Course Information Sheet for entry in 2026-27: DPhil in Paediatrics

Course facts

Mode of study	Full Time Only
Expected length	3 to 4 years

About the course

The DPhil in Paediatrics is a research-based course covering child health topics such as immunology, infectious disease, vaccines, imaging, neuromuscular biology, and gastroenterology, with training in research and professional skills.

You will develop generic research skills by making use of a range of research training and skills development offered by the medical sciences division, alongside direction by your supervisor in specific research methods in relation to your project. You are encouraged to develop a literature review in your first year and to attend courses in manuscript and thesis writing and in presentation skills. At the heart of the skills provision are regular group meetings and the annual departmental Research Day where you will present and develop your research ideas and proposals with the benefit of feedback and support from your peers.

To learn more about the research topics you'll have the opportunity to explore, please refer to the *Research areas* section on this page.

Attendance

The course is full-time and requires attendance in Oxford. Full-time students are subject to the University's Residence requirements. (//www.ox.ac.uk/admissions/graduate/after-you-apply/accommodation/residence-requirements)

Provision exists for students on some courses to undertake their research in a 'well-founded laboratory' outside of the University. This may require travel to and attendance at a site that is not located in Oxford. Where known, existing collaborations will be outlined on this page. Please read the course information carefully, including the additional information about course fees and costs.

Resources to support your study

As a graduate student, you will have access to the University's wide range of resources including libraries, museums, galleries, digital resources and IT services.

The Bodleian Libraries is the largest library system in the UK. It includes the main Bodleian Library and libraries across Oxford, including major research libraries and faculty, department and institute libraries. Together, the Libraries hold more than 13 million printed items, provide access to e-journals, and contain outstanding special collections including rare books and manuscripts, classical papyri, maps, music, art and printed ephemera.

The University's IT Services is available to all students to support with core university IT systems and tools, as well as many other services and facilities. IT Services also offers a range of IT learning courses for students to support with learning and research, as well as guidance on what technology to bring with you as a new student (https://www.it.ox.ac.uk/what-to-bring) at Oxford.

The department has state-of-the-art laboratories with a number of research groups at different locations in Oxford, with most of the groups based at the John Radcliffe Hospital and the Weatherall Institute of Molecular Medicine (WIMM), the Centre for Vaccinology and Tropical Medicine and the Institute of Developmental and Regenerative Medicine at the Churchill Hospital, and the Science Centre at South Parks Road.

Students will have access to the department's IT support and University library services. Workspace will be related to individual circumstances. If undertaking experimental work, bench space will be provided within a laboratory. The provision of other resources specific to a project should be agreed with the supervisor as part of the planning stages of the agreed project.

Weatherall Institute of Molecular Medicine

The Weatherall Institute of Molecular Medicine (WIMM) (http://www.imm.ox.ac.uk) fosters research in molecular and cell biology with direct application to the study of human disease. The WIMM is the location for the developmental immunology and haematology research groups in the Department.

Peter Medawar Building

The Peter Medawar Building (http://www.medawar.ox.ac.uk) houses an inter-disciplinary research consortium which investigates pathogen diversity through a combination of experimental and theoretical approaches, with links to two University divisions: Medical Sciences, Mathematical, Physical and Life Sciences. This is the location for the HIV research group.

Oxford Vaccine Group, Centre for Clinical Vaccinology and Tropical Medicine (CCVTM)

The Oxford Vaccine Group (OVG) (http://www.ovg.ox.ac.uk) is located in CCVTM which is a purpose-built space for research in vaccinology and tropical medicine. The facility includes fully-equipped modern Containment Level 2 and 3 laboratories for the design, development and clinical testing of vaccines. Facilities are designed to accommodate multi-disciplinary working across microbiology, immunology, and molecular techniques in proximity to clinical expertise and trial patients/volunteers.

Paediatric Nutrition Research Group Laboratories

The two Paediatric Nutrition Research Group Laboratories are located in the neonatal unit. One is a visual function laboratory to study the development of visual pathways in brain-damaged infants following neurotropic supplementation of their diets.

The second is a body composition laboratory which house an air displacement plethysmography used to validate new techniques derived from 3-D ultrasound measures of body composition in new-born infants.

Institute of Developmental and Regenerative Medicine (IDRM)

The Institute of Developmental and Regenerative Medicine (IDRM) opened in 2022 and is an available resource for relevant students. At its core is a formal merger of developmental biology and regenerative medicine in the form of 15-20 world leading research groups comprising 240 cardiovascular, neuroscience and immunology scientists. Our intention as an organisation is to integrate their expertise to foster multidisciplinary collaborations.

Library services

Bodleian Health Care Libraries provides services to the staff and students of the University of Oxford, mainly in clinical medicine, and to the staff of the Oxford University Hospitals NHS Trust. There are over 20,000 books and over 550 journal titles in the Bodleian Health Care Libraries

IT resources

The Medical Sciences Division IT services provide Information Technology services, support and advice to the University of Oxford's Medical Sciences Division. It operates and manages data networks and networked services for the division's departments located on the Oxford Hospital Sites (John Radcliffe, Churchill, Warneford and Nuffield Orthopaedic Centre), the Old Road Campus in Headington, and parts of the Science Area in the centre of Oxford.

Supervision

The allocation of graduate supervision for this course is the responsibility of the Department of Paediatrics and it is not always possible to accommodate the preferences of incoming graduate students to work with a particular member of staff. Under exceptional circumstances a supervisor may be found outside the Department of Paediatrics.

Most students have the opportunity to meet with their supervisor at least three times a term.

You will join one of the department's research groups with primary supervision provided by faculty members in one of the department's laboratory or clinical research facilities. It is highly recommended that individuals speak to and consider a supervisor before they make a formal application.

Assessment

Formal assessment of progress will be made at three points during the course: transfer of status from Probationary Research Student (PRS) status to DPhil Status; this occurs in the 4th term. This is followed by confirmation of status which traditionally takes place either at the departmental annual research day held in late April or at the end of the ninth term. Then the final thesis and oral examination (*viva voce*) before the twelfth term ends.

Research areas

Supervision for students on this course may be provided by the individuals listed below:

Sarah Atkinson

Infectious diseases are a leading cause of hospitalisation and death among young children living in resource-poor communities in sub-Saharan Africa. In the same communities, micronutrient deficiencies (MDs) are highly prevalent. Particularly concerning is that micronutrient deficiencies

are estimated to cause 745,000 deaths annually and have been associated with a range of life-threatening infections. The intersection between widespread MDs and infectious disease risk is a substantial opportunity for public health policy. However, causal links between MDs and life-threatening infections are difficult to establish since observational studies may be biased by unmeasured confounders, such as socioeconomic status, or reverse causality since infection itself alters micronutrient status. Several randomised controlled trials (RCT) evidence impacts of certain micronutrient supplements on a range of infections, but findings are inconsistent. Moreover, many RCTs have focused on mild disease, had variable duration, dosage, or timing of supplementation, and biological mechanisms are largely unknown. Extremely large RCTs required for studying rare outcomes are often not feasible or scalable. The PhD candidate will conduct genome wide-association studies in 3,000 children from around Kilifi and in stored samples from across Africa to identify genetic variants that alter blood levels of micronutrients in young children living in Africa. The PhD will then assess the causal impact of specific micronutrient deficiencies on severe infections in young children using Mendelian randomization analyses in very large datasets from children with severe malaria, bacteraemia, TB, and a range of other life-threatening infections. Further work will include recall by genotype studies to elucidate putative biological mechanisms underlying causal associations between specific micronutrient deficiencies and specific severe infections.

The successful candidate will be expected to contribute to the planning and set up of a study of 3,000 infants in Kilifi County, Kenya. The study will collect child health, and blood samples for biomarkers of micronutrients and genetic studies. GWAS studies will be used to identify genetic variants associated with these micronutrient levels in young children. Based on literature review and genetic variants identified from GWAS studies, the candidate will subsequently apply a Mendelian Randomization approach to investigate the causal effects of specific micronutrients on severe life-threatening infections in young children.

Rinn Song

Novel Diagnostics for Paediatric Tuberculosis

Tuberculosis (TB) remains a significant cause of morbidity and mortality in children, particularly in low- and middle-income countries, with an estimated incidence of one million cases per year. Diagnosis of TB is complex, especially in young children, because their symptoms are non-specific, they cannot expectorate sputum and often have paucibacillary disease. Despite significant advances in TB diagnostics made in the last decade, they barely impacted on paediatric TB. As a result, under-diagnosis of those with TB is common. Improving paediatric TB diagnosis is very important, not only for individual patients, but also for the assessment of the true burden of paediatric TB and the development of new treatments and vaccines which is hindered by the lack of a reliable reference standard.

New approaches for diagnosis of paediatric TB are urgently needed, especially in three areas that the group is working on:

1. tests that can be used at the point of care level;
2. non-sputum-based tests; and
3. tests that can accurately identify the children with TB currently classified as microbiologically negative.

The group works together in a strong consortium of world-leading scientists and collaborators from around the world, including Uganda, Peru, the United States of America, Switzerland and Canada: the Feasibility of Novel Diagnostics for TB in Endemic Countries (FEND for TB) Consortium (https://www.fend-tb.org) , funded by the U.S. National Institutes of Health for five years. The previous NIH-funded consortium led to the development of the GeneXpert Assay. The objective of the FEND for TB Consortium is to support the evaluation of early-stage tuberculosis diagnostic assays and strategies in the context of existing clinical algorithms in tuberculosis endemic countries. FEND for TB conducts early-stage diagnostic accuracy and feasibility studies and then feeds back to assay developers to facilitate the efficiency of the iterative assay evaluation-assay revision process. The consortium also involves a group of highly-recognised experts in modelling to evaluate impact, cost-effectiveness and other key factors to consider for the possible implementation of promising novel TB tests.

This project would offer a variety of exciting opportunities, including in-country study implementation and supervision, biostatistical and analytical work, modelling research, and

through close collaboration with the Foundation for Innovative New Diagnostics (FIND) insight and contributions to the process of working with the WHO in their regulatory approval process of new diagnostic tests for TB.

For further information, please see the grant information for FEND for FB (https://grantome.com/grant/NIH/U01-AI152084-01) and the grant information for Novel and Optimized Diagnostics for Pediatric TB (https://grantome.com/grant/NIH/R01-AI152159-01) (both external links).

Simon Draper

Analysis of the human antibody response to malaria vaccination

Traditionally the analysis of human antibody responses following vaccination has involved global approaches, with assays measuring the total polyclonal serum antibody response in terms of titre, concentration, subtype response or avidity. Although such measures remain useful readouts, the development of highly effective vaccines against difficult and complex pathogens, such as the Plasmodium parasites that cause human malaria, requires a much greater understanding of the fine specificity of the vaccine-induced antibody response. In recent years, significant advances have been made in terms of ability to analyse the human antibody repertoire generated in response to vaccination, and to assess the identification of key functional epitopes.

The Draper Group' research seeks to analyse the human antibody response induced by novel candidate malaria vaccines in Phase 1/2 clinical trials undertaken in Oxford and East or West Africa. This will build upon on-going research in the Draper Group to develop vaccines against essential antigens used by the parasite and to better understand their biology and the critical antibody functions that inhibit parasite growth. A variety of techniques will be used to isolate antigen-specific B cell subsets from vaccinated adults or children using different vaccine delivery regimens. The isolated B cells will be used to analyse the human antibody response via sequencing and cloning of the B cell receptor gene repertoire. Key analyses will include variable region gene usage, mutation, and clonality of the response over time post-immunisation. Identified sequences will be used to generate human monoclonal antibodies (hu-mAbs) which will be assessed for functional anti-parasitic activity, affinity and epitopes mapped on the antigens using structural, biophysical and immunological approaches. The outputs of this work should identify key epitopes recognised following human vaccination with novel vaccines. Next steps could include rational design of improved next-generation vaccine immunogens for onward clinical development, or immunological experiments to understand how antibodies mediate anti-parasitic function. The project will be benefit from the group’s extensive experience of clinical immunology, B cell immuno-monitoring, protein engineering and parasitology, as well as from strong collaborations with other leading labs globally. More information on the Draper Lab (https://draperlab.web.ox.ac.uk/) is on their website.

Michelle Fernandes

The F1000 Group: The “whole child” approach to promote and rescue early brain growth, health and development during the first 1000 days of life.

The first 1000 (F1000) days of life, from conception to age 2, are foundational to brain development. During this period, the developing brain is highly sensitive to environmental influences, both positive and adverse, with multi-system and enduring effects through the lifecourse. Approximately one in five children under five globally are at risk of developmental delay. Owing to a lack of screening resources, many do not receive the interventions they require within this golden window of brain development because they are only identified at school age or later.

The F1000 group’s work is focussed on developing novel “whole child” strategies to promote and rescue early child development during the F1000 days of life. Our work involves the pillars of early identification, intervention and impact, towards making a positive difference to the most vulnerable children, internationally, at risk of developmental delay. The research of this group seeks to (i) detail mechanistic understanding of the pathways underpinning typical and atypical early child development globally; (ii) construct & disseminate novel and scalable tools to rapidly and sensitively identify infants and young children with developmental delay at key points of

contact with healthcare services and (iii) develop and validate novel whole-child interventions to promote brain development among young children internationally by leveraging as much of the F1000 day window as possible. The group combines neuroscience, epidemiological, data science and global maternal and child health approaches and has longstanding collaborations with 26 institutions across 23 countries in the UK, Europe, South East Asia, the Middle East, Sub Saharan Africa, and North, Central and South America. The group has pioneered the construction of three novel early child development assessments and the first international standards of early child development. An important theme that is integrated in all aspects of the group's work is promoting community and stakeholder engagement at local and regional level to build and sustain capacity in the "whole child" approach to early brain growth, heath and development during the F1000 days.

The group places great importance on translating its research outputs into clinical practice and policy. The group can offer DPhil students opportunities to undertake mechanistic research, methodology development (neuropsychometric tools, population-based surveillance methods and data-science based clinical risk estimators), intervention research (both high-risk and community strategies) or a combination of these. It also provides opportunities to focus on implementation science projects to integrate research outputs into current clinical and population health pathways globally.

Daniela Ferreira

The mucosae (respiratory, gastrointestinal and genitourinary tract) is the port of entry and the body's first line of defence against pathogens. The immune response at the mucosa is the key determinant on whether pathogens are eliminated, an infection is established and subsequent transmission. We have limited understanding on how immune responses in the mucosa are orchestrated for optimal pathogen protection, how and why these responses are altered throughout life (from childhood to the elderly) and most importantly, how mucosa immunity can be harnessed for effective mucosal immunisation.

The group uses Human Infection Challenge models (in which participants are deliberately infected with live pathogens), novel methods of mucosal sampling to investigate cellular immunity, cutting-edge immunology including multi-OMICS such as such as single cell sequencing and spatial transcriptomics. We also apply bioinformatics, artificial intelligence, and systems biology to analyse complex datasets, dissect the immune system, understand correlates of protection against pathogens and inform the design of next generation immunotherapies (vaccines and monoclonals).
The group offers DPhil (PhD) projects focused in a range of pathogens investigating key questions such as:

- How do systemic and mucosal immune responses interact to maintain protection against infection?
- Why does susceptibility to respiratory disease increase with chronic inflammation, co-morbidities and aging?
- How does co-infection with viral and bacterial pathogens modulate immune responses?
- Breakthrough infections and vaccine escape- how do pathogens manipulate local immune responses?
- Tissue-memory: how immunity is generated, recalled and how long does it last?

As a DPhil (PhD) student in this group, you will gain hands-on experience with state-of-art wet-lab and computational platforms, contribute to globally relevant vaccine research, and work within a diverse, international, and collaborative environment at the IDRM and CCVTM —with access to all the infrastructure and services needed for successful research. The group collaborates with partners worldwide and often host visiting researchers from other institutions.

The group welcomes candidates from immunology, bioinformatics, systems biology, and related fields. Projects can be adapted to your interests and strengths while aligning with the group's broader scientific mission.

Philip Goulder

It is becoming increasingly clear that immune sex differences have a substantial impact on outcome from infectious disease and vaccines. The group's own studies of children who became infected with HIV in utero show that these immune sex differences start before birth and have substantial impact before birth. Female fetuses born to mothers who themselves become infected with HIV during pregnancy are 2-3x more susceptible to infection than male fetuses. The reason, the group believes, is that the female fetus shares with her mother a strong dependence on the innate immune response, and specifically type I interferon (IFN-I) production in response to viruses such as HIV, to protect against infection. Thus, the virus that evades this defence in the mother is highly IFN-I-resistant, and this same highly IFN-I-resistant virus evades the same innate response in the female fetus, but not male fetuses, who are more susceptible to IFN-I-sensitive viruses with high replicative capacity (Adland et al Nature Communications, 2020).

The Goulder Group Research theme focuses on two related goals: the first being to define the mechanisms and impact of immune sex differences in early life; and the second being to define the immune responses in early life that maximise the potential for achieve cure in HIV-infected children. HIV provides an ideal tool to help understand the immune sex differences that are present in early life and their impact. A cohort of 250 HIV-infected mother child pairs in KwaZulu-Natal, South Africa, followed from the infant's birth, form the focus of much of this work in the Peter Medawar Building in Oxford. The exposure of sex-discordant twins to other infections (CMV) and to vaccines provide an additional unique means of evaluating early-life immune sex differences. This group's work is focused on the South African HIV epidemic. Although the group is based in Oxford, they have over the past 20 years developed strong collaborations in Durban and Kimberley, South Africa.

Caroline Hartley

One in 13 babies are born prematurely; understanding and mitigating the long-term impact of premature birth is important to improve the lives of these children. Apnoea - the cessation of breathing - is a common pathology associated with prematurity. These potentially life-threatening events can result in reduced cerebral oxygenation and frequent apnoeas have been associated with long-term effects including reduced childhood cognitive ability. The focus of the research group is to understand the interaction between apnoea and brain development in premature infants, and to investigate how physiology is altered by pharmacological and non-pharmacological interventions. The group is part of a multidisciplinary team of clinicians, nurses, mathematicians, engineers and scientists. The group's work focuses on the collection and use of EEG (electroencephalography) and vital signs (heart rate, respiratory rate etc) data, and the group develops signal processing techniques and uses machine learning to derive tools with the aim to ultimately improve outcomes for prematurely-born children.

Young Chan Kim

Novel Vaccine Development and Diagnostic Tools for Emerging Infectious Diseases

This group, based within the Oxford Vaccine Group (OVG), is dedicated to the development of innovative vaccines and diagnostic tools targeting a range of emerging infectious diseases, including arboviruses (alphavirus and flavivirus), Plague, Q fever, and Chagas disease. The group's mission is to harness cutting-edge vaccine platforms to address global health challenges, with a primary focus on improving human health.

The group utilises a diverse array of vaccine technologies, including:

- Viral vectors (ChAdOx1, MVA)
- mRNA
- Virus-like particles (VLPs)
- Glycoconjugates
- Subunit

These platforms are used to design, develop, and conduct both pre-clinical and clinical testing of novel vaccines. In addition to vaccine development, the group also leads work on the development of diagnostic tools particularly for diseases such as enteric fever (Salmonella Typhi and Paratyphi), C. difficile and Neglected Tropical Diseases (NTDs). A key aim is to develop diagnostic assays tailored for use in low-resource settings to enhance clinical management and

disease surveillance.

This DPhil programme offers an exciting opportunity for motivated researchers to contribute to the group's vaccine and diagnostic innovation initiatives. You will be engaged in projects that advance the field of infectious disease research, with a focus on:

- Vaccine design using multiple platforms
- Pre-clinical and clinical testing of vaccines
- Immunoassays (ELISA, ELISpot, flow-cytometry, Luminex)
- Functional immunological assays, including virus neutralisation and serum bactericidal assays.

The team provides comprehensive support across a wide range of research areas, offering specialised training in both vaccine development and diagnostic tool design. You will gain hands-on experience in translational research, equipping you with the skills needed to address some of the most pressing global public health challenges. This programme provides a robust platform for building a career in vaccine and diagnostic development, with the opportunity to contribute to impactful research with real-world global health implications.

Teresa Lambe

Project Overview

Deadly respiratory pathogens - including coronaviruses, avian influenza, arenaviruses, and hantaviruses - pose persistent global threats due to their rapid airborne transmission, zoonotic potential, and ability to cause pandemics. Their mutability and potential for bioterrorism make them particularly dangerous, as they can overwhelm healthcare systems and cause high mortality rates. Current intramuscular vaccines induce strong systemic immunity but often fail to generate effective local responses, such as secretory IgA or tissue-resident memory T cells in the respiratory tract - limiting their ability to block infection and transmission. Mucosal vaccination offers a promising solution, providing the potential for sterilising immunity and interrupting chains of infection at the point of entry. This DPhil project aims to overcome challenges in mucosal vaccine delivery by advancing our understanding of localized immunity and developing next-generation technologies for targeted respiratory immunisation.

Objectives

- Dissect the relationship between mucosal and systemic immune responses.
- Investigate immune imprinting and immunisation strategies to circumvent.
- Engineer precision delivery systems for enhanced targeting of respiratory tissues.
- Develop thermostable vaccine formulations for pulsatile delivery, using innovative screening methods, including mucosal organoid models.

Training and Development

You will receive interdisciplinary training in mucosal immunology, molecular biology, and translational vaccinology. You will acquire expertise in advanced techniques such as - cellular assays, vector design, mRNA-LNP formulation with novel carriers (e.g., protein-functionalised nanoparticles), in vivo imaging, and mucosal challenge models. Mucosal organoid platforms will be used for high-throughput screening. This project offers a unique blend of fundamental science and technology innovation, equipping the student with the skills needed for impactful careers in public health, biodefense, and translational research.

Martin Maiden

The application of the evolutionary and population approaches to the genomic analysis of bacterial pathogens for translation into public health interventions, especially immunisation

Specific organism interests include the pathogenic Neisseria and Campylobacter. Highly interdisciplinary work across the Medical and MPLS Divisions.

See, for example: MacLennan JM, Rodrigues CMC, Bratcher HB, Lekshmi A, Finn A, Oliver J, et al. Meningococcal carriage in periods of high and low invasive meningococcal disease incidence

in the UK: comparison of UKMenCar1-4 cross-sectional survey results (http://doi.org/10.1016/S1473-3099(20)30842-2), (Reference: Lancet Infect Dis. 2021;21:677-87. Epub 2021/01/23. doi: 10.1016/S1473-3099(20)30842-2. PMID: 33482143)

Daniel O'Connor

Utilising the "-omics" toolkit to elucidate the mechanisms underlying immune responses to vaccines and infections

Vaccines have had a transformative impact on public health. However, infection remains an important cause of morbidity and mortality globally, causing ~9% of deaths and two of the five leading causes of disability-adjusted life-years. Acute febrile illness is one of the most common presenting symptoms in healthcare facilities. Signs and symptoms of infection can be non-specific of aetiology. Moreover, diagnostic tests can lack sensitivity and take several hours to days to return conclusive results. Consequently, there is a clinical demand for a new accurate and rapid diagnostic tool — to improve patient care and help tackle the emerging global crisis of antimicrobial resistance.

The immunological processes involved in protective immune responses are not entirely understood and vaccine development has been largely empirical. Recent technological advances offer the opportunity to reveal the immunology underlying vaccine response at an unprecedented resolution. These data could revolutionize the way vaccines are developed and tested and further augment their role in securing global health.

This theme of work explores multi-omics data across a spectrum of immune perturbation — vaccination through to infection. Research includes elucidating the genetic determinants of vaccine responses, describing novel immune correlates of protection, and developing rapid and accurate diagnostics.

Andrew Pollard

Oxford Vaccine Group

At the Oxford vaccine group our mission is the design, development, clinical evaluation and laboratory testing of vaccines to improve human health. We aim to achieve our mission with major programmes on:

- Pneumococcal infection and vaccines (Daniela Ferreira);
- Viral outbreak pathogens (Teresa Lambe);
- Typhoid, paratyphoid, Coxiella, meningococcus and plague (Andrew Pollard);
- Non-typhoidal salmonella (Maheshi Ramasamy);
- TB (Rinn Song);
- Use of "omics" to interrogate vaccine responses (O'Connor);
- Social sciences of vaccines (Samantha Vanderslott); and
- Alphaviruses and Chagas (Young Chan Kim).

Further details can be found under names of individual investigators. These major programmes above are in addition to a broad programme of work on COVID19 and the use of human challenge models and other experimental medicine studies. Our work includes opportunities for PhD training for potential students from both clinical and scientific backgrounds.

Katrina Pollock

Vaccines that provide long-term protection against evolving pathogens eg SARS-CoV-2 and that overcome immunocompromise in older people, are urgently needed. Our knowledge of human immunity is incomplete however, and the opportunity for rational vaccine design has been overlooked.

To address this, the Lymph node single cell genomics ancestry and ageing (LEGACY) Network studies the key tissue in which the immune response is generated. Using real time ultrasound

imaging to sample lymph nodes by fine needle aspiration, coupled with innovative clinical study design, we can map the steady state and vaccine-stimulated immune response over time.

Our work involves detailed immunological techniques such as single cell gene expression, Cellular Indexing of Transcriptomes and Epitopes by Sequencing (CITE-Seq), T cell receptor sequencing, sequencing of immunoglobulin genes, multiparameter flow cytometry and systems serology.

Our experimental medicine model is being used to investigate questions in vaccine-responsive lymph nodes and blood in diverse groups:

1. LEGACY01: what is the distribution of immune cell types in unstimulated and responding lymph nodes after seasonal influenza vaccine in an ancestrally diverse cohort?
2. LEGACY02: how does age affect the priming and recall responses to a novel adenoviral vector vaccine against Crimean-Congo Haemorrhagic Fever?
3. LEGACY03: how does age affect the kinetics of the response to seasonal influenza and COVID-19 booster vaccinations?

Our multidisciplinary clinical and scientific research team welcomes applications from DPhil students across the arc of our work, with immunology as the cross-cutting theme.

Maheshi Ramasamy

We welcome applications from prospective students from a scientific or clinical background who are passionate about infectious diseases and global health. Projects are designed around WHO priority pathogens with a focus on improving health outcomes in Africa.

Enteric infections and mucosal immune responses

Infections caused by Gram negative bacteria are a major cause of childhood morbidity and mortality in low and middle income countries. Disease control ultimately requires access to good sanitation, but the current lack of sensitive diagnostic tests and increasing resistance to commonly used antibiotics make vaccines against these pathogens a cost-effective medium-term solution.

The group investigates immunity against enteric pathogens with a focus on Salmonella. Projects include:

- assessing vaccines in healthy volunteer clinical trials;
- investigating correlates of protection against disease using natural infection and controlled human infection model studies; and
- developing laboratory techniques including spectral flow cytometry, systems serology and to measure systemic and mucosal immune responses to enteric organisms.

Emerging pathogens

The COVID-19 pandemic highlighted how rapidly a novel pathogen can spread, disrupting health systems, economies, and societies worldwide. The Oxford Vaccine Group played a key role in designing and testing a vaccine that contributed to saving millions of lives globally. Building on our expertise in emerging pathogen vaccines, we are developing strategies to tackle Lassa fever, a serious and often overlooked threat to public health, particularly in West Africa where it is endemic. Developing an effective vaccine would not only protect vulnerable populations and healthcare workers but also help contain outbreaks before they escalate.

Projects include:

- investigating novel Lassa fever candidates in clinical trials in West Africa;
- a social sciences approach to exploring how communities and policy stakeholders in endemic regions perceive Lassa fever and potential vaccines; and
- developing novel laboratory techniques including ELISpot and viral neutralising antibody assays against Lassa fever virus post vaccination and after natural infection.

Carlo Rinaldi

The overall purpose of the group's research is to reduce the global burden of hereditary neurological disease. This goal is pursued through three strategic aims:

1. identification of genes associated with neurological diseases,
2. advancement of the current understanding of the molecular mechanisms of pathogenesis in these diseases, and
3. development of effective treatments for hereditary neurological diseases.

This work has recently led to the development of an innovative gene therapy approach for a genetic condition named spinal and bulbar muscular atrophy, relying on viral delivery of an isoform of the disease gene Androgen Receptor and suitable for translation into the clinic (see reference: doi.org 10.1126/sciadv.abi6896 (https://doi.org/10.1126/sciadv.abi6896)) and the identification of genetic variants in the ATP6V0A1 gene as a cause of severe neurodevelopmental conditions (see reference: doi.org 10.1101/2021.06.01.21257500 (https://doi.org/10.1101/2021.06.01.21257500)).

In particular, the group are interested in understanding the mechanisms underlying the diversification of the human transcriptomic (RNA editing), the ways those contribute to the functioning of the motor unit in health and disease, and how this knowledge can be harvested to enable targeted correction of mutations in coding sequences of RNA for treatment.

The group employs a combination of transcriptomic analyses, advanced microscopy, cellular and biochemical studies in human iPSC-derived neurons, disease models in mice, and translational studies in human subjects. The group's expectation is that these studies will ultimately reveal central disease mechanisms of neuromuscular diseases and serve as a foundation for the development of effective disease-modifying therapies.

Thomas Roberts

RNA medicine

Strategies for therapeutic manipulation of gene expression have matured to the point where there are now multiple FDA-approved drugs with diverse mechanisms of action including gene silencing (via RNase H-active gapmer oligonucleotides or RNA interference using siRNA) and direct antagonism of proteins (using aptamers), and exon skipping/inclusion using steric block oligonucleotides. Of particular interest are splice switching oligonucleotides that can rescue expression of proteins associated with Duchenne muscular dystrophy (DMD) and spinal muscular atrophy (SMA) – both paediatric muscle-wasting disorders which previously had very limited treatment options. Central to the development of these therapies is an understanding of disease nucleic acid biology (in terms of understanding the target mRNA splicing) and drug nucleic acid chemistry (the design, composition, and delivery of the therapeutic molecule). These exciting developments are paving the way for a plethora of new molecule medicines across a wide spectrum of disease indications. The group are interested in developing new modalities of therapeutic gene manipulation, including gene editing, RNA editing, and gene activation. Primarily, the group are focused on neuromuscular diseases (such as DMD and SMA) and infantile epileptic encephalopathies (such as Dravet syndrome).

Work in the group encompasses:

1. investigations of novel RNA-targeting or RNA-based therapeutic strategies;
2. gene expression profiling to better understand disease (especially in terms of spatial-restriction, sub-cellular localisation, and non-coding RNA); and
3. the development of biomarkers for monitoring responses to therapeutic intervention (with a particular focus on small RNA biomarkers).

Anindita Roy

The developmental stage-specific cellular and molecular characteristics of fetal and postnatal progenitors are likely to determine the biology of ALL at different ages. We are particularly interested in high-risk childhood ALL, such as infant ALL and Down syndrome associated ALL. We have recently developed a novel MLL-AF4+ infant ALL model using primary human

haematopoietic stem and progenitor cells. The overarching aim of research in our lab is to improve the outcomes of children with high-risk ALL.

The current DPhil projects are in these areas:

1. Developing faithful models of high-risk childhood ALL to better understand leukaemia initiation and maintenance at different ages;
2. Mechanistic studies to understand key drivers of childhood ALL;
3. Target discovery and translation of findings from (1) and (2) into preclinical studies; and
4. Projects using multi-omics to understand how cell intrinsic and/or microenvironmental characteristics of the developmental stage at which a leukaemia originates, drives the biology of leukaemia at different ages.

Stephan Sanders

Severe neurodevelopmental disorders (NDD) lead to serious and often life-threatening symptoms including seizures, cognitive impairment, communication problems, and motor dysfunction. Our group aims to use bioinformatics to identify the genetic mechanisms underlying these disorders and to develop therapies to improve the lives of those affected.

We focus on three main research questions:

1. How can we find the genetic variants and genes underlying these disorders in the coding and noncoding genome?
2. What do these genetic variants and genes tell us about the underlying neurobiology?
3. How can we use these insights to develop advanced therapies to help affected individuals?

Over the past decade, our group has used whole-exome and whole-genome sequencing of thousands of individuals to identify hundreds of genes underlying NDDs (Read more about this (https://pubmed.ncbi.nlm.nih.gov/35982160/) on the PubMed website) and to understand the role of splicing variants and noncoding variants in these disorders (Read more about this (https://pubmed.ncbi.nlm.nih.gov/30661751/) on the PubMed website).

Working with collaborators in the USA (UC San Francisco and Yale) we have generated single-cell datasets with epigenetic (ATAC-seq) and transcriptomic (RNA-seq) data from postmortem brain samples of hundreds of individuals. We use these data to understand regulatory processes underlying brain development and NDDs, including the role of biological sex as a modifier. We also aim to use these data to identify genes and variants that are amenable to genome-targeted therapies, including antisense oligonucleotides (ASOs) and CRISPR-based genome editing.

Laurent Servais

STRONG (Specialised Translational Research Oxford Neuromuscular Group)

STRONG (Specialised Translational Research Oxford Neuromuscular Group) has a special interest for newborns screening of genetic condition, Angelman syndrome, innovative outcomes using magneto-inertial technology and wearable devices and natural history studies. The group are working with patients in order to design and conduct efficient clinical trials.

Rebeccah Slater

Paediatric Neuroimaging Group

The Paediatric Neuroimaging Group can offer a range of DPhil projects related to early life neurodevelopment and clinical research translation. The group's work is focussed on better understanding the development and treatment of infant pain. The group places great importance on translating mechanistic insights from research into clinical practice and can offer DPhil students opportunities to focus on mechanistic research, clinical trials, methodology development

(MRI, EEG and analytical approaches) and provide opportunities to work with industry, academia and regulators to optimise the acceleration of innovations into practice.

Nancy Stathopoulou

This group is interested in the genetic and epigenetic basis of congenital heart disease. Congenital heart disease (CHD) is the most frequent birth defect, affecting around 1 in 100 births globally. Heart malformations associated with CHD range in severity, from no or few symptoms to very severe, resulting in neonatal lethality or requiring open-heart surgery. Despite progress in cardiovascular medicine and surgery that has reduced mortality rates, CHD is still the primary cause of mortality from birth defects, imposing a significant disease burden worldwide. Although CHD is highly prevalent, most of the cases remaining unexplained, which highlights the need to identify new causes of CHD and better understand CHD pathogenesis.

The group uses mouse models of congenital heart disease and embryonic stem cells to gain insights into the developmental processes disrupted in disease. It employs a wide variety of techniques including molecular biology, gene editing, histology/anatomy and imaging as well as transcriptomics and epigenomics, combined with bioinformatics analysis. This approach allows the group to study different components of the cardiac gene regulatory networks, and discover new genes with important roles in cardiac development. It also investigates the role of chromatin during cardiac development and disease. To achieve this, the group is exploring the non-coding genome to identify and characterise novel enhancers involved in cardiac development.

This group is based at the Institute of Developmental and Regenerative Medicine (IDRM).

Samantha Vanderslott

Vaccines, Health and Society (VHAS) Unit

The Vaccines, Health and Society (VHAS) Unit is a multidisciplinary research centre that seeks to improve understanding of the roles played by different individuals and groups and their interaction with healthcare practice and medical research. The unit aims to produce theoretical and empirical research in social sciences and create a bridge to public health issues through policy advice, interventions, and public engagement. We draw on a variety of disciplines from sociology, history, behavioural science, health economics, and public policy to combine a wide set of tools and literatures. Further, being based within the Oxford Vaccine Group, benefits from the unique opportunity to interact with vaccinologists, epidemiologists, immunologists, and clinicians. A particular focus lies on studying actors' attitudes and behaviour towards vaccination in society, policy, and media, across time and geographies. More broadly, our interests are also in a wide range of public health topics, including issue prioritisation, disease history, and social mobilisation. Our research unit runs regular research seminars, has ongoing collaborative writing groups on a wide range of topics, and frequently hosts visiting researchers, providing a lively environment for DPhil candidates. We can support a range of DPhil projects on the social aspects of vaccination and health, including co-supervision with other groups within the Department of Paediatrics (and in exceptional cases outside of the department).

Changes to this course

The University will seek to deliver this course in accordance with the description set out in this course page. However, there may be situations in which it is desirable or necessary for the University to make changes in course provision, either before or after registration. The safety of students, staff and visitors is paramount and major changes to delivery or services may have to be made if a pandemic, epidemic or local health emergency occurs. In addition, in certain circumstances, for example due to visa difficulties or because the health needs of students cannot be met, it may be necessary to make adjustments to course requirements for international study.

Where possible your academic supervisor will not change for the duration of your course. However, it may be necessary to assign a new academic supervisor during the course of study or before registration for reasons which might include illness, sabbatical leave, parental leave or change in employment.

For further information please see our page on changes to courses (//www.ox.ac.uk/admissions/graduate/courses/changes-to-courses) and the provisions of the student contract (//www.ox.ac.uk/admissions/graduate/after-you-apply/your-offer-and-

contract) regarding changes to courses.

Costs

Annual course fees

The fees for this course are charged on an annual basis.

Fees for the 2026-27 academic year at the University of Oxford

Fee status	Annual Course fees
Home	£10,470
Overseas	£34,700

What do course fees cover?

Course fees cover your teaching as well as other academic services and facilities provided to support your studies. Unless specified in the additional information section below, course fees do not cover your accommodation, residential costs or other living costs. They also don't cover any additional costs and charges that are outlined in the additional costs information below.

How long do I need to pay course fees?

Course fees are payable each year, for the duration of your fee liability (your fee liability is the length of time for which you are required to pay course fees). For courses lasting longer than one year fees will usually increase annually, as explained in the University's Terms and Conditions (//www.ox.ac.uk/students/new/contract) .

Graduate students who have reached the end of their standard period of fee liability will be required to pay a University continuation charge and/or a college continuation charge.

The University continuation charge, per term for entry in 2026-27 is £656, please be aware that this will increase annually. For part-time students, the termly charge will be half of the termly rate payable by full-time students.

If a college continuation charge applies (not applicable for non-matriculated courses) it will be between £150 and £500, as explained in our information about continuation charges (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges/continuation-charges) . Please contact your college for more details, including information about whether your college's continuation charge is applied at a different rate for part-time study.

Where can I find more information about fees?

Our fees and other charges (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges) pages provide further information, including details about:

- course fees and fee liability (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges/courses-fees-and-liability) ;
- how your fee status is determined (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges/fee-status) ;
- changes to fees and other charges (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges/changes-to-fees-and-charges) ; and
- continuation charges (//www.ox.ac.uk/admissions/graduate/fees-and-funding/fees-and-other-charges/continuation-charges) .

Information about how much fees and other costs will usually increase each academic year is set out in the University's Terms and Conditions (//www.ox.ac.uk/students/new/contract) .

Additional costs

There are no compulsory elements of this course that entail additional costs beyond fees (or, after fee liability ends, continuation charges) and living costs. However, please note that, depending on your choice of research topic and the research required to complete it, you may incur additional expenses, such as travel expenses, research expenses, and field trips. You will need to meet these additional costs, although you may be able to apply for small grants from your department to help you cover some of these expenses.

Living costs

In addition to your course fees and any additional course-specific costs, you will need to ensure that you have adequate funds to support your living costs for the duration of your course.

Living costs for full-time study

For the 2026-27 academic year, the range of likely living costs for a single, full-time student is between £1,405 and £2,105 for each month spent in Oxford. We provide the cost per month so you can multiply up by the number of months you expect to live in Oxford. Depending on your circumstances, you may also need to budget for the costs of a student visa and immigration health surcharge (//www.ox.ac.uk/admissions/graduate/fees-and-funding/living-costs) and/or living costs for family members or other dependants (//www.ox.ac.uk/admissions/graduate/fees-and-funding/living-costs#field_listing_content_content-item--2) that you plan to bring with you to Oxford (if dependant visa eligibility criteria (//www.ox.ac.uk/students/visa/before/family) are met).

Further information about living costs

The current economic climate and periods of high national inflation in recent years make it harder to estimate potential changes to the cost of living over the next few years. For study in Oxford beyond the 2026-27 academic year, it is suggested that you budget for potential increases in living expenses of around 4% each year – although this rate may vary depending on the national economic situation.

A breakdown of likely living costs for one month during the 2026-27 academic year are shown below. These costs are based on a single, full-time graduate student, with no dependants, living in Oxford.

Likely living costs for one month in Oxford during the 2026-27 academic year

	Lower range	Upper range
Food	£315	£545
Accommodation	£825	£990
Personal items	£160	£310
Social activities	£50	£130
Study costs	£35	£90
Other	£20	£40
Total	£1,405	£2,105

For information about how these figures have been calculated as well as tables showing the likely living costs for nine and twelve months, please refer to the living costs (//www.ox.ac.uk/admissions/graduate/fees-and-funding/living-costs) page of our website.

Document accessibility

If you require a more accessible version of this document please contact Graduate Admissions and Recruitment by email (graduate.admissions@admin.ox.ac.uk).