# Tracey J. Lamb

Dr Tracey J. Lamb, PhD is a notable researcher in the field of malaria. Dr. Lamb's educational background includes a B.Sc. from the University of Glasgow, Scotland, and a Ph.D. from the University of Edinburgh, Scotland. Her work focuses on understanding the immunopathogenesis of infectious diseases. Tracey holds the position of Professor of Pathology at the Department of Pathology, University of Utah, USA where she is also the Director of the Microbiology and Immunology Graduate Program.

Tracey's research group focuses on understanding host-pathogen interactions, particularly the immune mechanisms that influence infection outcomes. Her lab is focused on *Plasmodium* infections that cause malaria. Tracey is an Adjunct Scientist at the Centre Pasteur Cameroon where she works closely with her collaborator Dr Lawrence Ayong on paediatric malaria. Her work has identified key molecules involved in disease processes such as cerebral malaria and malaria-associated liver fibrosis.

**Could you please describe your research interests and how they relate to the name of your lab "host-pathogen interactions"?**

My main research interest is in understanding the spectrum of disease that occurs during infection. Both host and pathogen factors combine to dictate the severity of infection in any one host. I have worked on malaria for over 20 years. The current work in my lab spans the whole spectrum of malaria from severe organ-specific pathologies, such as cerebral malaria through to understanding the immune mechanisms that mediate the asymptomatic carriage of *P. falciparum* in children.

**What are some significant findings from your research that have practical implications for malaria disease prevention and control?**

Our work looks at molecular mechanisms of malaria disease and has identified a family of receptor tyrosine kinases called Eph receptors as novel therapeutic targets for organ-specific syndromes in malaria. Given the lack of funding for developing new drugs for malaria disease, the Eph receptors are an attractive therapeutic target because there are Eph-receptor based drugs currently in development for use in cancer patients. This raises the possibility of repurposing these drugs for malaria. Following our initial studies on the role of the EphB2 member of this family of molecules in mediating the development of liver fibrosis in malaria, we discovered a key role for the EphA2 in mediating the breakdown of the blood-brain barrier during cerebral malaria. We used a mouse model of malaria to show the proof-in-principal that this molecule could be blocked to prevent vascular leak during *Plasmodium* infection.

**Do you see a cost-effective malaria vaccine becoming a reality in the next 10 years?**

The current RTS,S and R21 vaccines target the infectious sporozoite stage deposited in the skin upon mosquito feeding and require four doses per child. The longevity of protection is poor lasting around 1-2 years and vaccination is limited to

young children. Whilst generating cost-effective vaccines is certainly crucial in rolling out an anti-malarial vaccine in resource-poor countries where malaria is endemic, there is much work to be done to develop a vaccine that can be administered in fewer doses and provide a greater level of protection that lasts much longer than the RTS,S and R21 vaccines. I see the next generation of vaccines incorporating the generation of immunity against the gametocyte stages that mosquitos ingest during feeding. By preventing successful transmission to mosquitos and protecting against the establishment of infection in humans, we will be more likely to see significant drops in circulating infection in malaria-endemic communities.

**What is the most fascinating thing about host-pathogen interactions?**

The variation in disease in different hosts during infection has always fascinated me. The symptoms of many infections involve the attempts of the immune system to combat the pathogen. Variation of disease is inextricably linked to the quality of the immune response elicited by a pathogen in any given host. Recently I have become interested in how infections sometimes cause no disease at all! Since the death of the host through disease certainly halts the ability of an infection to transmit to new hosts, silently infecting the host is an important transmission strategy for some infections. In many *Plasmodium* infections individuals do not develop malaria but harbour the transmissible forms in their bloodstream. It is apparent that in some malaria endemic areas, much of the transmission of malaria in a community stems from asymptomatic individuals. The importance of asymptomatic infections was highlighted during the COVID-19 pandemic where asymptomatic carriers were shown to spread the infection without knowing they were infected.

**What challenges do researchers face in zoonotic disease studies?**

Zoonotic diseases are difficult to eliminate in affected areas as all reservoirs must be targeted. For malaria, the circulation of *P. knowlesi* and other species such as *P. cynomolgi* and *P. inui* in non-human primates will be a major challenge to the elimination of malaria in some areas, particularly in Southeast Asia. Solving this problem will likely involve better targeting and engineering of mosquito populations to resist infection from all *Plasmodium* sp. parasites.

**What are the challenges of working in a country (USA) that only has cases of travel-associated malaria?**

We are fortunate that we have a fantastic collaboration with Dr Lawrence Ayong at the Centre Pasteur Cameroon. Our trainees from the USA have benefitted from this collaboration by visiting Dr Ayong's lab to learn more about malaria. The main challenge working on malaria in the USA has been obtaining visas for our Cameroonian trainees to participate in reciprocal visits to my lab in Utah to learn some of the techniques needed for our joint projects. We have been fortunate to be able to procure a fully serviced flow cytometer at the Centre Pasteur Cameroon. Along with the tissue culture facility set up by Dr Ayong, we have modified our training model where we have peer-to-peer training on these techniques in Cameroon. Our goal remains to provide bi-directional learning to pull together our complementary expertise in the projects we do.

**What advice do you have for other scientists who would like to study malaria?**

I would strongly recommend finding good collaborators with complementary expertise and funding opportunities. Collectively we should focus on understanding the immune responses in those who are exposed to *Plasmodium* infection every day but cognizant that studies in animal models are needed to interpret findings from such studies.

**How do you envision AI influencing immunology?**

The ability to analyse large data sets is significant. I think sometimes AI often poses a challenge to see the “wood from the trees” but AI is already having an enormous impact on the ability of researchers to understand the complexity of immune responses. This is important to strategize for therapeutic interventions that will best harness the immune system and combat disease. It will also allow comparisons between different conditions, whether it be cancer, autoimmunity, or infectious diseases, to garner new insight into how the immune system functions at a baseline level.

**What is your role in the International Union of Immunological Societies (IUIS) Education Committee?**

My role is in part to co-teach science communication and grant writing skills to students who take part in the wonderful in-person and online courses funded by the IUIS. I hope to use my experience to help trainees overcome writer’s block and write clear and compelling proposals. Communicating the science that you do in an understandable and exciting way is crucial, particularly when seeking funding for research costs or to facilitate travel to scientific conferences.

*Interview by Bonamy (Bon) Holtak*