G glycoprotein. These studies identified protective epitopes not previously documented in the literature (publication in preparation) and the first to describe receptor-independent protective epitopes of Henipavirus G. I devised and performed molecular studies to show extensive structural changes in the G glycoprotein following receptor binding and found some of these changes present in unbound soluble G (additional publications in preparation). This discovery suggests soluble G assumes an intermediate receptor-bound structural configuration and could explain why crystal structures of paramyxovirus G glycoproteins have not exhibited

significant changes when co-crystallized with receptor. Refining the paramyxovirus fusion model can identify opportunities for developing clinical therapies to Henipaviruses and structures/functions common to other viruses that use a Type I viral fusion mechanism, such as HIV and Ebola virus.

- a. Borisevich V, Lee B, **Hickey AC**, DeBuysscher B, Broder CC, Feldmann H, Rockx B (2016). Escape From Monoclonal Antibody Neutralization Affects Henipavirus Fitness In Vitro and In Vivo. *J Infect Dis.* 213(3):448-55.
- b. **Hickey AC**, Broder CC (2009). The Mechanism of Henipavirus Fusion: Examining the Relationships between the Attachment and Fusion Glycoproteins. *Virologica Sinica* 24(2):110-20.
- c. Bishop KA, **Hickey AC**, Khetawat D, Patch JR, Bossart KN, Zhu Z, Wang LF, Dimitrov DS, Broder CC (2008). Residues in the stalk domain of the Hendra virus G glycoprotein modulate conformational changes associated with receptor binding. *J Virol.* 82(22):11398-409.
- d. Bishop KA, Stantchev TS, **Hickey AC**, Khetawat D, Bossart KN, Krasnoperov V, Gill P, Feng YR, Wang L, Eaton BT, Wang LF, Broder CC (2007). Identification of Hendra virus G glycoprotein residues that are critical for receptor binding. *J Virol.* 81(11):5893-901.

**4. I developed multi-site collaborative studies to identify emerging viruses and further define the epidemiology.** I worked with a team of epidemiologists and laboratorians to use molecular techniques, including next generation sequencing, to uncover the epidemiologic relationships of a cluster of Ebola infections near Monrovia, Liberia. These data were used to improve the public health intervention and control further spread of the virus. I developed a reliable and adaptable assay for identifying Henipavirus-specific antibody responses and deployed the assay for field studies, uncovering serologic evidence of sporadic exposure to Nipah/Nipah-like virus among bats in China and school children in rural Thailand (publication in preparation). Notably, this was the northern most detection of the virus and the first identification of Henipaviruses in insectivorous bats. I contributed to serology screening to determine the incidence and rate of re-infection with human Metapneumovirus, a common childhood respiratory infection. While developing a Dengue research project, I discovered abnormal properties of a sylvatic Dengue virus isolate isolated from a Malaysian individual with severe disease. Studies of this isolate in NHPs elicited illnesses among animals previously challenged with another Dengue virus serotype and NHP antibody responses suggested the isolate was antigenically divergent to the other Dengue serotypes (publication in preparation). The unique attributes of this Dengue virus isolate have been confirmed by additional groups. These studies have contributed a better understanding of the viral ecology and occurrence of important paramyxo-, flavi-, and filoviruses.

- a. Dokubo EK, Wendland A, Mate SE, Ladner JT, Hamblion EL, Raftery P, Blackley DJ, Laney AS, Mahmoud N, Wayne-Davies G, Hensley L, Stavale E, Fakoli L, Gregory C, Chen TH, Koryon A, Roth-Allen D, Mann J, **Hickey AC**, Saindon J, Badini M, Baller A, Clement P, Bolay F, Wapoe Y, Wiley MR, Logue J, Dighero-Kemp B, Higgs E, Gasasira A, Williams DE, Dahn B, Kateh F, Nyenswah T, Palacios G, Fallah MP (2018). Persistence of Ebola virus after the end of widespread transmission in Liberia: an outbreak report. *Lancet Infectious Diseases* 18(9):1015-1024.
- b. Li Y, Wang J, **Hickey AC**, Zhang Y, Li Y, Wu Y, Zhang H, Yuan J, Han Z, McEachern J, Broder CC, Wang LF, Shi Z (2008). Antibodies to Nipah or Nipah-like viruses in bats, China. *Emerg Infect Dis.* 14(12):1974-6.
- c. Pavlin JA, **Hickey AC**, Ulbrandt N, Chan YP, Endy TP, Boukhvalova MS, Chunsuttiwat S, Nisalak A, Libraty DH, Green S, Rothman AL, Ennis FA, Jarman R, Gibbons RV, Broder CC (2008). Human metapneumovirus reinfection among children in Thailand determined by ELISA using purified soluble fusion protein. *J Infect Dis.* 198(6):836-42.

URL to a list of published work:

<https://www.ncbi.nlm.nih.gov/pubmed/?term=%22Hickey+AC%22>

#### D. Additional Information: Research Support and/or Scholastic Performance

**Ongoing Research Support**

NIH RO1

Kelley (PI)

2019-2023

Project title: Understanding the rectal mucosal effects of cross-sex hormone therapy among U.S. and Thai transgender women

Role: Site Investigator / CDC Principle Investigator

NIH RO1

Beyrer (PI)

2015-2020

Project title: Effectiveness and Cost Effectiveness of a Combination HIV Preventive Intervention with and without daily oral Truvada® pre-exposure prophylaxis (PrEP) with adherence support among young men who have sex with men (YMSM) and transgender women (TGW) aged 18-26 in Bangkok and Pattaya, Thailand

Role: Site Investigator / CDC Principle Investigator

HPTN-083 network trial

2016-

Project title: A Phase 2b/3 Double Blind Safety and Efficacy Study of Injectable Cabotegravir Compared to Daily Oral Tenofovir Disoproxil Fumarate/Emtricitabine (TDF/FTC), for Pre-Exposure Prophylaxis in HIV-Uninfected Cisgender Men and Transgender Women who have Sex with Men

Role: Laboratory lead

**Completed Research Support (last 3 years only)**

MTN-026 network trial

2016-2018

Project title: A Randomized, Double Blind, Placebo-Controlled, Phase 1 Safety and Pharmacokinetic Study of Dapivirine Gel (0.05%) Administered Rectally to HIV-1 Seronegative Adults

Role: CRS Laboratory Lead

CDC - Advanced Molecular Diagnostics

2016-2017

Project title: *Development and evaluation of a rapid point-of-care NAT for accurate diagnosis of HIV-1 infection*

Role: Site PI

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Field, Hume Ernest

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Honorary Professor, School of Veterinary Science, University of Queensland, Australia.  
Principal Scientist and Director, Jeppesen Field Consulting, Australia.

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Queensland, Australia	BVSc	12/1976	Veterinary Science
Griffith University, Australia	MSc	02/1981	Environmental Science
Australian College of Veterinary Scientists	Member by examination	07/2004	Epidemiology
University of Queensland, Australia	Ph.D.	12/2005	Emerging Disease Ecology (Hendra virus)

**A. Personal Statement**

My strong research background with a suite of emerging zoonoses associated with wildlife will positively support the success of the proposed project. My hybrid professional skills enable me to take a cross-disciplinary approach to the surveillance of wildlife populations, the identification of the origins of novel agents, and the elaboration of infection dynamics in reservoir and spillover host populations. I am recognized as an authority on EIDs associated with bats, having worked with the US Centers for Disease Control, the World Health Organization, and the UN Food and Agriculture Organization to find the origins of Nipah virus in Malaysia, SARS in China, and Reston ebolavirus in the Philippines. More recently, as Principal Research Scientist at the Queensland Centre for Emerging Infections Diseases, I was co-PI on government and university-funded grants to elaborate Hendra virus infection and immune dynamics in the reservoir population, enabling more effective spillover risk management. The current proposal complements and substantially expands this approach in proposing to novel and powerful tools to understand how host immune dynamics and heterogeneity in immune response affect the timing, location, and severity of disease outbreaks in wildlife, and risk of spillover from wildlife to human populations. As a company Director, I also have strong management skills that translate to effective team, project, budget and report management. My affiliations with the University of Queensland and the University of Malaysia, Sabah support EID research capacity building. I have a strong publication record, with over 120 peer-reviewed papers and numerous book chapters.

1. Chua K, Bellini W, Rota P, Harcourt B, Tamin A, Lam S, Ksiazek T, Rollin P, Zaki S, Shieh W-J, Goldsmith C, Gubler D, Roehrig J, Eaton B, Gould A, Olson J, **Field HE**, Daniels P, Ling A, Peters C, Anderson L, Mahy B (2000). Nipah virus: A recently emergent deadly paramyxovirus. **Science** 288:1432-1435.
2. Li W, Shi Z, Yu M, Ren W, Smith C, Epstein JH, Wang H, Crameri G, Hu Z, Zhang H, Zhang J, McEachern J, **Field HE**, Daszak P, Eaton BT, Zhang S & Wang L-F (2005). Bats are natural reservoirs of SARS-like coronaviruses. **Science** 310: 676-679.

3. **Field HE**, MacKenzie J, Daszak P (2007). Henipaviruses: emerging paramyxoviruses associated with fruit bats. *Wildlife and Zoonotic Diseases: The Biology, Circumstances, and Consequences of Cross-Species Transmission*. Eds. MacKenzie, J.S. et al. **Curr. Topics Microbiol. Immunol.** 315: 133-159.
4. Jayme SI, **Field HE**, de Jong C, Olival KJ, Marsh G et al. (2015). Molecular evidence of Ebola Reston virus infection in Philippine bats. **Viol. J.** 12:107.

## **B. Positions and Honors**

### **Positions and Employment**

- 2000 -09 Principal Epidemiologist (Emerging Infectious Diseases), Queensland Department of Agriculture. Brisbane, Australia
- 2009 -10 Visiting Professor for Zoonoses, University of Malaysia, Sarawak
- 2010 -14 Principal Research Scientist, Queensland Centre for Emerging Infections Diseases. Brisbane, Australia
- 2014 - Director and Principal Scientist, Jeppesen Field Consulting. Brisbane, Australia
- 2016 - Honorary Professor, University of Queensland. Brisbane Australia

### **Other Experience and Professional Memberships**

- 2003 WHO Adviser on SARS (China)
- 2003 FAO Consultant on SARS (China)
- 2010 OIE/FAO/WHO Emerging Diseases at the human-animal interface (Italy)
- 2010 FAO Ebola Reston Origin Project (Philippines)
- 2010 OIE Rabies Code Working Group (Italy)
- 2013 Expert Working Group on Emerging Rabies (Taiwan)
- 2015 -18 Deputy Chair, Board of Wildlife Health Australia (Australia)
- 2015 - Research Advisor, Development and Health Research Unit, University of Sabah (Malaysia)
- 2016 -18 Board Member, International Association of Ecosystem Health
- 2016 -18 Expert Working Group, Hendra virus Risk Management (Australia)

## **C. Contributions to Science**

1. **Hendra virus research.** My role in identifying species of bats (Chiroptera) as the natural reservoir of Hendra virus was a pivotal breakthrough in the subsequent realization of the unique role of this taxa as reservoirs for highly lethal zoonoses. The early work provided a model for the investigation of the origins of wildlife associated EIDS and facilitated effective surveillance strategies; the later work elaborated spatiotemporal patterns and informed more targeted risk mitigation strategies.
  - a. Halpin K, Young P, **Field HE**, Mackenzie J. (2000). Isolation of Hendra virus from pteropid bats: a natural reservoir of Hendra virus. **J. Gen. Virol.** 81(8): 1927-32.
  - b. **Field HE**, de Jong C, Melville D, Smith C, Smith I, Broos A, Kung YH, McLaughlin A, Zeddeman A (2011). Hendra virus infection dynamics in Australian fruit bats. **PLoS One** 6: e28678.
  - c. Edson D, **Field HE**, McMichael L, Vidgen M, Goldspink L et al. (2015). Routes of Hendra Virus Excretion in Naturally-Infected Flying-Foxes: Implications for Viral Transmission and Spillover Risk. **PLoS One** 15:e0140670.
  - d. **Field HE**, Jordan D, Edson D, Morris S, Melville D, Parry-Jones K, Broos A, Divljan A, McMichael L, Davis R, Kung N, Kirkland P, Smith C. (2015). Spatiotemporal Aspects of Hendra Virus Infection in Pteropid Bats (Flying-Foxes) in Eastern Australia. **PLoS One** 10: e0144055.
2. **Origins and drivers of Nipah virus.** Beyond identifying the origins of the virus, the Nipah virus research focused on elaborating the ecology of infection in the natural host and drivers for emergence. Our



collaborative and cross-disciplinary approach to the research across human health, livestock health and environmental components has been widely adopted. The work provided a basis for subsequent focus on immunology, phylogenetics, ecological modelling and diagnostic test development.

- a. Yob JM, **Field HE**, Rashdj AM, Morrissy C, van der Heide B, Rota P, bin Adzhar A, White J, Daniels P, Jamaluddin A, Ksiazek TJohara MY (2001). Nipah Virus Infection in Bats (Order Chiroptera) in Peninsular Malaysia. **Emerg. Infect. Dis.** 7(3):439-41.
- b. Sohayati AR, Hassan L, Sharifah SH, Lazarus K, Zaini CM, Epstein JH, Shamsyul NN, **Field HE**, Arshad SS, Abdul Aziz J, Daszak P, Henipavirus Ecology Research Group (2011). Evidence for Nipah virus recrudescence and serological patterns of captive *Pteropus vampyrus*. **Epidemiol. Infect.** 139(10):1570-9.
- c. Pulliam JRC, Epstein JH, Dushoff J, Rahman SA, Bunning M, HERG, Jamaluddin AA, Hyatt AD, **Field HE**, Dobson AP & Daszak P and the Henipavirus Ecology Research Group (HERG). (2012). Agricultural intensification, priming for persistence, and the emergence of Nipah virus: a lethal bat-borne zoonosis. **J. Roy. Soc. Interface** 9:89-101

**3. Origins and drivers of SARS emergence.** The early epidemiological investigation of SARS cases undertaken by our WHO team showed that the earliest human cases were associated with wet markets, and lead to the identification of civets and other traded species as the source of human infection. However, these species were not the natural reservoirs and as part of an international team, I played a key role in focusing research on bats in which we subsequently found ancestral SARS-like coronaviruses. This finding precipitated global surveillance of bats and lead to the discovery of a suite of coronaviruses in the taxa, and promoted broader pathogen discovery focus on bats.

- a. Xu RH, He JF, Evans MR, Peng GW, **Field HE**, Yu DW, Lee CK, Luo HM, Lin WS, Lin P, Li LH, Liang WJ, Lin JY, Schnur A (2004). Epidemiologic clues to SARS origin in China. **Emerg. Infect. Dis.** 10:1030-1037.
- b. Wang L-F, Shi Z, Zhang S, **Field HE**, Daszak P, Eaton BT (2006). A review of bats and SARS: virus origin and genetic diversity. **Emerg. Infect. Dis.** 12: 1834-1840.
- c. Cui J, Han N, Streicker D, Li G, Tang X, Shi Z, Hu Z, Zhao G, Fontane, A, Yi G, Wang L, Jones G, **Field HE**, Daszak P, Zhang S (2007). Evolutionary relationships between bat coronaviruses and their hosts. **Emerg. Infect. Dis.** 13: 1526-1532.
- d. Wood JLN, Leach M, Waldman L, MacGregor H, Fooks AR, Jones KE, Restif O, Dechmann D, Hayman DTS, Baker KS, Peel AJ, Kamins AO, Fahr J, Ntiamoa-Baidu Y, Suu-Ire R, Breiman RF, Epstein JH, **Field HE**, Cunningham AA (2012). A framework for the study of zoonotic disease emergence and its drivers: spillover of bat pathogens as a case study. **Phil. Trans. Roy. Soc. B.** 367:2881-2892.

**D. Additional Information: Research Support and/or Scholastic Performance**

Not applicable

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Zambrana-Torrelío, Carlos

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Associate Vice President for Conservation and Health

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Universidad Mayor de San Andres - Bolivia	Licenciado	11/2002	Biology
Universidad de Puerto Rico - Rio Piedras	M.S.	12/2010	Ecology and Evolution
Sapienza - Università di Roma	Ph.D.	09/2017	Environmental and Evolutionary Biology

**A. Personal Statement**

I have over 15 years' experience linking biodiversity conservation, land use planning, environmental change and disease emergence via multi-institutional collaborative consortia, as well as over 10 years of experience managing projects internationally. I made significant contributions to the development of the research on ecosystem health, especially as it relates to biodiversity loss, land use change, disease emergence and their economic implications. I have published peer-reviewed papers in Nature, Nature Comm., Lancet, PNAS, mBio and others. I have advised the Convention on Biological Diversity (CBD), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services Intergovernmental Panel of Biodiversity and Ecosystem Services (IPBES), the United Nations – System of Environmental-Economic Accounting (UN-SEEA) and I chair the International Union of Conservation Nature (IUCN) Task Force on Human Health and Ecosystems Management. Over the past ten years, I supervised students and technical teams in Argentina, Bolivia, Malaysia, Mexico, Venezuela and the USA. I am is a key member of the Modeling and Analytics Team of the PREDICT Consortium, under the cooperative agreement for USAID's Emerging Pandemic Threats Program. I have designed and implemented the Deep Forest Project that evaluates how increasing land-use development affects biodiversity which in turn changes viral dynamics that could lead to disease emergence. This project has been implemented in Brazil, Malaysia and Uganda. Similarly, Dr. Zambrana-Torrelío is Key Personnel of the USAID Infectious Disease Emergence and Economics of Altered Landscapes (IDEEAL) team that examines how land-use change and economics of disease emergence can be used by local and regional decision makers.

**B. Positions and Honors****Positions and Employment**

1999 -02 Research Associate, Centro de Analisis Espacial – Bolivia  
 2002 -03 Researcher, Wildlife Conservation Society  
 2003 - Research Associate, Bolivian Bat Conservation Program  
 2006 Consultant, NatureServe  
 2008 - Research Associate, Institute of Molecular Biology and Biotechnology, Bolivia  
 2010 -13 Research Scientist, EcoHealth Alliance  
 2014 -17 Senior Research Scientist, EcoHealth Alliance  
 2017 - Associate VP for Conservation & Health, EcoHealth Alliance

## **Other Experience and Professional Membership**

2019 - Chair IUCN Task Force Human Health and Ecosystem Management (2019 - 2022)

## **Honors**

2006 Alwyn H. Gentry Fellowship – Missouri Botanical Garden

2007 WWF Russell E. Train Education for Nature Program Fellowship

2009 Dissertation fellowship. Decanato de Estudios Graduados e Investigacion University of Puerto Rico

## **C. Contributions to Science**

1. **Applications of ecological niche modeling in disease systems.** Ecological niche modeling (ENM) is widely employed in ecology to predict species' potential geographic distributions in relation to their environmental constraints. This method is increasingly employed to prioritize geographic areas for disease surveillance and control under the assumption that the distribution of hosts is directly related to the distribution of pathogens. I applied ENMs to predict the potential impact of future climate change on the distribution of Henipaviruses. We showed that Henipaviruses' hosts could potentially expand to new geographic areas in Africa and Southeast Asia. I further explored the main assumption of ENMs in disease ecology: host distribution corresponds to pathogen distribution. Hosts may occur where parasites are absent, and even when infection occurs, disease may be absent. I developed an ecological framework to model the geography of disease transmission under the an ENM approach. This theoretical framework: (i) addresses the selection of an appropriate modeling approach and highlights the importance of including biologically sound predictor variables; (ii) proposes the concept of a microscale parasitic niche defined by host traits to identify relevant parasite–host associations; and (iii) integrates traditional parasite ENM with the proposed microscale niche to better understand geographic distributions and improve fine-scale predictions of disease transmission risk.
  - a. Daszak P, **Zambrana-Torrelío C**, Bogich TL, Fernández M, Epstein JH, Murray KA, Hamilton H (2013). Interdisciplinary approaches to understanding disease emergence: the past, present, and future drivers of Nipah virus emergence. **PNAS** 110:3681–3688.
  - b. Johnson EE, Escobar LE, **Zambrana-Torrelío C\*** (2019). An Ecological Framework for Modeling the Geography of Disease Transmission. **Trends in Ecology & Evolution** 34:655-668.
2. **Linking biodiversity, human health and ecosystems.** Human health is intimately interconnected with biodiversity and the health of our ecosystems. There are different ways in which biodiversity can provide health and wellbeing to humans, including psychological (e.g. mental health), physiological (e.g. food provision), and traditional and modern medicines. Another important benefit from biodiversity to human health is the capacity to regulate the transmission and prevalence of some infectious diseases. Over the past 5 years I have worked with environmental economists, disease ecologists and biodiversity researchers and developed an optimal land use planning framework that assess the costs and benefits of developing land. This framework allows to determine the optimal land conversion rate when considering the losses of ecosystem services and also the economic damages of disease emergence. I have tested this framework in Sabah, Malaysia and our results showed that the Malaysian government could potentially lose \$US 748 million due to excessive land conversion over the next 30 years by not considering the economic damages of malaria.
  - a. **Zambrana-Torrelío C**, Lee KD, Hughes T, Murray KA, Loh E, Epstein JH, Schar D, Daszak P (2015). Land use change and economic cost of emerging infectious diseases, Montpellier: International Congress for Conservation Biology.

- b. Machalaba C, Smith KM, Awada L, Berry K, Berthe F, Bouley TA, Bruce M, Cortiñas Abrahantes J, El Turabi A, Feferholtz Y, Flynn L, Fournié G, Andre A, Grace D, Jonas O, Kimani T, Le Gall F, Miranda JJ, Peyre M, Pinto J, Ross N, Rüegg SR, Salerno RH, Seifman R, **Zambrana-Torrelío C**, Karesh WB (2017). One Health Economics to confront disease threats. **Trans R Soc Trop Med Hyg.** 111:235–237.

**3. Impacts of land use change on the ecology of emerging infectious diseases.** The majority of emerging infectious diseases since 1940 were caused by zoonotic pathogens. Over the past 5 years I developed and implemented a systematic sampling methodology to address the ecological factors that drive zoonotic disease emergence due to land-use change. Land-use change has been attributed to around 1/5 of all novel disease emergence events and around half of all zoonotic diseases. Land-use changes could modify the risk of cross-species transmission (“spillover”) by perturbing the dynamics of pathogens in wildlife hosts and/or by bringing novel host-pathogen pairs (including humans) into unprecedented contact. This project was implemented across a range of biogeographical regions including the Neotropical region (Brazil), Afrotropical (Uganda) and the Oriental region (Malaysian Borneo). Sampling was focused on two high-risk groups: bats and rodents.

- a. Anthony SJ, Islam A, Johnson C, Navarrete-Macias I, Liang E, Jain K, Hitchens PL, Che X, Soloyvov A, Hicks AL, Ojeda-Flores R, **Zambrana-Torrelío C**, Ulrich W, Rostal MK, Petrosov A, Garcia J, Haider N, Wolfe N, Goldstein T, Morse SS, Rahman M, Epstein JH, Mazet JK, Daszak P Lipkin WI (2015). Nonrandom patterns in viral diversity. **Nature Comm** 6:8147.
- b. Anthony SJ, Epstein JH, Murray KA, Navarrete-Macias I, **Zambrana-Torrelío C**, Soloyvov A, Ojeda-Flores R, Arrigo NC, Islam A, Ali Khan S, Hosseini P, Bogich TL, Olival KJ, Sanchez-Leon MD, Karesh W, Goldstein T, Luby SP, Morse SS, Mazet JAK, Daszak P, Lipkin WI (2013). A strategy to estimate unknown viral diversity in mammals. **MBio** 4(5): e00598-13.
- c. Hosseini PR, Murray KA, Loh E, **Zambrana-Torrelío C**, Gilardi KVK, Goldstein T, Johnson CK, Mazet JAK, Daszak P (2013). Land-use change and pathogen emergence: Differential implication of factors driving emergence across land-use gradients. Ecological Society of America 98<sup>th</sup> Annual meeting.
- d. Murray KA, Preston N, Allen T, **Zambrana-Torrelío C**, Hosseini PR, Daszak P (2015). Global biogeography of human infectious diseases. **PNAS** 12:12746-12751.

**D. Additional Information: Research Support and/or Scholastic Performance**

**Ongoing Research Support**

USAID Emerging Pandemic Threats	Mazet (PI)	10/01/14 – 09/30/19
PREDICT-2		

The goal is to conduct surveillance for novel pathogens in wildlife, livestock and people; characterize human risk behavior; analyze EID risk; and design interventions in >20 countries

Role: Senior Personal

**Completed Research Support**

USAID 1414374 (RDMA, Thailand)	Daszak (CoP)	10/01/13 - 03/30/19
Infectious Disease Emergence and Economics of Altered Landscapes (IDEEAL)		

Cooperative agreement to analyze how land use change affects economics of disease risk in SE Asia.

Role: Senior Personal

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Hemachudha, Pasin

eRA COMMONS USER NAME (credential, e.g., agency login): (b) (6)

POSITION TITLE: Physician

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
King's College London, United Kingdom	BSc	06/2012	Biomedical Science
Barts and The London, London, United Kingdom	MD	06/2017	Medicine
Royal Free Hospital, London, United Kingdom	Residency	08/2018	Internship

**A. Personal Statement**

I am an early career medical doctor and Thai national, who graduated from medicine and biomedical sciences in 2017 with ongoing interests in neurology, infectious disease and immunology. I recently joined Thai Red Cross Emerging Infectious Diseases in 2018 as a research physician and have become involved with emerging infectious disease. Since joining I have been involved in Zika technical workshop and clinical section editor for Zika operational guideline in Southeast Asian countries, leading to my first lead-authored paper below. I have participated in multi-sectoral collaboration at the animal human ecosystem interface in Thailand, and the infectious disease emergence and economic of altered landscapes and environmental economics workshop led by EcoHealth Alliance. I have been working with the USAID-PREDICT project for the last 6 months to lead analysis of clinical data and linking this to observed virus detections.

I am also a full-time clinician now based at the Queen Savang Vadhana Memorial Hospital in Chonburi, Thailand. If we are funded to develop our EID-SEARCH research program, I am excited to include our hospital as one of our clinical sites under Specific Aim 3 of the research proposal.

**B. Positions and Honors****Positions and Employment**

2017 - 18 Foundation year doctor, The Royal Free Hospital London, UK  
2018 - Thai Red Cross Emerging Infectious Disease Health Sciences, Thailand  
2019 - Queen Savang Vadhana Memorial Hospital, The Thai Red Cross Society, Thailand

**C. Contributions to Science****1. Publications**

- a. Hemachudha P, Wacharapluesadee S, Buathong R, Petcharat S, Bunprakob S, Ruchiseesarod C, Roeksomtawin P, Hemchudha T. (2019). Lack of Transmission of Zika Virus Infection to Breastfed Infant. *Clinical Medical Insights – Case Reports*, 12:UNSP 1179547619835179.

**2. Reviewer for Biomedical Journal Case Report.**

**BIOGRAPHICAL SKETCH**

NAME: Lin, Ingrid Ting Pao

eRA COMMONS USER NAME:

POSITION TITLE: Clinical Specialist

**EDUCATION/TRAINING**

INSTITUTION AND LOCATION	DEGREE	COMPLETION DATE	FIELD OF STUDY
Kursk State Medical University	B.S.	2002	Pre-Medical
Kursk State Medical University	MD	2009	Medicine
Universiti Sains Malaysia	MMED	2018	Internal Medicine

**A. Personal Statement**

Positions and H I have 8 years of working experience as a medical officer and clinician in Sarawak Hospitals. I am currently the lead Clinical Specialist in the Department of Medicine at Hospital Miri in Sarawak, Malaysia. I was involved in the recruitment of patients for the USAID PREDICT Human Syndromic Surveillance in 2018.

**B. Positions and Honors****Positions and Employment**

2011 -12 Medical Officer, Hospital Daerah Bau, Kuching, Sarawak  
 2012- 14 Medical Officer, Internal Medicine, Hospital Raja Perempuan Zainab II, Kota Bharu  
 2014 -18 Medical Officer, Internal Medicine, Hospital Universiti Sains Malaysia, Kubang Kerian  
 2018 - Clinical Specialist, Department of Medicine, Hospital Miri, Sarawak

**Other Experience and Professional Memberships**

2016 Certification, Good Clinical Practice Certification  
 2016 Certification, Bioethics and Communication Skills  
 2016 Certification, Basic Statistics and Research Methodology  
 2017 Certification, Intermediate Statistics and Research Methodology  
 2019 Reviewer, British Medical Journal Case Reports

**Honors**

2013 Anugerah Perkhidmatan Cemerlang 2013 from Jabatan Kesihatan Negeri Kelantan  
 2016 3<sup>rd</sup> Place, 3<sup>rd</sup> Malaysian Parkinson's and Movement Disorder Teaching course  
 2019 2<sup>nd</sup> Place in 4<sup>th</sup> Northern Zone Sarawak Research Day 2019 Poster Presentation

**C. Contribution to Science**

1. I have presented at many different major conferences and conventions on various communicable and non-communicable diseases across Malaysia.
  - a. "Risk Factors of In-Hospital Mortality of Tuberculosis Patients in Hospital Raja Perempuan Zainab II". (*Oral Poster Presentation*), National TB and Lung Diseases Conference, 2014."
  - b. "Acute abdomen, a rare occurrence in MELAS syndrome" (*Oral Poster Presentation*), MyNeuro2017 Conference
  - c. "Predictive Factors of First-year Mortality in Newly Diagnosed ESRD patients commencing on Hemodialysis in Kelantan". (*Oral Poster Presentation*) 34<sup>th</sup> Annual Congress of Malaysian Society of Nephrology 2018.
  - d. "A First Reported Case of Successful Chronic Lead Extraction with Lead Extractor-Evolution". (*Oral Poster Presentation*), 11<sup>th</sup> Asia Pacific Cardiology Update 2018

2. **I am a published author and have contributed to the general medical field through the findings of my research papers.**
- a. **Ting IP**, Halim SA, Adnan A, Jaafar H. (2017). Status epilepticus as the initial presentation of antibody-negative Goodpasture's syndrome. **British Medical Journal**
  - b. **Ting IP**, Adnan A, Imran K, Alfatah AW (2018). Predictive Factors of First-Year Mortality in Newly Diagnosed End-Stage Renal Disease Patients Commencing on Hemodialysis in Kelantan, Malaysia. **J Nephrol Forecast**; 1(1).;1004.
3. **I have been an invited speaker at several different hospitals in Malaysia on various medical topics.**
- a. Management of Hypertension, Bilik Mesyuarat Lama, Hospital Bau, 2011
  - b. Recognizing Revere Dengue, Hospital Miri weekly CME, 2019
  - c. Heart Disease in Pregonancy and Postpartum, Bilik Mesyuarat Klinik Kesihatan Tudan, 2019
  - d. Thyroid Disorder in Pregnancy, Bilik Mesyuarat Klinik Kesihatan Tudan, 2019

**D. Additional Information: Research Support and/or Scholastic Performance**

**Ongoing Research Support**

<p>(b) (4)</p>	<p>Lin (PI)</p>	<p>2019-2020</p>
<p>Impact of on-site herpes simplex virus molecular diagnostics on the laboratory diagnosis and case management of suspected viral encephalitis in Central Sarawak using den Bruel's framework of diagnostic test evaluation</p>		

**Completed Research Support**

	<p>Lin (PI)</p>	<p>2016-2018</p>
<p>Predictive Factors of First-Year Mortality in Newly Diagnosed End-Stage Renal Disease Patients Commencing on Hemodialysis in Kelantan, Malaysia as Principal investigator</p>		

RESEARCH & RELATED BUDGET - SECTION A & B, Budget Period 1

ORGANIZATIONAL DUNS\*: 0770900660000

Budget Type\*:  Project  Subaward/Consortium

Enter name of Organization: EcoHealth Alliance

Start Date\*: 03-01-2020

End Date\*: 02-28-2021

Budget Period: 1

A. Senior/Key Person													
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*	
1 .	Dr.	Peter	Daszak	Ph.D	PD/PI							(b) (4), (b) (6)	
2 .	Dr.	Kevin	Olival	Ph.D	Co-Investigator								
3 .	Dr.	Carlos	Zambrana-Torrello		Co-Investigator								
4 .	Dr.	Alice	Latinne		Bioinformatician								
5 .	Dr.	Kendra	Phelps		Field Scientist								
6 .	Dr.	Patrick	Dawson		Epidemiologist								
7 .	Ms.	Hongying	Li		Epidemiologist								
8 .	Dr.	Aleksei	Chmura		Senior Program Manager								
<b>Total Funds Requested for all Senior Key Persons in the attached file</b>													
<b>Additional Senior Key Persons:</b>											File Name:		
											<b>Total Senior/Key Person</b>	<b>256,075.51</b>	

B. Other Personnel										
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*			
	Post Doctoral Associates									
	Graduate Students									
	Undergraduate Students									
	Secretarial/Clerical									
1	Data Scientist							(b) (4), (b) (6)		
1	Epidemiologist									
1	Program Manager									
<b>3</b>	<b>Total Number Other Personnel</b>							<b>Total Other Personnel</b>	<b>113,489.98</b>	
							<b>Total Salary, Wages and Fringe Benefits (A+B)</b>	<b>369,565.49</b>		

RESEARCH & RELATED Budget (A-B) (Funds Requested)



## RESEARCH & RELATED BUDGET - SECTION C, D, & E, Budget Period 1

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**     Project     Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2020

**End Date\*:** 02-28-2021

**Budget Period:** 1

<b>C. Equipment Description</b>		<b>Funds Requested (\$)*</b>
List items and dollar amount for each item exceeding \$5,000		
<b>Equipment Item</b>		
<b>Total funds requested for all equipment listed in the attached file</b>		
<b>Total Equipment</b>		<b>0.00</b>
<b>Additional Equipment:</b> File Name:		

<b>D. Travel</b>	<b>Funds Requested (\$)*</b>
1. Domestic Travel Costs ( Incl. Canada, Mexico, and U.S. Possessions)	15,592.00
2. Foreign Travel Costs	56,633.00
<b>Total Travel Cost</b>	<b>72,225.00</b>

<b>E. Participant/Trainee Support Costs</b>	<b>Funds Requested (\$)*</b>
1. Tuition/Fees/Health Insurance	
2. Stipends	
3. Travel	
4. Subsistence	
5. Other:	
<b>Number of Participants/Trainees</b>	
<b>Total Participant Trainee Support Costs</b>	<b>0.00</b>

RESEARCH & RELATED Budget (C-E) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTIONS F-K, Budget Period 1

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**  Project  Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2020

**End Date\*:** 02-28-2021

**Budget Period:** 1

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	7,917.50
2. Publication Costs	
3. Consultant Services	15,000.00
4. ADP/Computer Services	
5. Subawards/Consortium/Contractual Costs	708,280.27
6. Equipment or Facility Rental/User Fees	
7. Alterations and Renovations	
8. Shipping	27,000.00
<b>Total Other Direct Costs</b>	<b>758,197.77</b>

G. Direct Costs	Funds Requested (\$)*
<b>Total Direct Costs (A thru F)</b>	<b>1,199,988.26</b>

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. Facilities and administrative costs	32.0	616,708.01	197,346.56
2. Foreign Subcontractual & Consortium IDC	8.0	708,280.27	40,662.42
3. Henry Jackson IDC	52.0	74,999.99	39,372.03
4. University of North Carolina IDC	55.5	125,000.00	69,375.00
<b>Total Indirect Costs</b>			<b>346,756.01</b>
<b>Cognizant Federal Agency</b>		EcoHealth Alliance: DOD Dept. of Navy, Shea Kersey,	
(Agency Name, POC Name, and POC Phone Number)		+1.703.696.2055	

I. Total Direct and Indirect Costs	Funds Requested (\$)*
<b>Total Direct and Indirect Institutional Costs (G + H)</b>	<b>1,546,744.27</b>

J. Fee	Funds Requested (\$)*

K. Total Costs and Fee	Funds Requested (\$)*
	<b>1,546,744.27</b>

L. Budget Justification*
File Name: EHA_EIDRC_2019_budget_Justification_FINAL.pdf (Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION A & B, Budget Period 2

ORGANIZATIONAL DUNS\*: 0770900660000

Budget Type\*:  Project  Subaward/Consortium

Enter name of Organization: EcoHealth Alliance

Start Date\*: 03-01-2021

End Date\*: 02-28-2022

Budget Period: 2

A. Senior/Key Person												
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1 .	Dr.	Peter	Daszak	Ph.D	PD/PI							(b) (4), (b) (6)
2 .	Dr.	Kevin	Olival	Ph.D	Co-Investigator							
3 .	Dr.	Carlos	Zambrana-Torrello		Co-Investigator							
4 .	Dr.	Alice	Latinne		Bioinformatician							
5 .	Dr.	Kendra	Phelps		Field Scientist							
6 .	Dr.	Patrick	Dawson		Epidemiologist							
7 .	Ms.	Hongying	Li		Epidemiologist							
8 .	Dr.	Aleksei	Chmura		Senior Program Manager							
<b>Total Funds Requested for all Senior Key Persons in the attached file</b>												
<b>Additional Senior Key Persons:</b>											File Name:	
											<b>Total Senior/Key Person</b>	<b>256,075.51</b>

B. Other Personnel										
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*			
	Post Doctoral Associates									
	Graduate Students									
	Undergraduate Students									
	Secretarial/Clerical									
1	Data Scientist						(b) (4), (b) (6)			
1	Epidemiologist									
1	Program Manager									
<b>3</b>	<b>Total Number Other Personnel</b>					<b>Total Other Personnel</b>	<b>113,489.98</b>			
						<b>Total Salary, Wages and Fringe Benefits (A+B)</b>	<b>369,565.49</b>			

RESEARCH & RELATED Budget (A-B) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTION C, D, & E, Budget Period 2

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**     Project     Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2021

**End Date\*:** 02-28-2022

**Budget Period:** 2

<b>C. Equipment Description</b>		<b>Funds Requested (\$)*</b>
List items and dollar amount for each item exceeding \$5,000		
<b>Equipment Item</b>		
<b>Total funds requested for all equipment listed in the attached file</b>		
<b>Total Equipment</b>		<b>0.00</b>
<b>Additional Equipment:</b> File Name:		

<b>D. Travel</b>	<b>Funds Requested (\$)*</b>
1. Domestic Travel Costs ( Incl. Canada, Mexico, and U.S. Possessions)	15,592.00
2. Foreign Travel Costs	56,633.00
<b>Total Travel Cost</b>	<b>72,225.00</b>

<b>E. Participant/Trainee Support Costs</b>	<b>Funds Requested (\$)*</b>
1. Tuition/Fees/Health Insurance	
2. Stipends	
3. Travel	
4. Subsistence	
5. Other:	
<b>Number of Participants/Trainees</b>	
<b>Total Participant Trainee Support Costs</b>	<b>0.00</b>

RESEARCH & RELATED Budget (C-E) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTIONS F-K, Budget Period 2

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**     Project     Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2021

**End Date\*:** 02-28-2022

**Budget Period:** 2

F. Other Direct Costs	Funds Requested (\$)*
1. Materials and Supplies	7,917.50
2. Publication Costs	
3. Consultant Services	15,000.00
4. ADP/Computer Services	
5. Subawards/Consortium/Contractual Costs	708,280.27
6. Equipment or Facility Rental/User Fees	
7. Alterations and Renovations	
8. Shipping	27,000.00
<b>Total Other Direct Costs</b>	<b>758,197.77</b>

G. Direct Costs	Funds Requested (\$)*
<b>Total Direct Costs (A thru F)</b>	<b>1,199,988.26</b>

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. EcoHealth Alliance IDC	32.0	491,708.01	157,346.56
2. Foreign Subcontractual & Consortium IDC	8.0	708,280.27	40,662.42
3. Henry Jackson IDC	52.0	74,999.99	39,372.03
4. University of North Carolina IDC	55.5	125,000.00	69,375.00
<b>Total Indirect Costs</b>			<b>306,756.01</b>
<b>Cognizant Federal Agency</b>		DOD Dept. of Navy, Shea Kersey, +1.703.696.2055	
<small>(Agency Name, POC Name, and POC Phone Number)</small>			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
<b>Total Direct and Indirect Institutional Costs (G + H)</b>	<b>1,506,744.27</b>

J. Fee	Funds Requested (\$)*

K. Total Costs and Fee	Funds Requested (\$)*
	<b>1,506,744.27</b>

L. Budget Justification*
File Name: EHA_EIDRC_2019_budget_Justification_FINAL.pdf (Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION A & B, Budget Period 3

ORGANIZATIONAL DUNS\*: 0770900660000

Budget Type\*:  Project  Subaward/Consortium

Enter name of Organization: EcoHealth Alliance

Start Date\*: 03-01-2022

End Date\*: 02-28-2023

Budget Period: 3

A. Senior/Key Person													
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*	
1 . Dr.	Peter		Daszak	Ph.D	PD/PI							(b) (4), (b) (6)	
2 . Dr.	Kevin		Olival	Ph.D	Co-Investigator								
3 . Dr.	Carlos		Zambrana-Torrello		Co-Investigator								
4 . Dr.	Alice		Latinne		Bioinformatician								
5 . Dr.	Kendra		Phelps		Field Scientist								
6 . Dr.	Patrick		Dawson		Epidemiologist								
7 . Ms.	Hongying		Li		Epidemiologist								
8 . Dr.	Aleksei		Chmura		Senior Program Manager								
<b>Total Funds Requested for all Senior Key Persons in the attached file</b>													
<b>Additional Senior Key Persons:</b>											File Name:		
											<b>Total Senior/Key Person</b>	<b>256,075.51</b>	

B. Other Personnel										
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*			
	Post Doctoral Associates									
	Graduate Students									
	Undergraduate Students									
	Secretarial/Clerical									
1	Data Scientist						(b) (4), (b) (6)			
1	Epidemiologist									
1	Program Manager									
<b>3</b>	<b>Total Number Other Personnel</b>					<b>Total Other Personnel</b>	<b>113,489.98</b>			
						<b>Total Salary, Wages and Fringe Benefits (A+B)</b>	<b>369,565.49</b>			

RESEARCH & RELATED Budget (A-B) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTION C, D, & E, Budget Period 3

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**     Project     Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2022

**End Date\*:** 02-28-2023

**Budget Period:** 3

<b>C. Equipment Description</b>		<b>Funds Requested (\$)*</b>
List items and dollar amount for each item exceeding \$5,000		
<b>Equipment Item</b>		
<b>Total funds requested for all equipment listed in the attached file</b>		
<b>Total Equipment</b>		<b>0.00</b>
<b>Additional Equipment:</b> File Name:		

<b>D. Travel</b>	<b>Funds Requested (\$)*</b>
1. Domestic Travel Costs ( Incl. Canada, Mexico, and U.S. Possessions)	15,592.00
2. Foreign Travel Costs	56,633.00
<b>Total Travel Cost</b>	<b>72,225.00</b>

<b>E. Participant/Trainee Support Costs</b>	<b>Funds Requested (\$)*</b>
1. Tuition/Fees/Health Insurance	
2. Stipends	
3. Travel	
4. Subsistence	
5. Other:	
<b>Number of Participants/Trainees</b>	
<b>Total Participant Trainee Support Costs</b>	<b>0.00</b>

RESEARCH & RELATED Budget (C-E) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTIONS F-K, Budget Period 3

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**   ● Project   ○ Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2022

**End Date\*:** 02-28-2023

**Budget Period:** 3

<b>F. Other Direct Costs</b>	<b>Funds Requested (\$)*</b>
1. Materials and Supplies	7,917.50
2. Publication Costs	
3. Consultant Services	15,000.00
4. ADP/Computer Services	
5. Subawards/Consortium/Contractual Costs	708,280.27
6. Equipment or Facility Rental/User Fees	
7. Alterations and Renovations	
8. Shipping	27,000.00
<b>Total Other Direct Costs</b>	<b>758,197.77</b>

<b>G. Direct Costs</b>	<b>Funds Requested (\$)*</b>
<b>Total Direct Costs (A thru F)</b>	<b>1,199,988.26</b>

<b>H. Indirect Costs</b>			
<b>Indirect Cost Type</b>	<b>Indirect Cost Rate (%)</b>	<b>Indirect Cost Base (\$)</b>	<b>Funds Requested (\$)*</b>
1. EcoHealth Alliance IDC	32.0	491,708.01	157,346.56
2. Foreign Subcontractual & Consortium IDC	8.0	708,280.27	40,662.42
3. Henry Jackson IDC	52.0	74,999.99	39,372.03
4. University of North Carolina IDC	55.5	125,000.00	69,375.00
<b>Total Indirect Costs</b>			<b>306,756.01</b>
<b>Cognizant Federal Agency</b>		DOD Dept. of Navy, Shea Kersey, +1.703.696.2055	
<small>(Agency Name, POC Name, and POC Phone Number)</small>			

<b>I. Total Direct and Indirect Costs</b>	<b>Funds Requested (\$)*</b>
<b>Total Direct and Indirect Institutional Costs (G + H)</b>	<b>1,506,744.27</b>

<b>J. Fee</b>	<b>Funds Requested (\$)*</b>

<b>K. Total Costs and Fee</b>	<b>Funds Requested (\$)*</b>
	<b>1,506,744.27</b>

<b>L. Budget Justification*</b>
File Name: EHA_EIDRC_2019_budget_Justification_FINAL.pdf (Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)



RESEARCH & RELATED BUDGET - SECTION A & B, Budget Period 4

ORGANIZATIONAL DUNS\*: 0770900660000

Budget Type\*:  Project  Subaward/Consortium

Enter name of Organization: EcoHealth Alliance

Start Date\*: 03-01-2023

End Date\*: 02-29-2024

Budget Period: 4

A. Senior/Key Person													
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*	
1 .	Dr.	Peter	Daszak	Ph.D	PD/PI							(b) (4), (b) (6)	
2 .	Dr.	Kevin	Olival	Ph.D	Co-Investigator								
3 .	Dr.	Carlos	Zambrana-Torrello		Co-Investigator								
4 .	Dr.	Alice	Latinne		Bioinformatician								
5 .	Dr.	Kendra	Phelps		Field Scientist								
6 .	Dr.	Patrick	Dawson		Epidemiologist								
7 .	Ms.	Hongying	Li		Epidemiologist								
8 .	Dr.	Aleksei	Chmura		Senior Program Manager								
<b>Total Funds Requested for all Senior Key Persons in the attached file</b>													
<b>Additional Senior Key Persons:</b>											File Name:		
											<b>Total Senior/Key Person</b>	<b>256,075.51</b>	

B. Other Personnel										
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*			
	Post Doctoral Associates									
	Graduate Students									
	Undergraduate Students									
	Secretarial/Clerical									
1	Data Scientist						(b) (4), (b) (6)			
1	Epidemiologist									
1	Program Manager									
<b>3</b>	<b>Total Number Other Personnel</b>					<b>Total Other Personnel</b>	<b>113,489.98</b>			
						<b>Total Salary, Wages and Fringe Benefits (A+B)</b>	<b>369,565.49</b>			

RESEARCH & RELATED Budget (A-B) (Funds Requested)

## RESEARCH & RELATED BUDGET - SECTION C, D, & E, Budget Period 4

**ORGANIZATIONAL DUNS\*:** 0770900660000

**Budget Type\*:**     Project     Subaward/Consortium

**Organization:** EcoHealth Alliance

**Start Date\*:** 03-01-2023

**End Date\*:** 02-29-2024

**Budget Period:** 4

<b>C. Equipment Description</b>		<b>Funds Requested (\$)*</b>
List items and dollar amount for each item exceeding \$5,000		
<b>Equipment Item</b>		
<b>Total funds requested for all equipment listed in the attached file</b>		
<b>Total Equipment</b>		<b>0.00</b>
<b>Additional Equipment:</b> File Name:		

<b>D. Travel</b>	<b>Funds Requested (\$)*</b>
1. Domestic Travel Costs ( Incl. Canada, Mexico, and U.S. Possessions)	15,592.00
2. Foreign Travel Costs	56,633.00
<b>Total Travel Cost</b>	<b>72,225.00</b>

<b>E. Participant/Trainee Support Costs</b>	<b>Funds Requested (\$)*</b>
1. Tuition/Fees/Health Insurance	
2. Stipends	
3. Travel	
4. Subsistence	
5. Other:	
<b>Number of Participants/Trainees</b>	
<b>Total Participant Trainee Support Costs</b>	<b>0.00</b>

RESEARCH & RELATED Budget (C-E) (Funds Requested)