

# Kumamoto University – Ragon Institute (Harvard) Partnership Seminar



Date: Wednesday 26 June, 2024

Venue: Seminar Room at 2nd Floor, HuRetro Center



## Mathias Lichterfeld, MD, PhD

Professor of Medicine, Harvard Medical School

Visiting Professor, Kumamoto University

### **Immune selection of HIV reservoir cells**

## Xu Yu, MD

Professor of Medicine, Harvard Medical School

### **Elite controllers as a model for a cure of HIV-1 infection**



## Jun-Ichirou Yasunaga, MD, PhD

Faculty of Life Sciences, Kumamoto University

### **Coding and non-coding functions of HTLV-1 bZIP factor gene in T-cell oncogenesis**

## Yorifumi Satou, MD, PhD

Joint Research Center for Human Retrovirus Infection, Kumamoto University

### **HIV-Tocky system to visualize proviral expression dynamics**

## Terumasa Ikeda, PhD

Joint Research Center for Human Retrovirus Infection, Kumamoto University

### **Interaction between APOBEC3 family proteins and HIV-1 in myeloid cell line THP-1**

## Naofumi Takahashi, PhD

Joint Research Center for Human Retrovirus Infection, Kumamoto University

### **Monocyte and macrophage subsets in persistent HIV-1 infection**

Organized by Takamasa Ueno

Joint Research Center for Human Retrovirus Infection, Kumamoto University  
Japan Society for the Promotion of Science, Core-to-Core Program



## Mathias Lichterfeld, M.D., Ph.D.

Professor of Medicine, Harvard Medical School  
Ragon Institute of MGH, MIT, and Harvard  
Visiting Professor, Kumamoto University



### Personal Statement:

I am an M.D./Ph.D. and a practicing infectious disease physician who has been involved in the investigation of HIV-1 disease pathogenesis for more than ten years. In addition to my clinical work that mostly focuses on care of HIV-1-infected patients, I maintain a translational virology laboratory with three postdocs that focuses on exploring mechanisms of HIV-1 immune pathogenesis, on profiling HIV-1 reservoir cells, and on developing clinical strategies for HIV eradication and cure. My activities have covered a broad spectrum of investigations that reach from molecular and cellular immunology and virology to translational investigations and interventional clinical trials. I have successfully led studies related to the identification of specific subsets of cells that serve as long-term reservoirs for HIV-1, and my lab has been instrumental in detecting immune pathways that restrict HIV-1 replication in patients with natural control of HIV-1 and reduce residual viral reservoirs. A particular emphasis of my work relates to the deep analysis of HIV-1 reservoir characteristics with a specific emphasis on using novel technologies based on next-generation sequencing approaches, and to performing early-stage pilot clinical trials related to HIV eradication and cure in adults and infants.

### Citations:

1. Armani-Touret M, Gao C, Hartana CA, Sun W, Carrere L, Vela L, Hochroth A, Bellefroid M, Sbrolla A, Shea K, Flynn T, Roseto I, Rassadkina Y, Lee C, Giguel F, Malhotra R, Bushman FD, Gandhi RT, Yu XG, Kuritzkes DR, **Lichterfeld M**. Selection of epigenetically privileged HIV-1 proviruses during treatment with panobinostat and Interferon- $\alpha$ 2a. **Cell** 2024, 187:1238-1254
2. Lian X, Seiger KW, Parsons EM, Gao C, Sun W, Gladkov GT, Roseto IC, Einkauf KB, Osborn MR, Chevalier JM, Jiang CM, Blackmer J, Carrington M, Rosenberg ES, Lederman M, McMahon D, Bosch RJ, Jacobson JM, Gandhi JM, Peluso M, Chun TW, Deeks SG, Yu XG, **Lichterfeld M**. Progressive transformation of the HIV-1 reservoir cell profile towards deep latency over two decades of antiretroviral therapy. **Cell Host & Microbe** 2023; 31(1):83-96.e5.
3. Sun W, Gao C, Hartana CA, Osborn MR, Einkauf KB, Lian X, Bone B, Bonheur N, Chun TW, Rosenberg ES, Walker BD, Yu XG, **Lichterfeld M**. Phenotypic signatures of immune selection in HIV-1 reservoir cells. **Nature** 2023; 614:309-317.
4. Einkauf KB, Osborn MR, Gao C, Sun W, Sun X, Lian X, Parsons EM, Gladkov G, Seiger KW, Blackmer J, Jiang C, Yukl S, Rosenberg ES, Yu XG, **Lichterfeld M**. Parallel analysis of transcription, integration and sequence of single HIV-1 proviruses. **Cell** 2022; 185:266-282.
5. Shapiro RL, Ajibola G, Maswabi K, Hughes M, Nelson BS, Niesar A, Pretorius Holme M, Powis KM, Sakoi M, Batlang O, Moyo S, Mohammed T, Maphorisa C, Bennett K, Hu Z, Giguel F, Reeves JD, Reeves MA, Gao C, Yu X, Ackerman ME, McDermott A, Cooper M, Caskey M, Gama L, Jean-Philippe P, Yin DE, Capparelli EV, Lockman S, Makhema J, Kuritzkes DR, **Lichterfeld M**. Broadly neutralizing antibody treatment maintained HIV suppression in children with favorable reservoir characteristics in Botswana. **Sci Transl Med**. 2023; 15(703), eadh0004

## Xu Yu, M.D.

Professor of Medicine, Harvard Medical School  
Ragon Institute of MGH, MIT, and Harvard



### Personal Statement:

I have worked on viral immunology since the beginning of my scientific career 23 years ago. Currently, my laboratory focuses on understanding molecular and cellular mechanisms involved in viral immune control, with a focus on exploring cell-intrinsic immune defense mechanisms and interplay between innate immune recognition and evolution of adaptive immune responses. Over the recent years, I have made major contributions to understanding the role of dendritic cells and their immunoregulatory functions for generating and fine-tuning adaptive immune responses during viral infections, to the analysis of immune responses and correlates of immune protection against HIV-1 and Zika infections using systems-immunology based approaches, and to the investigation of immunoregulatory circuits influencing immune activation during HIV-1 infection. Since 2010, my laboratory has utilized novel high-throughput omics technologies for the study of HIV-1 pathogenesis, including gene microarrays, RNA-Seq, ATAC-Seq, ChIP-Seq and proteomics/phosphoproteomics techniques. Recently, I have also pioneered the use of single-cell transcriptomics approaches for identifying cellular immune defense mechanisms against viral infection, and for detecting innate sensors of viral infections. Moreover, I combined my work as a basic science immunologist with clinical and translational perspectives for improving clinical treatment options for viral infectious disease.

### Citations:

1. Jiang C, Lian L, Gao C, Sun X, Einkauf K, Chevalier JM, Chen S, Hua S, Rhee B, Chang K, Blackmer JE, Osborn M, Peluso MJ, Hoh R, Somsouk M, Milush J, Bertagnolli LN, Sweet S, Varriale J, Burbelo PD, Chun TW, Laird GM, Serrao E, Engelman AN, Carrington M, Siliciano RF, Siliciano J, Deeks SG, Walker BD, Lichterfeld M, **Yu XG**. A unique viral reservoir landscape in HIV-1 elite controllers. **Nature** 2020. *Named as one of the 9 runners-up for Breakthrough of the Year 2020 by Science Magazine*
2. Turk G\*, Seiger K\*\*\*, Lian X, Sun W, Parsons EM, Gao C, Rassadkina Y, Polo ML, Czernikier A, Ghiglione Y, Vellicce A, Varriale J, Lai J, Yuki Y, Martin M, Rhodes A, Lewin SR, Walker BD, Carrington M, Siliciano R, Siliciano J, Lichterfeld M\*, Laufer N\*, **Yu XG\***. A Possible Sterilizing Cure of HIV-1 Infection without Stem Cell Transplantation. **Annals of Internal Medicine**. 2022. 175(1):95-100. *Named as one of the most influential articles in "Best of Annals 2021"*.
3. Hartana CA, Rassadkina Y, Gao C, Martin-Gayo E, Walker BD, Lichterfeld M, **Yu XG**. A lncRNA-dependent, enhanced functional metabolic state of myeloid dendritic cells from HIV-1 elite controllers. **J Clin. Invest.** 2021 131(9):e146136.
4. Lian X\*\*, Gao C, Sun X, Jiang C, Einkauf KB, Seiger KW, Chevalier JM, Yuki Y, Martin M, Hoh R, Peluso MJ, Carrington M, Ruiz-Mateos E, Deeks SG, Rosenberg ES, Walker BD, Lichterfeld M, **Yu XG**. Footprints of immune selection in intact and defective proviruses from HIV-1 elite controllers. **Sci. Transl. Med.** 2021 13(624):eab14097.
5. Sun X, Hua S, Gao C, Blackmer J, Ouyang Z, Ard K, Ciaranello A, Yawetz S, Sax PE, Rosenberg ES, Lichterfeld M, **Yu XG\***. Immune-profiling of ZIKV-infected patients identifies a distinct function of plasmacytoid dendritic cells for immune cross-regulation. **Nat Comms**. 2020. 11(1):2421