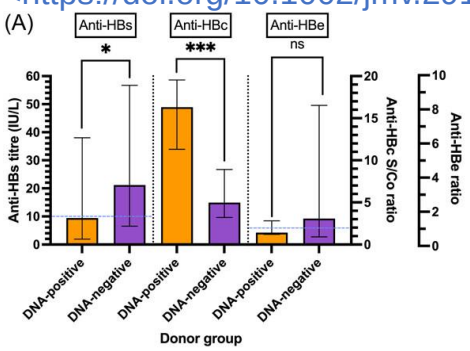
Recent Achievements

Ultrasensitive PCR system for HBV DNA detection: Risk stratification for occult hepatitis B virus infection in English blood donors

Occult hepatitis B (HBV) infection (OBI), with its low viral loads, poses a substantial risk for transfusion-transmitted infection. The introduction of anti-core antibodies (anti-HBc) screening in England has heightened the need to identify OBI donors. The study developed an ultra-sensitive PCR system, comparing seven extraction methods and three PCR assays to detect HBV DNA in blood donations. Optimizing the system for anti-HBc-positive donations, the research found that extracting from 5 mL of plasma increased sample representation, enabling the detection of HBV DNA in low viral load samples (~0.5 IU/mL). Testing 134 anti-HBc-positive donations with the optimized method revealed two additional HBV DNA-positive donations. Higher anti-HBc titre and anti-HBs negativity were significant predictors of DNA detectability. The implementation of an ultrasensitive PCR assay increased HBV DNA detection in anti-HBc-positive donors from 0.5% to 1.9%, enabling future improved risk stratification and reduced unnecessary donor deferral.

<https://doi.org/10.1002/jmv.29144>



Comparison of anti-HBs, anti-HBc, and anti-HBe reactivity ratios (platform-based) between DNA-positive and DNA-negative donors.

Recent Events

1st *GEMS annual meeting*

On June 26th and 27th, 2023, our inaugural annual meeting successfully convened over 50 researchers and representatives from organizations such as NHSBT, UKHSA, BTRU-GEMS, and international institutes. The primary goal was to facilitate data exchange, share best practices, and promote innovation and discussions among researchers.

Peter Simmonds introduced BTRU-GEMS, outlining objectives and themes. The meeting included four sessions. The first, "Harnessing New Genomics Technologies," featured presentations by Sofia Morfopoulou (UCL), Jonathan Edgeworth (Guy's & St Thomas' Hospital), Emanuele Di Angelantonio (University of Cambridge), and Tanya Golubchik, Theme 1 leader.

The second session, "Viruses Everywhere: The Human Viromes," included presentations by Maria Perdomo (University of Helsinki), Belinda Singleton (NHSBT), Martin Howell (NHSBT), and updates from Oscar Torres and Sarah Buddle on Theme 2: Viromics.

Session three, "Donor, Patient, and Public Perspectives of TTTIs Matching Inclusion with Microbiological Safety," featured Eamonn Ferguson's ethics presentation (University of Nottingham) and insights from Mark Croucher (NHSBT) and Roanna Maharaj (UK Thalassemia Society).

In Session four, focusing on infectious disease risks, Will Irving discussed occult hepatitis B virus, Pierre Tiberghien provided a European perspective on transfusion safety, Aaron Tobian discussed pathogen reduction technology, and Neil Almond addressed NGS quality using Reference Materials.

The final session, "Pandemics, New and Old Pathogens," covered topics like epidemic pathogen monitoring (Colin Brown), maintaining blood safety (Claire Reynolds), and creating a Donation Bioarchive (Eilish Hart). Theme 3: Blood Safety progress was presented by Shannah Gates and Michael Fu from the University of Oxford.

A Conversation With…

Vidushi Chugh, *DPhil student*

What do you find interesting about your current research project?

What captivates me the most is the direct clinical impact of my project. Comparing two bacterial screening techniques and investigating their utility for bacterial pathogen detection has immense clinical relevance for improving patient safety. Being able to contribute directly and practically to medical practice has always been a lifetime goal of mine, and the projects I will be involved in will be the perfect recipe for my DPhil.

Tells us about your hobbies.

I find joy in dancing, indulging in literature, hitting the gym, and, when budget permits, exploring new destinations through travel.

Piya Rajendra, *DPhil student*

What motivates you about BTRU-GEMS?

The direct impact of research on scientific policy, particularly the research's clinical applicability. The prospect that our generated data and findings could influence decisions to enhance blood services, ensuring even greater safety, is a motivating force. BTRU-GEMS not only addresses current issues but also anticipates future challenges, such as emerging infections.

If you were an animal or insect vector, which one would you be and why?

I'd choose a mosquito. This choice is driven by the ability to navigate and establish in more temperate climates, an advantage in the context of climate change and globalization. Additionally, mosquitoes' adaptation to extracting blood without detection aligns with the ease of gaining nutrients, highlighting intriguing aspects of their behaviour.

Jaid Debrah, *DPhil student*

What motivates you about BTRU-GEMS?

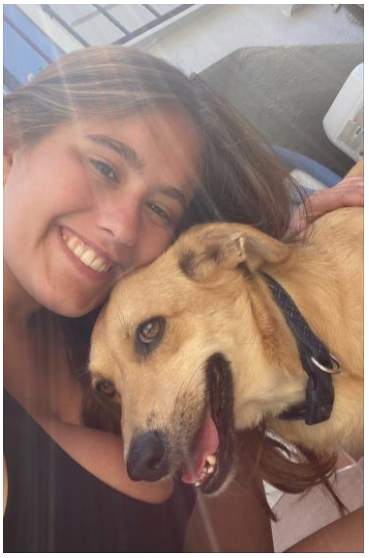
The unparalleled opportunity to shape and contribute to the enhancement of policies, ultimately benefiting everyone within the NHS blood donor system.

What do you find interesting about your current research project?

It provides a virological perspective on the impact of the recently introduced FAIR guidelines, which aim for greater inclusivity in blood donor selection in the UK. Unlike previous assessments that focused on epidemiology, behavior, and psychology, this approach leads to a shift to individual risk assessment based on sexual behavior rather than gender or veiled references to one's race – a pioneering step on the global stage.

A Conversation With…

Kaitlin Reid, *DPhil student*



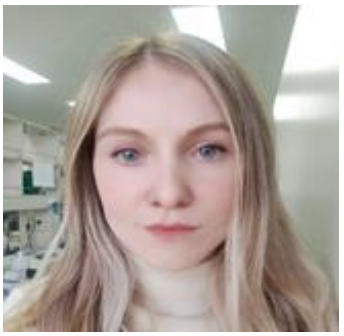
What do you find interesting about your current research project?

The potential to enhance current methodologies current methodologies and creating bioinformatic tools accessible to a broader audience beyond the field. The multi-disciplinary nature of bioinformatics captivates me, and I'm excited about developing tools that are not only useful but also user-friendly for a wider audience.

If you could travel anywhere (with no limited budget), where would that be and why?

I love extended travel, exploring multiple destinations in one journey. Currently, South America is my next adventure destination, with a specific goal of flying over the Nazca lines—a dream my dad and I hope to fulfill together.

Kai Kean, *DPhil student*



What do you find interesting about your current research project?

The human virome, a diverse community of viruses coexisting with humans, plays a crucial role in health and disease onset. This microbial community interacts with the human immune system, influencing immune development and responses, impacting the broader microbiome, and influencing host physiology. Investigating the virome is crucial for a comprehensive understanding of factors affecting human health.

NGS reveals the presence of various DNA and RNA viruses in blood and tissues, even in healthy individuals. The potential transmissibility and impact of these viruses, especially in blood transfusion and immunocompromised transplant recipients, are poorly documented but fundamental for safety. Blood-borne viruses like HIV, HBV, and HCV can cause severe, chronic infections, posing global public health risks. Reactivation of dormant endogenous retroviruses in the blood can influence human physiology and contribute to diseases, including autoimmune disorders.

If you can travel anywhere (with no limited budget), where would that be and why?

I dream of visiting New Zealand, inspired by my love for the Lord of the Rings books and movies. Exploring the set locations would be a truly magical experience for me.

To Look Forward To…

NHSBT/BTRU Genomics Workshop:
Following on from a very successful workshop in March 2023, we hope to have 2nd workshop on 25th April 2024

@BTRU_GEMS

QR code to our website: