

MOROCCAN SOCIETY OF GENOMICS AND HUMAN GENETICS (SM2GH)
SCHOOL OF IMMUNOGENETICS (SIG)

7TH ADVANCED IMMUNOGENETICS COURSE

Theme

Immunogenetics in the Era of Precision Health: Integrating Genetic Diversity and Innovative Technologies

Faculty of Sciences & Faculty of Medicine and Pharmacy, Ibn Zohr
University — Agadir, Morocco

July 01 – 04, 2026

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Welcome Message from the Chairs

Dear Colleagues and Friends, On behalf of the Moroccan Society of Genomics and Human Genetics (SM2GH) and the School of Immunogenetics (SIG), it is our great pleasure and honour to welcome you to the 7th International Advanced Immunogenetics Course, held from in Agadir July 1st to 4th, 2026, at Faculty of Medicine and Pharmacy in close collaboration with the Faculty of Sciences. It is particularly meaningful for us to gather once again in Agadir, nearly seven years after hosting the first international congress of SM2GH in this very city a landmark event marked by high-level scientific exchanges and enduring collaborations. We are delighted to return and continue building on this strong and inspiring foundation.

Immunogenetics today stands at the crossroads of immunology, genomics, bioinformatics, and precision medicine. The remarkable polymorphism of the HLA system, the diversity of immunoglobulin (IG) and T-cell receptor (TR) repertoires, and the genetic determinants of host responses to infection and cancer collectively shape individual and population differences in health and disease. Understanding this complex architecture of immune diversity and translating it into clinical and public health applications remains the central ambition of this course.

In a context defined by rapid technological advances from high-throughput and third-generation sequencing to single-cell approaches, immunotherapies, and gene and cell therapies and by the growing recognition of the importance of genetic diversity, particularly in African populations, the need for high-level training and scientific exchange has never been greater.

Over four intensive days, the program combines hands-on workshops with high-level lectures. Participants will receive training on the IMGT information system for the annotation and analysis of adaptive immune repertoires, as well as on high-resolution HLA genotyping using NGS (Oxford Nanopore and other technology) and advanced bioinformatics pipelines. These practical sessions are complemented by keynote lectures and thematic discussions covering immune diversity, cancer immunogenetics, infectious diseases, host-pathogen interactions, advanced genomic technologies, and next-generation vaccines.

This edition places special emphasis on African genomic and immunogenetic diversity, still underrepresented in global databases. Through the African Immunogenome initiative, the course aims to strengthen scientific capacity, promote equitable precision medicine, and foster sustainable international collaborations.

We are honoured that this 7th edition is held under the distinguished honorary presidency of Professor Rajae El Aouad, Director of the College of Life Sciences and Technologies at the Hassan II Academy of Sciences and Technologies, and a leading figure in Moroccan immunology. We also wish to highlight the participation of our partner, IMGT®, the Gold international reference platform for immunogenetics and immunoinformatics.

We warmly thank Ibn Zohr University, as well as the Faculties of Sciences and of Medicine and Pharmacy, for hosting this edition. Our sincere thanks go to all speakers and members of the organizing and scientific committees, whose engagement makes this course a vibrant scientific and human experience.

We wish you a stimulating, fruitful, and memorable course, and a most enjoyable stay in the beautiful coastal city of Agadir.

Prof. Khalid SADKI — Chair of the 7th edition of the SIG, Founding President of SM2GH and of the School of Immunogenetics (SIG)

Prof. Ahmed BELMOUDDEN — Co-Chair of the 7th edition, Dean of the Faculty of Sciences, Ibn Zohr University, Agadir

Committees

Honorary committee

- **Prof. Nabil Hmina** — President of Ibn Zohr University, Agadir, Morocco
- **Prof. Mehdi Soufi** — Dean of the Faculty of Medicine and Pharmacy, Agadir, Morocco
- **Prof. Rajae El Aouad** — Honorary President of the 7th edition; Director of the College of Life Sciences and Technologies, Hassan II Academy of Sciences and Technologies, Morocco

Organizing Committee

- **Prof. Khalid Sadki, PhD** — Chair, 7th International Advanced Course of Immunogenetics (SIG 2026); Founding President, Moroccan Society of Genomics and Human Genetics (SM2GH) and SIG
- **Prof. Ahmed Belmoudden, PhD** — Co-Chair, 7th International Advanced Course of Immunogenetics (SIG 2026); Dean of the Faculty of Sciences, Agadir
- **Prof. Hicham Oumzil**, virology and medical biology, Mohammed V University of Rabat
- **Prof. Ihsane El Otmani**, Molecular biology and oncogenetic, Hassan 1st University, Settat
- **Prof. Mohamed Gouskir**, Computer science, ENSA Béni Mellal, Sultan Moulay Slimane University
- **Dr. Saadi Amasdl**, Medical Genetics, CHU Hassan II Fes
- **Dr. Salsabil Hamdi**, Population genetics Parasitology, Pasteur Institut
- **Prof. Younes Abbas**, Biologist , FP-Béni Mellal, Sultan Moulay Slimane University
- **Dr. Meryem Fakhkhari**
- **Mme Radia Benoun**
- **Miss Majda Sadki**

Technical Program

Four-day advanced course combining hands-on workshops (IMGT and HLA NGS) with keynote lectures and thematic sessions.

Day 1 — Wednesday, July 1st, 2026

Time	Session	Speaker / Subject
08:30 – 09:00	Registration	Registration and Welcome Coffee
09:00 – 09:20	Opening Remarks	Prof. Khalid Sadki (Chair) & Prof. Ahmed Belmoudden (Co-Chair)
09:20 – 10:30	Session 1 — IMGT Workshop	Prof. Sofia Kossida & Dr. Myriam Croze (Univ. Montpellier, IMGT, France): Introduction to IMGT — annotation, nomenclature and analysis of the adaptive immune repertoire
10:30 – 10:50		Coffee Break
10:50 – 13:00	Session 1 — IMGT Workshop (cont.)	Prof. Sofia Kossida & Dr. Myriam Croze : Introduction to IMGT (hands-on)
13:00 – 14:15		Lunch
	Moderators	Prof. Ahmed Belmoudden & Dr. Myriam Croze
14:15 – 15:15	Session 2 — Foundations of Immune Diversity	Prof. John Trowsdale (Univ. of Cambridge, UK): The Cost of a Comprehensive Immune Defence
15:15 – 16:00	Session 2	Prof. Sofia Kossida (IMGT, France): IMGT — past achievements, present developments, future directions
16:00 – 16:15		Coffee Break
16:15 – 17:15	Session 3 — Opening Ceremony	- Prof. Nabil Hmina, President of Ibn Zohr University, Agadir - Prof. Ahmed Belmoudden, Dean of the Faculty of Sciences, Co-Chair of the 7th edition of the SIG - Prof. Mehdi Soufi, Dean of the Faculty of Medicine and Pharmacy - Prof. Rajae El Aouad, Director of the College of Life Sciences and Technologies, Hassan II Academy of Sciences and Technologies, Honorary President of the 7th Edition of the SIG - Prof. Khalid Sadki, Chair of the 7th edition of the SIG, Founding President of the Moroccan Society of Genomics and Human Genetics (SM2GH) and the School of Immunogenetics (SIG)
	Moderator	Prof. Khalid Sadki
17:15 – 18:15	Keynote Lecture 1	Prof. Dominique Charron (Univ. of Paris, “Jean Dausset” Lab; SJTU Ruijin Hospital): Personalized Immunogenetics in Medicine

Day 2 — Thursday, July 2nd, 2026

Time	Session	Speaker / Subject
09:00 – 10:30	Session 4 — IMGT Workshop	Prof. Sofia Kossida & Dr. Myriam Croze: Analysis and exploration of the expressed IG and TR repertoire with IMGT tools
10:30 – 10:50		Coffee Break
10:50 – 12:30	Session 4 — IMGT Workshop (cont.)	Prof. Sofia Kossida & Dr. Myriam Croze (hands-on)
12:30 – 14:00		Lunch
	Moderators	Prof. Khalid Sadki & Prof. Hicham Oumzil
14:00 – 14:45	Session 5 — Advanced Technologies / Keynote Lecture 2	Prof. Ambroise Wonkam (Johns Hopkins Univ., USA): Leveraging our Common African Genomes to Improve Health Globally
14:45 – 15:30	Session 5	Prof. Lbachir BenMohamed (Univ. of California, Irvine, USA): Multi-antigen Coronavirus Vaccine Cross-Protection
15:30 – 16:15	Session 5	Prof. Solomon F. Ofori-Acquah (Emory Univ. & WAGMC, Univ. of Ghana): Inflammatory Pathways as Therapeutic Targets in Sickle Cell Disease
16:15 – 16:45		Coffee Break
	Moderators	Prof. Nabil Hajji & Prof. John Trowsdale
16:45 – 17:30	Session 5	Dr. Tala Shahin (NYU Abu Dhabi, UAE): Deciphering T-Cell Immune Regulation Using Single-Cell Technologies
17:30 – 18:15	Session 5	Prof. Ahmed Belmoudden (Ibn Zohr Univ., Agadir): Bacteriophage Therapy in the Era of Antimicrobial Resistance
18:15 – 19:15	Session 5	Prof. Paola Lanuti (Univ. "G. d'Annunzio" Chieti-Pescara, Italy): Tracking CAR-T Cells and Their Extracellular Vesicles by Flow Cytometry

Day 3 — Friday, July 3rd, 2026

Time	Session	Speaker / Subject
	Moderator	Dr. Salsabil Hamdi
09:00 – 10:00	Session 6 — HLA NGS Workshop	Prof. Khalid Sadki & Dr. Sami Djoulah (Wiratech Europe, France): HLA typing, TCR/BCR analysis, bioinformatics pipelines, data interpretation, case studies
10:00 – 10:30		Coffee Break
10:30 – 12:30	Session 6 — HLA NGS Workshop	Dr. Mohammed Fadli (BH Lab) & Dr. El Hadi Seninet (Sfax Univ., Tunisia): High-resolution HLA genotyping / Oxford Nanopore (Part 1)
12:30 – 14:00		Lunch
	Moderators	Prof. Sami Djoulah & Prof. Dominique Charron

Time	Session	Speaker / Subject
14:00 – 15:00	Session 7 — Cancer Immunogenetics / Keynote Lecture 3	Prof. Nabil Hajji (Univ. of Seville, Spain; LIU & Dassault Systèmes, USA): Adaptive, Dynamic Digital Twins of the Tumor–Immune Microenvironment
15:00 – 16:00	Session 7	Dr. Meryem Aloulou (Toulouse Inst. for Infectious & Inflammatory Diseases, France): Decoding T–B Cell Cooperation in Cancer Immunotherapy
16:00 – 17:00	Session 7	Prof. Collet Dandara (Univ. of Cape Town, South Africa): Genomic and Pharmacogenomic Determinants of Cancer Susceptibility in African Ancestry
17:00 – 18:00	Panel — Africa Immunogenome Initiative	Prof. Khalid Sadki, Prof. Dominique Charron, Dr. Sami Djoulah, Prof. Musa Kana & Prof. Sofia Kossida : Africa Immunogenome — Unlocking Genetic Diversity for Precision Medicine

Day 4 — Saturday, July 4th, 2026

Time	Session	Speaker / Subject
	Moderator	Prof. Ihsane El Otmani
09:00 – 10:30	Session 8 — HLA NGS Workshop	Dr. Mohammed Fadli (BH Lab) & Dr. El Hadi Seninet (Sfax Univ., Tunisia): High-resolution HLA genotyping /Oxford Nanopore technology 2
10:30 – 10:50		Coffee Break
10:50 – 12:30	Session 8 — HLA NGS Workshop (cont.)	Dr. Mohammed Fadli & Dr. El Hadi Seninet : Fundamentals of MinKNOW and NanoTYPER tools
12:30 – 14:00		Lunch
	Moderator	Dr. Meryem Aloulou
14:00 – 15:00	Session 9 — Immunogenetics of Infectious Diseases / Keynote Lecture 4	Prof. Youssef Idaghdour (NYU Abu Dhabi, UAE): Genetic and Environmental Determinants of the Host Response to Infection
15:00 – 15:45	Session 9	Dr. Issiaka Soulama (IRSS/CNRST, Burkina Faso): Immune System Genes and Malaria Resistance
15:45 – 16:00		Coffee Break
	Moderators	Prof. Fatima Boubrik & Prof. Larbi Baassi
16:00 – 16:45	Session 9	Prof. Hicham Oumzil (Mohammed V Univ., Rabat): HIV Host Genetic Polymorphisms and Antiretroviral Treatment Response
16:45 – 17:30	Session 9	Prof. Kamal El Bissati (Univ. of Chicago Medical Center, USA): Immunogenetics, Vaccines and Molecular Diagnostics in Toxoplasmosis
17:30 – 18:00	Session 10 — Closing Remarks	Prof. Khalid Sadki & Prof. Ahmed Belmoudden

Keynote Lectures

Four plenary keynote lectures delivered by distinguished international speakers.

KEYNOTE LECTURE 1

Personalized Immunogenetics in Medicine

Prof. Dominique Charron, MD, PhD | *University of Paris, "Jean Dausset" Laboratory, France; and Shanghai Jiao Tong University, Ruijin Hospital, Shanghai, China*

Abstract. Displaying the highest degree of allelic polymorphism of any functional and medically relevant system (more than 30,000 alleles), the HLA complex is a landmark and a model of personalized, predictive and preventive medicine.

I will illustrate the impact and future potential of HLA NGS genetic typing in organ and hematopoietic transplantation. I will also emphasize the importance of HLA in cancer and infectious diseases. Other immunogenes such as TcR, cytokines and receptors contribute to the fine tuning of individual immune responses to pathogens, cancer but also drugs, qualifying the HLA genes as genuine pharmacogenes.

The role of immunogenomics is fast developing and the high-throughput DNA sequencing technologies are now allowing us to unravel the potential usefulness of HLA, TcR, cytokine and receptor polymorphisms in personalized medicine and public health.



**Prof. Dominique Charron,
MD, PhD**

Biosketch. Professor Dominique Charron was born in Nantes. He joined Nantes medical school and the Paris Intern Residency program in Hematology at Hopital Saint-Louis with Pr Jean Bernard. He further trained as a post-doctoral fellow and became Assistant Professor of research at Stanford University in Immunology with Pr Hugh O. McDevitt. Trained as an Immunologist, he specialized in HLA and Molecular Immunogenetics, Transplantation and Regenerative Medicine.

Currently, he is Professor Emeritus of Medicine at Paris University and Medical Advisor for international biology at the international affairs department of the Greater Paris University Hospital (AP-HP) General Directorate. He was appointed in 2016 Consulting Professor at Jiaotong University / Ruijin Hospital in Shanghai and Professor at Unistra (University of Strasbourg). He is Editor in Chief of the journal "Exploration of Immunology", Founding President of HLA-MED, and co-Founder and CMO of Asfalia Biologics.

Formerly, Pr Charron founded and headed the "Jean Dausset" Histocompatibility and Immunogenetics laboratory (one of the largest worldwide) at Hopital Saint-Louis, and the INSERM research units U396, U662 and U940. He has contributed to over 500 papers in high-ranking journals (Nature, Cell, NEJM, J. Exp. Med, Blood, PNAS, Lancet, J. of Immunology). He organized and chaired the 12th International Histocompatibility Workshop and Conference, and presided over the International Histocompatibility Council (HIC) and the European Federation of Immunogenetics (EFI). His accomplishments were rewarded by the Ruggero Ceppellini Award of the EFI, the Claude Bernard Grand Prize in Medicine and the Rose Payne Award of the ASHI (2017).

KEYNOTE LECTURE 2

Leveraging our Common African Genomes to Improve Health Globally

Prof. Ambroise Wonkam | McKusick-Nathans Institute and Department of Genetic Medicine, Johns Hopkins University School of Medicine, Baltimore, USA

Abstract. Africa, as the cradle of modern humans, holds unparalleled genetic diversity. However, less than 2% of sequenced human genomes come from individuals of African ancestry. We argue that investing in African genomics is a scientific imperative, driven by three major pillars: Ancestry, Ecology, and Equity.

Ancestry. All humans share common origins in Africa, with approximately 5–15% of our genetic makeup stemming from ancient hominid lineages (the so-called “Ghost DNA”). Over 300,000 years of human history in Africa, marked by various waves of migration and related genetic admixture, have resulted in a rich pool of unique genetic variants. Studies such as those by the H3Africa consortium identified millions of previously undocumented variants, most of which are population specific.

Ecology. Africa’s vast ecological, linguistic and cultural diversity has exerted strong selective pressures on its populations. Well-documented examples include the sickle cell trait (HBB), which offers protection against malaria; APOL1 (G1/G2 variants); lactase persistence mutations; and the African-specific variant (rs2814778) in the Duffy Antigen Receptor for Chemokines (DARC/ACKR1), offering malaria resistance but potentially associated with triple-negative breast cancer.

Equity. There is a critical need to address the underrepresentation of African genomes in biomedical research, to reduce health disparities and accelerate the discovery of treatments. For instance, sickle cell disease (SCD) affects around 300,000 newborns annually, 75% of whom are in Africa. Genomic studies have helped identify modifiers of disease severity and novel genes for non-syndromic hearing impairment (INPP4B, CCDC141, UBFD1). Ultimately, investing in African genomics promotes both scientific innovation and health equity worldwide.



Prof. Ambroise Wonkam

Biosketch. Dr. Wonkam is a Professor of Genetic Medicine and Director of the McKusick-Nathans Institute and Department of Genetic Medicine at Johns Hopkins University School of Medicine, USA. He is Director of GeneMAP (Genetic Medicine of African Populations) and immediate past Deputy Dean for Research at the Faculty of Health Sciences, University of Cape Town.

He completed his MD at the University of Yaoundé I (Cameroon), a thesis in Medical Sciences at the University of Geneva, and a PhD in Human Genetics from the University of Cape Town. With over 250 peer-reviewed publications, his research focuses on genomic modifiers of sickle cell disease, genetics of hearing impairment, and ethical issues in human genetics, with NIH- and Wellcome Trust-funded projects across many African countries.

His awards include the 2014 Clinical Genetics Society International Award, the 2021 MRC South Africa Gold Scientific Merit Award, and the 2023 HUGO Africa Prize. He was elected Fellow of The World Academy of Sciences (2024). Prof. Wonkam currently serves as President of the African Society of Human Genetics, championing the integration of genetic medicine across the African continent.

KEYNOTE LECTURE 3

From Static Models to Learning Systems: Towards Adaptive, Dynamic Digital Twins of the Tumor–Immune Microenvironment

Prof. Nabil Hajji | *Faculty of Medicine, University of Seville, Spain; Long Island University and Dassault Systèmes 3DEXPERIENCE Center of Excellence, USA*

Abstract. Current oncology digital twins remain largely static and fail to capture the dynamic behaviour of the tumour microenvironment. We propose a perturbation-driven Minimum Viable Digital Twin (MV-DT) framework specifically designed for the tumour microenvironment, enabling iterative learning from biological perturbations.

Using glioma as a model, we integrate multi-omics data, cellular deconvolution approaches, intercellular communication inference and agent-based modelling to construct a multiscale digital twin of the tumour microenvironment. A smart scoring strategy identifies key regulatory programs governing proliferation, epigenetic regulation, extracellular matrix remodelling and immune signalling, enabling translation from gene-level data to mechanistic, program-level rules within the digital twin.

Simulations reproduce emergent tumour heterogeneity, spatial organization and microenvironmental dynamics driven by tumour–immune–stromal interactions. Coupling model predictions with iterative perturbation data enables closed-loop learning, continuously refining the digital twin. This framework advances digital twins from static representations to adaptive learning systems, providing a scalable foundation for predictive oncology, precision medicine and AI-driven therapeutic discovery.



Prof. Nabil Hajji

Biosketch. Professor Nabil Hajji is a translational oncology researcher and Professor of Cancer Epigenetics and Immunology at the Faculty of Medicine, University of Seville (Spain). With more than 20 years of international experience across academia, biotechnology and translational medicine, his research focuses on cancer epigenetics, the tumour immune microenvironment, drug resistance, precision oncology and next-generation therapeutics. He holds honorary positions at Imperial College London and Queen Mary University of London, has been a visiting researcher at Harvard University, and is Adjunct Visiting Professor at Long Island University within the Dassault Systèmes 3DEXPERIENCE Center of Excellence.

His work, published in journals such as *Nature*, *Nature Communications*, *Oncogene* and the *Journal of Clinical Investigation*, has contributed to innovative therapeutic approaches including nanoparticle-based therapies. More recently, his research has expanded toward AI-driven cancer digital twins and virtual laboratory platforms integrating multi-omics, single-cell biology and cell–cell communication analysis. Through academic and biotechnology initiatives, including KeyZell, he works at the interface between translational oncology, computational biology and precision medicine.

KEYNOTE LECTURE 4

Genetic and Environmental Determinants of the Host Response to Infection

Prof. Youssef Idaghdour | New York University Abu Dhabi, United Arab Emirates

Abstract. Genetic and environmental effects modulate host responses to infection and result in variation between individuals and populations. Efforts to understand these effects are more likely to be fruitful when using integrative approaches that capitalize on the advantages gained from multi-omics and population-scale sampling. In this talk, I highlight the power of these approaches in revealing novel mechanisms of regulation of host immunity and in advancing our understanding of disease pathogenesis.



Prof. Youssef Idaghdour

Biosketch. Youssef grew up in southern Morocco where he graduated with a BSc in Biology and spent several years working on endangered avian species. After an MSc in Molecular Genetics at the University of Leicester (UK) and a PhD in Genetics at North Carolina State University under a Fulbright Scholarship, he received a Banting Postdoctoral Fellowship and joined a large program in medical and population genomics at Sainte-Justine Research Center in Montreal, prior to joining New York University Abu Dhabi.

Youssef Idaghdour studies the role that genetic and environmental factors play in shaping health-related phenotypes and how interactions between these effects trigger disease and modulate its outcome. He focuses on metabolic traits and immune responses to cancer and infection, generating high-dimensional genomic datasets from single cells, tissues and cells, and analysing them with bioinformatics and statistical genetic approaches. He is also active in ecological genomics, developing genetic tools for population analysis of endangered marine and wildlife species.

Scientific Sessions & Workshops

Thematic sessions and hands-on workshops. Keynote lectures associated with these sessions are detailed in the previous chapter.

Sessions 1 & 4 — IMGT Workshop

Hands-on training on the IMGT information system for the annotation, nomenclature and analysis of the adaptive immune repertoire.

LECTURE

IMGT: Past Achievements, Present Developments, and Future Directions in Immunogenetics

Prof. Sofia Kossida | University of Montpellier, IMGT, Institute of Human Genetics, France

Abstract. With more than three decades of expertise, IMGT is a leader in immunogenetics and immunoinformatics. We identify and characterize immunoglobulin (IG) genes and T-cell receptor (TR) genes in jawed vertebrates. We analyze expressed repertoires by comparing them with IMGT reference datasets under both normal and pathological conditions. We provide the scientific community with tools to achieve these objectives and continuously enhance them with new features. In addition, we investigate the mechanisms of action of monoclonal antibodies in autoimmune and neurodegenerative diseases. My talk will address past achievements, present endeavors and future perspectives within IMGT.



Prof. Sofia Kossida

Biosketch. Currently a professor at the University of Montpellier in France, Sofia Kossida has more than 30 years of experience in bioinformatics in both the academic and private sectors. She is also Director of IMGT and laureate of the Senior Innovation Chair of the Institut Universitaire de France.

WORKSHOP

Introduction to IMGT and Analysis of the Expressed IG and TR Repertoire with IMGT Tools

Dr. Myriam Croze | University of Montpellier, IMGT, Institute of Human Genetics, France

Abstract. IMGT, the international ImMunoGeneTics information system (<https://www.imgt.org>), provides comprehensive databases and tools for the detailed exploration of the adaptive immune response. First, we introduce the IMGT portal and its associated resources, including IMGT Repertoire and IMGT/GENE-DB. In a second part, we introduce the analysis of expressed immunoglobulin (IG) and T-cell receptor (TR) repertoires using IMGT standards and tools such as IMGT/V-QUEST, IMGT/HighV-QUEST, and the integrated IMGT/JunctionAnalysis tool. We also

address the visualization and interpretation of results, enabling a detailed examination of V-(D)-J rearrangements and junctions. Finally, we present in silico antibody grafting using IMGT tools.



Dr. Myriam Croze

Biosketch. After earning her PhD at the University of Munich (Germany), Myriam Croze worked as a post-doctoral researcher abroad for several years as a bioinformatician before returning to France, where she is currently working as a Research Engineer at IMGT.

Session 2 — Foundations of Immune Diversity

The biological meaning and evolutionary logic of HLA and immune-gene diversity.

LECTURE

The Cost of a Comprehensive Immune Defence

Prof. John Trowsdale | Department of Pathology, University of Cambridge, UK

Abstract. The study of immunogenetics has led to several key insights. Our immune system is extensive: it comprises well over 10% of our genes and is integrated into every tissue in the body. As well as combating infection, it has unexpected roles, such as in wound repair, tissue maintenance, reproduction and gut/brain communication.

Defence genes tend to be polymorphic — it pays to be different. The MHC is the most polymorphic collection of immune defence genes, with functions impinging on most aspects of defence. The clustering of polymorphic immune-system genes in the MHC helps to integrate and coordinate its various functions. Because of its importance, the MHC is genetically associated with a large number of diseases, especially autoimmune conditions.

Among other clusters of polymorphic immune-system genes are those encoding natural killer receptors, such as the KIR genes in the Leukocyte Receptor Complex. Since some natural killer cell receptors interact with MHC class I molecules, coordinating these interactions along with those of T-cell receptors is a major challenge.



Prof. John Trowsdale

Biosketch. John Trowsdale PhD FMedSci MAE FRSB is Emeritus Professor in the Department of Pathology, Cambridge, UK. After postdoctoral work on bacterial genetics in Paris and California, he joined Sir Walter Bodmer's laboratory in Oxford, which then moved to Cancer Research UK in London. In the early 1980s he was one of the first to clone HLA genes and to complete sequencing of the entire MHC region, in collaboration with Stephan Beck at the Sanger Centre. He identified key components of antigen processing for HLA, such as TAP transporters and the immunoproteasome, and his group contributed to understanding polymorphic receptors for HLA such as KIR and LILR. He is a

recipient of the ASHI Rose Payne distinguished scientist award and the EFI Ceppellini Award, a Fellow of the Academy of Medical Sciences, and the author of the immunology book “What the Body Knows” (Yale).

Session 5 — Advanced Technologies

Single-cell immunology, vaccine design, antimicrobial strategies and advanced cytometry of cellular therapies.

LECTURE

Multi-antigen Coronavirus Vaccine Induces Potent and Durable Cross-Protection Against Multiple SARS-CoV-2 Variants

Prof. Lbachir BenMohamed | *University of California, Irvine, USA*

Abstract. First-generation Spike-based COVID-19 vaccines reduced the risk of hospitalization, serious illness and death from SARS-CoV-2 infections. However, waning immunity failed to prevent immune escape, resulting in multiple variants of concern (VOCs). We hypothesize that next-generation coronavirus vaccines incorporating highly conserved SARS-CoV-2 T-cell antigens would confer potent, broad, long-lasting cross-protective immunity.

We identified 10 non-Spike antigens common and highly conserved across 8.7 million SARS-CoV-2 strains, prior VOCs, SARS-CoV-1, MERS-CoV, seasonal human cold CoVs and animal CoVs. Seven antigens were preferentially recognized by CD8⁺ and CD4⁺ T cells from unvaccinated asymptomatic COVID-19 patients, irrespective of VOC. Three conserved antigens (NSP2, NSP14, Nucleocapsid) administered to golden Syrian hamsters induced high frequencies of lung-resident polyfunctional T cells; reduced morbidity, viral load and lung pathology from various VOCs including Delta and Omicron KP.3; improved protection conferred by spike-alone mRNA; and conferred protection lasting more than one year. This multi-antigen vaccine could provide potent, broad-spectrum and durable cross-protective immunity against current and future variants of concern.



**Prof. Lbachir
BenMohamed**

Biosketch. Dr. BenMohamed earned his MS in Immunology-Parasitology and his PhD in immunology at the Pasteur Institute, Paris, France. He completed postdoctoral fellowships at the Pasteur Institute and in the United States (City of Hope and the Beckman Research Institute). At the University of California, Irvine, he holds a full professor tenured appointment at the Gavin Herbert Institute, the Institute for Immunology, the Department of Molecular Biology and Biochemistry, and the Chao Family Comprehensive Cancer Center.

He founded and directs the Cellular and Molecular Immunology Laboratory and is the recipient of NIH grants totaling over \$30 million. An internationally recognized immunologist with strong expertise in vaccine development and immunotherapy against infectious diseases and cancer, he has published over 145 peer-reviewed papers and holds

20 patents. In 2021 he founded TechImmune Inc., developing a universal Coronavirus vaccine and a T-cell-targeted immunotherapy for Long COVID.

LECTURE

Inflammatory Pathways as Therapeutic Targets in Sickle Cell Disease

Prof. Solomon F. Ofori-Acquah | *Emory University School of Medicine, USA; West African Genetic Medicine Centre, University of Ghana*



**Prof. Solomon F.
Ofori-Acquah**

Biosketch. Dr. Solomon Fiifi Ofori-Acquah is an internationally recognized scientist, educator and leader in sickle cell disease (SCD). He is currently Professor and Calvin Smyre Endowed Chair in the Department of Pediatrics at Morehouse School of Medicine and the Department of Pediatrics at Emory School of Medicine. He is a Georgia Research Alliance Eminent Scholar and Director of the Georgia Solve Sickle Cell Initiative.

His research focuses on molecular pathogenesis, genomics and drug discovery in SCD. He developed the first animal model of the acute chest syndrome, a severe lung complication of SCD. His current efforts include multiple genome-wide association studies and the first population DNA sequencing of a cohort of 1,000 children living with SCD. He is the Founding Director of the West African Genetic Medicine Centre, a World Bank-sponsored Centre of Excellence building genomics capacity in West Africa. He has authored over 100 peer-reviewed publications and serves as a Member of the National Heart, Lung, and Blood Institute Advisory Council.

LECTURE

Deciphering T-Cell Immune Regulation in Disease Using Single-Cell Technologies

Dr. Tala Shahin | *New York University Abu Dhabi, United Arab Emirates*

Abstract. T cells play a central role in coordinating immune responses, balancing protective immunity with inflammatory regulation across infectious and immune-mediated diseases. Recent advances in single-cell technologies have provided unprecedented opportunities to dissect T-cell heterogeneity, activation states and regulatory programs at high resolution.

In this talk, I discuss how single-cell transcriptomic approaches can be leveraged to investigate T-cell immune regulation across different disease contexts. I first present findings from our single-cell study of *Plasmodium falciparum* malaria, highlighting how infection shapes T-cell functional states, inflammatory responses and immune adaptation in an ethnically diverse endemic population. I then discuss complementary work examining the immunomodulatory effects of pregnenolone on human immune cells, focusing on its influence on T-cell activation and inflammatory signaling pathways. Together, these studies illustrate how single-cell technologies can uncover complex immune regulatory mechanisms and provide deeper insight into human immune heterogeneity in health and disease.



Dr. Tala Shahin

Biosketch. Tala Shahin, PhD, is a post-doctoral researcher in the Idagh-dour Lab at New York University Abu Dhabi, specializing in immunogenetics, single-cell genomics and integrative multi-omics approaches to study immune variation and disease susceptibility in underrepresented populations. She has led projects on single-cell immune responses to *Plasmodium falciparum* malaria in African populations and currently leads the Moroccan Immune Cell Atlas initiative. She obtained her PhD from the Research Center for Molecular Medicine of the Austrian Academy of Sciences (CeMM), where she studied genetic defects underlying immune dysregulation and T-cell dysfunction.

LECTURE

Bacteriophage Therapy in the Era of Antimicrobial Resistance: Immunological and Translational Challenges

Prof. Ahmed Belmoudden | *Faculty of Sciences, Ibn Zohr University, Agadir, Morocco*

Abstract. Antimicrobial resistance is creating major therapeutic gaps in the management of multidrug-resistant bacterial infections. This lecture introduces bacteriophage therapy as a precision anti-infective strategy based on the use of bacterial viruses selected against the infecting strain. Particular emphasis is placed on the interactions between phages and host immunity, including immunogenicity, neutralizing antibodies, inflammatory responses, and phage-bacteria-host dynamics. The lecture also highlights the main translational challenges that currently limit broader clinical implementation, including phage selection, formulation, standardization, regulation and personalized therapeutic design.



Prof. Ahmed Belmoudden

Biosketch. Ahmed Belmoudden is a Professor of Genetics and Molecular Biology at the Faculty of Sciences, Ibn Zohr University, Agadir, Morocco. He holds a PhD in Cellular and Molecular Biology from Pierre and Marie Curie University (Paris VI) and completed postdoctoral training at Necker Hospital, Paris Descartes University. He is Dean of the Faculty of Sciences of Agadir and Head of the Cell Biology and Molecular Genetics Laboratory.

His research lies at the interface of molecular genetics, genomics, metagenomics, infectious diseases and environmental health, including the genetic basis of human diseases (glaucoma, Parkinson's disease, gastric and breast cancer), the surveillance of antimicrobial resistance genes, and wastewater-based epidemiology. More recently, his work has expanded toward bacteriophage-based strategies to combat multidrug-resistant bacteria in healthcare and agri-food environments.

LECTURE

Tracking CAR-T Cells and Their Extracellular Vesicles Through Flow Cytometry

Prof. Paola Lanuti | University "G. d'Annunzio" of Chieti-Pescara, Italy

Abstract. Chimeric antigen receptor (CAR)-T cell therapy has revolutionized the treatment of hematological malignancies, providing unprecedented responses in relapsed or refractory leukemias and lymphomas. Beyond therapeutic efficacy, CAR-T cells offer a unique opportunity for real-time monitoring through advanced flow cytometry, enabling characterization of their phenotype, persistence, activation status and functional dynamics in vivo.

This presentation highlights the role of multiparametric and high-dimensional flow cytometry in tracking CAR-T cells and their extracellular vesicles (EVs). Recent studies from our group demonstrated that CD19 CAR-T cell-derived EVs can be detected in peripheral blood for up to two years after infusion, reflecting the long-term persistence of their parental cells, while early declines in circulating EV levels were associated with treatment failure. These EVs carry elevated CAR molecules and a pro-apoptotic cargo while maintaining potent, specific cytotoxic activity. The lecture also discusses the application of CAR-T-derived EVs beyond hematological cancers, with a focus on solid tumours such as pancreatic ductal adenocarcinoma, positioning flow cytometry as an indispensable tool for next-generation EV-based immunotherapies.



Prof. Paola Lanuti

Biosketch. Paola Lanuti is Associate Professor of Human Anatomy at the University "G. d'Annunzio" of Chieti-Pescara, Italy. She holds a Degree in Pharmacy, a European PhD in Biomedical and Cytomorphological Sciences and a specialization in Clinical Pathology. Her research focuses on advanced flow cytometry, extracellular vesicles, cellular signaling and regenerative medicine, and she is internationally recognized for developing innovative cytometry approaches for the identification and isolation of EVs.

She has authored over 160 peer-reviewed publications (more than 5,100 citations, H-index 38), is co-author of three book chapters and inventor of two patents related to EV analysis. She has coordinated and participated in numerous funded research projects (PRIN, PNRR, Heal Italia) and is co-founder and CEO of the university spin-off FlowForLife Lab.

Sessions 6 & 8 — HLA NGS Workshop

High-resolution HLA genotyping with third-generation Oxford Nanopore sequencing, from sample preparation to clinical reporting, and integration of immune-repertoire and AI analytics.

LECTURE

From HLA and TCR Repertoires to AI-Driven Precision Medicine: Toward Early Disease Detection and Population-Scale Immune Monitoring

Dr. Sami Djoulah | Wiratech Europe, France

Abstract. The adaptive immune system contains one of the most information-rich biological records of human health. Through the combined diversity of HLA molecules and T-cell receptor (TCR) repertoires, every individual carries a dynamic molecular archive reflecting genetic background, environmental exposures, infectious encounters, vaccination history, immune ageing and disease development. Recent advances in next-generation sequencing have enabled unprecedented characterization of TCR and BCR repertoires, while high-resolution HLA genotyping continues to provide critical insights into susceptibility to autoimmune diseases, infectious diseases, cancer and transplantation outcomes.

This lecture explores the convergence of HLA immunogenetics, immune repertoire sequencing, microbiome research and artificial intelligence. Particular emphasis is placed on immune repertoire metrics (clonal diversity, D50, Delta Index, Disease-Specific Linklet Analysis) and their value for biomarker discovery, early diagnosis, patient stratification and prediction of immunotherapy responses. The presentation also discusses the AFRISCAN and GENOMSURV-AFRICA initiatives as examples of how immunogenetics, genomic surveillance, sovereign health-data infrastructures and AI-driven analytics can support precision medicine and public health across diverse populations.



Dr. Sami Djoulah

Biosketch. Dr. Sami Djoulah is a molecular biologist and immunologist with more than 30 years of experience in biotechnology and over two decades of expertise in next-generation sequencing, immunogenetics, molecular diagnostics and translational research. He holds a PhD in Molecular Biology and a Doctorate in Immunology, and has led the implementation of advanced genomic technologies including HLA typing, immune repertoire profiling (TCR/BCR) and genomic surveillance, with collaborations across Europe, Africa and Asia. He is Founder and Chief Scientific Officer of AFRISCAN (African Surveillance and Alert Network), a non-profit initiative dedicated to strengthening genomic surveillance, epidemic preparedness and African data sovereignty.

WORKSHOP

High-resolution HLA Genotyping with Oxford Nanopore Technology: A Complete Step-by-Step Workflow for Routine Clinical Use

Dr. El Hadi Seninet & Dr. Mohammed Fadli | *Sfax University, Tunisia; BH Lab / Oxford Nanopore Technology*



Dr. El Hadi Seninet

Abstract. Third-generation nanopore sequencing offers a transformative approach to HLA typing, enabling full-gene characterization across 11 loci in a single workflow. This workshop provides comprehensive, reproducible and practical training on NanoTYPE, from genomic DNA input to high-resolution genotyping output, with a focus on single-sample processing.

The complete workflow consists of seven sequential steps with a total hands-on time of approximately 5 hours. Steps 1–4 (Genomic DNA preparation, PCR amplification, amplicon quantification and normalization, library preparation) are prepared in the lab before the workshop. Step 5 covers sequencing on the MinION (R9.4.1 flow cell verification, priming, loading and run initiation via MinKNOW). Step 6 covers bioinformatic analysis, processing FASTQ files through Nanotyper software to deliver 3-field high-resolution HLA genotyping across all 11 loci.

This streamlined protocol achieves complete HLA genotyping at 3-field resolution within 5 hours. The single-tube multiplex format minimizes handling and contamination risk, while CE marking and ISO 9001:2015 manufacturing ensure analytical reliability. Compared to conventional PCR-SSOP (Luminex) approaches, the NanoTYPE workflow provides superior allelic resolution, full-gene coverage and unambiguous phase-resolved genotyping.

WORKSHOP

Fundamentals of MinKNOW and NanoTYPER Tools: Mastering the Software for Nanopore-Based HLA Typing

Dr. El Hadi Seninet & Dr. Mohammed Fadli | *Sfax University, Tunisia; BH Lab / Oxford Nanopore Technology*



Dr. Mohammed Fadli

Abstract. Implementing third-generation nanopore HLA typing requires proficiency not only in wet-lab procedures but also in the dedicated software tools that control sequencing and deliver genotyping results. This workshop provides hands-on training on the two core platforms of the NanoTYPE ecosystem: MinKNOW (the Oxford Nanopore sequencing control software) and NanoTYPER (the HLA-specific genotyping and results-management platform).

Part I (MinKNOW) covers flow-cell verification, run configuration (SampleSheet.csv and Sequencing Run.json), real-time run monitoring (pore occupancy, read-length histograms, quality scores, barcode statistics) and data output (FAST5/FASTQ files and HTML reports). Part II

(NanoTYPER) covers data import and analysis, a four-level hierarchical interface, multi-level results interpretation with a traffic-light QC system (homozygous, heterozygous, ambiguous), detailed QC metrics (allele balance, mean coverage, N50, exon coverage) and report export in multiple formats (HML, JSON, HPRIM, PDF, CSV, TXT, XLSX).

This workflow delivers 3-field HLA genotyping across 11 loci (4-field for null alleles) in under 5 hours per sample, with sequencing accuracy reaching 99.8%. The integrated MinKNOW/NanoTYPER pipeline minimizes operator dependency and accommodates 1 to 24 samples per run.

Session 7 — Cancer Immunogenetics & Immune-Mediated Diseases

T–B cell cooperation, tertiary lymphoid structures and the pharmacogenomics of cancer susceptibility.

LECTURE

Decoding T–B Cell Cooperation in Cancer Immunotherapy

Dr. Meryem Aloulou | *Toulouse Institute for Infectious and Inflammatory Diseases (INSERM), France*

Abstract. Recent advances in cancer immunology have challenged the traditional T-cell-centric view of anti-tumor immunity by highlighting the central role of B cells and tertiary lymphoid structures (TLS) in shaping therapeutic responses. Effective anti-tumor immunity relies on coordinated interactions between T cells, B cells, dendritic cells and stromal components within the tumor microenvironment and tumor-draining lymph nodes. TLS support local antigen presentation, germinal-center-like reactions, B-cell maturation and the generation of tumor-reactive immune responses.

Helper T cells promote B-cell activation, antibody class switching and plasma-cell differentiation, while B cells enhance anti-tumor immunity through antigen presentation, cytokine production and tumor-reactive antibodies. B-cell functions remain highly context-dependent: although mature TLS are often associated with favorable prognosis, distinct B-cell populations may also promote immune suppression and therapy resistance. Emerging approaches such as spatial transcriptomics and multiplex imaging are reshaping our understanding of these immune ecosystems, positioning T–B cell cooperation as a key determinant of immunotherapy efficacy and a promising therapeutic target.



Dr. Meryem Aloulou

Biosketch. Dr. Meryem Aloulou is an INSERM scientist at the Toulouse Institute for Infectious and Inflammatory Diseases, France. Originally from Agadir, she trained in immunology at Pierre and Marie Curie University in Paris before continuing her research at the University of Cambridge, where she worked with Prof. Adrian Liston as a French Government Fellow and Visiting Fellow at Churchill College. During her PhD she investigated inhibitory signaling pathways mediated by antibody receptors on immune cells. Her current research focuses on how regulatory T-cell subsets shape B-cell responses and humoral immunity, with particular interest in T–B cell cooperation, germinal-center regulation and the spatial organization of immune responses in health and disease.

LECTURE

Genomic and Pharmacogenomic Determinants of Cancer Susceptibility in Populations of African Ancestry

Prof. Collet Dandara | *Division of Human Genetics, University of Cape Town and South African Medical Research Council, South Africa*

Abstract. Populations of African ancestry possess the highest levels of genomic diversity and the shortest blocks of linkage disequilibrium globally, reflecting deep evolutionary histories. Despite this, they remain profoundly underrepresented in global genomic databases. This presentation addresses how this immense, uncharacterised variation acts as a dual axis driving both disparate cancer susceptibility and highly variable treatment outcomes in African cohorts.

We explore host genetic drivers of cancer susceptibility, contrasting findings with current public diagnostics offered by the National Health Laboratory Service (NHLS). While essential germline testing exists for high-penetrance syndromes (BRCA1/2 panels, mismatch-repair screening for Lynch syndrome), diagnostic yield is frequently limited by population disparities, discordant allele frequencies and a high prevalence of variants of uncertain significance. This genomic divergence extends to clinical management: standardised chemotherapeutic regimens frequently lead to unpredictable outcomes due to unique pharmacogene profiles. Our recent work on tamoxifen in breast cancer shows that variation across core CYP genes (CYP2D6, 3A4, 2B6) significantly modulates disease-free survival and severe toxicity. Achieving equitable oncology outcomes requires transitioning from descriptive genetics to translating diverse genomic architectures into targeted, high-priority African precision panels.



Prof. Collet Dandara

Biosketch. Professor Collet Dandara, PhD, is Head of the Division of Human Genetics, Department of Pathology, and former Deputy Dean of Postgraduate Education, Faculty of Health Sciences, University of Cape Town. He is Director of the SAMRC/UCT Platform for Pharmacogenomics Research and Translation (PREMED) and a Fellow of both the South African Academy of Sciences (ASSAf) and the African Academy of Sciences (AAS). He serves on the Executive Committee of the African Society for Human Genetics, chairs the African Pharmacogenomics Network, and is on the Executive of the Human Genome Organisation (HUGO).

His research spans drug metabolism, genetic susceptibility, pharmacogenetics and pharmacogenomics across infectious and non-communicable diseases. He has published more than 180 manuscripts in international peer-reviewed journals and is a recipient of the prestigious HUGO 2025 Africa Prize for Lifetime Achievement in Human Genetics.

LECTURE

Decoding the Hidden Logic of HLA Diversity: Biological Meaning and Evolutionary Insights

Prof. Khalid SADKI | *Founding President of the Moroccan Society of, Genomics and Human Genetics (SM2GH), Founding of the School of Immunogenetics (SIG), Mohammed-V University in Rabat*

Abstract. Human immunomics is characterized by a great diversity that fundamentally controls immune function and determines variability in disease susceptibility and clinical outcomes. Within this framework, immunogenomics provides a functional perspective on immune regulation by describing molecular features and dynamic changes in immune cells associated with disease, using high-throughput functional genomics technologies.

This presentation explores the evolution of HLA alleles through a comparative immunogenomic analysis, highlighting the extraordinary polymorphism of the HLA system, as reflected by the large number of identified alleles across populations. This diversity underpins the structural and functional complexity of antigen presentation, particularly within the HLA Class I-peptide complex, which constitutes a central interface between host immunity and pathogen or tumor recognition.

The co-evolution of pathogens and HLA polymorphism represents a dynamic evolutionary process that continuously shapes immune system adaptation. This interplay is particularly relevant in African populations, where genetic diversity is exceptionally high, yet immunogenomic data remain limited. This lack of comprehensive datasets represents a major challenge for understanding HLA-driven immune variability and for developing equitable precision medicine strategies.

From a translational perspective, we address the prediction of peptide-HLA interactions as a critical step for vaccine design, infectious disease control, and cancer immunotherapy. In oncology, HLA diversity plays a central role in shaping tumor immune surveillance and response to immunotherapeutic interventions, raising important challenges for patient stratification and treatment optimization.

Overall, this presentation highlights the need to integrate African immunogenomic diversity into global frameworks to advance predictive immunology and personalized medicine.



Prof. Khalid Sadki

Biosketch. Prof. Khalid SADKI is a Full Professor at Mohammed V University in Rabat, specializing in immunology, immunogenetics, and genomics. He is Head of the Basic Science Department and founder of the School of Immunogenetics. He is also President and founder of the Moroccan Society of Genomic and Human Genetics (SM2GH). In 2001, he completed his PhD in immunogenetics in the laboratory of Dominique Charron at the Hayem Center, St-Louis Hospital in Paris (Jean Dausset Nobel Laureate laboratory). From 1992 to 2010, he served as Principal Chief Engineer at the National Institute of Hygiene in Morocco, where he co-led the HLA laboratory and headed the Human Genomics Laboratory, gaining extensive expertise in immuno-

histocompatibility and clinical laboratory management.

Since 2010, he has been active at Mohammed V University, contributing to teaching, research, and institutional development in medical sciences. He has coordinated and participated in numerous national, European, and US-funded research projects in human genetics, bioinformatics, and genomics.

Prof. SADKI has authored approximately 50 peer-reviewed publications and serves as a reviewer

for several international journals. He is Guest Editor of the International Journal of Molecular Sciences (IF 4.9). His scientific expertise is recognized by major institutions including the WHO, the British Academy of Medical Sciences, CDC Africa, and others. He is also an international expert for genomic research initiatives, including the Genome of Ireland (2024) evaluation.

His research focuses on the immunogenomics of infectious diseases, including HIV, cancer (lung and breast), and rare diseases, particularly inborn errors of immunity. He is actively involved in international collaborations across Europe, Africa, and the Middle East, notably through COST actions, H3Africa, and gene therapy networks such as GENEHUMDI.

He has also played a key role in establishing scientific societies, academic programs, and collaborative platforms in immunogenetics and human genomics, contributing significantly to capacity building and research development in Africa.

Session 9 — Immunogenetics of Infectious Diseases

Host genetics of malaria, HIV and toxoplasmosis, and the integration of immunogenetics into vaccines and diagnostics.

LECTURE

Immune System Genes and Malaria Resistance

Dr. Issiaka Soulama | Institute for Health Sciences Research (IRSS/CNRST), Burkina Faso

Abstract. Malaria remains one of the deadliest infectious diseases in the world, with 282 million cases and 610,000 deaths in 2024 (WHO), 94% of which occur in sub-Saharan Africa. The co-evolution between humans and Plasmodium has generated numerous protective genetic variants, making malaria a primary driver of recent evolutionary selection in humans. GWAS studies by MalariaGEN on 17,000 individuals identified five replicable loci — HBB, ABO, ATP2B4, GYPAB (Dantu), EPHA7/MAP3K7 — collectively explaining about 10% of an estimated heritability of about 23%.

Several protective variants have been identified, including hemoglobinopathies (HbS, HbC, HbE), G6PD deficiency, hereditary elliptocytosis and Southeast Asian ovalocytosis, and the Duffy Antigen / ACKR1 FY*O allele, which renders red blood cells resistant to *P. vivax*. Newer GWAS variants include the Dantu blood group, which provides 74% protection against severe malaria, and ATP2B4. Adaptive immunity contributes through HLA-B53 and TNF/NCR3 polymorphisms. In conclusion, despite major advances, about 90% of the heritability of severe malaria remains unexplained, and integrated genomic surveillance of host and pathogen remains essential to reduce the global burden of malaria.



Dr. Issiaka Soulama

Biosketch. Dr. Issiaka Soulama is a researcher at the Institute for Health Sciences Research (IRSS)/CNRST. He holds a Doctorat d'État in Pharmacy and a PhD in Molecular Parasitology from the University of Ouagadougou, as well as a certificate in genetics and genomics from Stanford University. He coordinates malaria genomic surveillance activities and is a visiting researcher at the Broad Institute and Harvard University. He is the author and co-author of approximately one

hundred scientific publications, serves on the scientific committees of several national and international organizations (ASTMH, AREF), and since February 2024 is Director General of the National Pharmaceutical Regulatory Agency of Burkina Faso (ANRP).

LECTURE

HIV Host Genetic Polymorphisms and Their Impact on Viral Susceptibility and Antiretroviral Treatment Response

Prof. Hicham Oumzil | *Faculty of Medicine and Pharmacy, Mohammed V University in Rabat, Morocco*

Abstract. Despite the remarkable success of modern antiretroviral therapy (ART), substantial interindividual variability remains in HIV-1 acquisition risk, disease progression, viral control and treatment response. Increasing evidence demonstrates that host genetic factors play a pivotal role in shaping these outcomes through modulation of immune responses, viral entry mechanisms and drug pharmacokinetics.

This talk provides an updated overview of major host genetic determinants associated with HIV-1 susceptibility, natural viral control and antiretroviral treatment outcomes. Particular emphasis is placed on variants influencing viral acquisition pathways, including CCR5, CCR2, CXCR4, HLA class I alleles and killer-cell immunoglobulin-like receptors (KIRs), as well as host restriction factors (APOBEC3G, TRIM5 α , IFITM3). Protective effects have been reported for HLA-B57 and HLA-B27. In the pharmacogenetic field, variants within UGT1A1, ABCG2, NR1I2 and SLC22A2 significantly influence plasma exposure to dolutegravir and cabotegravir. The convergence of host immunogenetics, pharmacogenomics and viral genetic diversity provides new opportunities for individualized HIV management and the transition toward precision-medicine approaches.



Prof. Hicham Oumzil

Biosketch. Professor Hicham Oumzil is a senior public-health virologist and laboratory-systems leader with over 20 years of experience in strengthening national and regional capacities for infectious-disease diagnostics and surveillance. He is Associate Professor at the Faculty of Medicine and Pharmacy, Mohammed V University in Rabat, and former Head of the National HIV Reference Laboratory and the Department of Virology at the National Institute of Hygiene, Morocco.

He has played a key role in the design and scale-up of integrated laboratory and surveillance systems for priority pathogens (HIV, viral hepatitis, influenza, SARS-CoV-2, polio). A Certified IRCA Lead Auditor for ISO 13485, he serves as Chair of the Africa CDC Diagnostic Advisory Committee and provides technical expertise to WHO and the Global Fund on laboratory-system strengthening and genomic surveillance. He has authored numerous peer-reviewed publications in HIV drug resistance and molecular epidemiology.

LECTURE

Immunogenetics, Vaccines and Molecular Diagnostics in Toxoplasmosis: Novel Strategies, Clinical Applications and Future Challenges

Prof. Kamal El Bissati | *University of Chicago Medical Center, USA*

Abstract. Toxoplasmosis is a significant clinical problem causing mortality in congenitally infected infants, immunocompromised patients and those with AIDS, and is a leading cause of foodborne-related death. It is estimated that one third of the global population carries the parasite. The limitations of current anti-Toxoplasma therapies and the lack of a vaccine have created a need for alternative approaches.

We focus on Self-Assembling Protein Nanoparticles (SAPNs) as a scaffold/platform for vaccine delivery, tested in human HLA transgenic mice. SAPNs induce a strong immune response through repetitive display of B-cell epitopes, promote CD4 and CD8 T-cell responses by incorporating T-cell epitopes into the nanoparticle core, and trigger innate immunity via the TLR5 pathway. In parallel, we have developed a simple point-of-care prenatal diagnostic test requiring only a finger-prick blood sample. With the support of the Moroccan health ministry, we implemented one of the largest studies assessing monthly point-of-care prenatal screening for Toxoplasma infections in Southeastern Morocco. Together, this work integrates epidemiology, diagnosis and vaccine development to improve prevention and management of the disease.



Prof. Kamal El Bissati

Biosketch. Dr. Kamal El Bissati is a molecular biologist and parasitologist with a strong emphasis on public health and the translation of laboratory discoveries into patient-centered interventions. He is an international expert in toxoplasmosis, with expertise in molecular diagnostics, novel therapies and vaccines, nanotechnology-based vaccine delivery and immunotherapeutics.

He received his PhD from the University of Pierre and Marie Curie (Paris VI) and École Normale Supérieure, Paris, and completed postdoctoral training at the University of Connecticut School of Medicine. He joined the University of Chicago, where he is Principal Investigator at the Toxoplasmosis Research Institute. A Fulbright U.S. Scholar in Medical Sciences and Public/Global Health for Morocco and the MENA region, he holds 7 US patents in malaria and toxoplasmosis, is co-founder of canZero Therapeutics, and is President of the Association Marocaine pour la Santé de l'Enfant et de la Mère (AMSEM).

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The Venue

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Beyond the lecture halls, participants are invited to discover the warmth of Moroccan hospitality, the Souss–Massa region's natural landscapes, and the city's blend of tradition and modernity.

Welcome to Agadir!

We look forward to a stimulating and memorable course.