



## Albert Tsai, M.D., Ph.D.

Assistant Professor of Pathology

### CLINICAL OFFICE (PRIMARY)

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### Bio

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#### BIO

Dr. Tsai received his undergraduate training at the University of California, Los Angeles (B.S., Biochemistry, summa cum laude), followed by combined medical and graduate training at the University of Southern California (M.D., Ph.D., Biochemistry). He completed anatomic and clinical pathology (AP/CP) residency and hematopathology fellowship at Stanford University, receiving board certification in AP/CP and hematopathology. As an instructor, he performed clinical diagnostic duties on the hematopathology service while doing postdoctoral training in the laboratory of Dr. Sean Bendall, with funding from the Damon Runyon Cancer Research Foundation.

As a physician and hematopathologist, he seeks to mechanistically dissect myelodysplastic syndromes (MDS) using highly-multiplexed immunophenotyping — mass cytometry / cytometry by time-of-flight (CyTOF) and multiplexed ion beam imaging (MIBI). MDS is an especially complex and heterogeneous disease of abnormal blood cell development with increasing prevalence and few treatments. By combining practical experience clinically diagnosing MDS, next generation single cell proteomic approaches, fundamental discoveries in the biology of MDS, and knowledge of clinical laboratory testing, we hope to develop new clinical diagnostics for personalizing MDS therapies and therapeutic monitoring.

His clinical diagnostic duties are on the hematopathology service, primarily in the diagnosis of MDS, leukemias, lymphomas, and other hematopoietic diseases from blood, bone marrow, and tissue samples.

#### CLINICAL FOCUS

- Hematopathology
- Anatomic and Clinical Pathology

#### ACADEMIC APPOINTMENTS

- Assistant Professor - University Medical Line, Pathology

## HONORS AND AWARDS

- Fellow, Damon Runyon Cancer Research Foundation (2016-2019)

## PROFESSIONAL EDUCATION

- MD, University of Southern California Keck School of Medicine , Medicine (2010)
- PhD, University of Southern California Keck School of Medicine , Biochemistry (2008)
- Pathology, Stanford University School of Medicine, Department of Pathology , Anatomic and Clinical Pathology (2014)
- Hematopathology, Stanford University School of Medicine, Department of Pathology , Hematopathology Fellowship (2015)
- Board Certification: Hematology, American Board of Pathology (2015)
- Board Certification: Anatomic and Clinical Pathology, American Board of Pathology (2014)

## LINKS

- Tsai Laboratory: <https://tsai.stanford.edu/index.php>

## Publications

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### PUBLICATIONS

- **An Integrated Multi-omic Single-Cell Atlas of Human B Cell Identity.** *Immunity*  
Glass, D. R., Tsai, A. G., Oliveria, J. P., Hartmann, F. J., Kimmey, S. C., Calderon, A. A., Borges, L. n., Glass, M. C., Wagar, L. E., Davis, M. M., Bendall, S. C.  
2020; 53 (1): 217–32.e5
- **Multiplexed single-cell morphometry for hematopathology diagnostics.** *Nature medicine*  
Tsai, A. G., Glass, D. R., Juntilla, M. n., Hartmann, F. J., Oak, J. S., Fernandez-Pol, S. n., Ohgami, R. S., Bendall, S. C.  
2020; 26 (3): 408–17
- **Human Chromosomal Translocations at CpG Sites and a Theoretical Basis for Their Lineage and Stage Specificity** *CELL*  
Tsai, A. G., Lu, H., Raghavan, S. C., Muschen, M., Hsieh, C., Lieber, M. R.  
2008; 135 (6): 1130-1142
- **Author Correction: Advances and prospects for the Human BioMolecular Atlas Program (HuBMAP).** *Nature cell biology*  
Jain, S., Pei, L., Spraggins, J. M., Angelo, M., Carson, J. P., Gehlenborg, N., Ginty, F., Goncalves, J. P., Hagood, J. S., Hickey, J. W., Kelleher, N. L., Laurent, L. C., Lin, et al  
2024
- **Rapid Setup of Tissue Microarray and Tiled Area Imaging on the Multiplexed Ion Beam Imaging Microscope using the Tile/SED/Array Interface.** *Journal of visualized experiments : JoVE*  
Piyadasa, H., Oberlton, B., Kong, A., Camacho Fullaway, C., Reddy Varra, S., Sowers, C., Tsai, A. G.  
2023
- **Advances and prospects for the Human BioMolecular Atlas Program (HuBMAP).** *Nature cell biology*  
Jain, S., Pei, L., Spraggins, J. M., Angelo, M., Carson, J. P., Gehlenborg, N., Ginty, F., Goncalves, J. P., Hagood, J. S., Hickey, J. W., Kelleher, N. L., Laurent, L. C., Lin, et al  
2023
- **UNRAVELLING HUMAN HEMATOPOIETIC PROGENITOR CELL DIVERSITY THROUGH ASSOCIATION WITH INTRINSIC REGULATORY FACTORS**  
Favaro, P., Glass, D., Borges, L., Baskar, R., Reynolds, W., Ho, D., Bruce, T., Tebaykin, D., Tsai, A., Shestopalov, I., Bendall, S.  
ELSEVIER SCIENCE INC.2023: S79
- **Supervised dimensionality reduction for exploration of single-cell data by HSS-LDA.** *Patterns (New York, N.Y.)*  
Amouzgar, M., Glass, D. R., Baskar, R., Averbukh, I., Kimmey, S. C., Tsai, A. G., Hartmann, F. J., Bendall, S. C.  
2022; 3 (8): 100536
- **An optimized protocol for phenotyping human granulocytes by mass cytometry.** *STAR protocols*

- Vivanco Gonzalez, N., Oliveria, J., Tebaykin, D., Ivison, G. T., Mukai, K., Tsai, M. M., Borges, L., Nadeau, K. C., Galli, S. J., Tsai, A. G., Bendall, S. C.  
2022; 3 (2): 101280
- **Longitudinal study of 2 patients with cyclic thrombocytopenia, STAT3, and MPL mutations.** *Blood advances*  
Zhang, H., Chien, M., Hou, Y., Shomali, W., Brar, R., Ho, C., Han, P., Xu, D., Zhang, B. M., Guo, X., Tolentino, L., Wu, N. C., Tsai, et al  
2022
  - **Chromatin Content Capture Reveals Acute Leukaemia Oncogenic Vulnerability Point in Human B Cell Development**  
Baskar, R., Favaro, P., Reynolds, W. D., Domizi, P., Tsai, A. G., Davis, K. L., Bendall, S.  
AMER SOC HEMATOLOGY.2021
  - **Mass Cytometry Phenotyping of Human Granulocytes Reveals Novel Basophil Functional Heterogeneity.** *iScience*  
Vivanco Gonzalez, N., Oliveria, J., Tebaykin, D., Ivison, G. T., Mukai, K., Tsai, M. M., Borges, L., Nadeau, K. C., Galli, S. J., Tsai, A. G., Bendall, S. C.  
2020; 23 (11): 101724
  - **Impact of somatic and germline mutations on the outcome of systemic mastocytosis.** *Blood advances*  
Munoz-Gonzalez, J. I., Jara-Acevedo, M., Alvarez-Twose, I., Merker, J. D., Teodosio, C., Hou, Y., Henriques, A., Roskin, K. M., Sanchez-Munoz, L., Tsai, A. G., Caldas, C., Matito, A., Sanchez-Gallego, et al  
2018; 2 (21): 2814-28
  - **Bone marrow morphology is a strong discriminator between chronic eosinophilic leukemia, not otherwise specified from reactive idiopathic hypereosinophilic syndrome.** *Haematologica*  
Wang, S. A., Hasserjian, R. P., Tam, W., Tsai, A. G., Geyer, J. T., George, T. I., Foucar, K., Rogers, H. J., Hsi, E. D., Rea, B. A., Bagg, A., Bueso-Ramos, C. C., Arber, et al  
2017
  - **Targeted next-generation sequencing identifies a subset of idiopathic hypereosinophilic syndrome with features similar to chronic eosinophilic leukemia, not otherwise specified.** *Modern pathology*  
Wang, S. A., Tam, W., Tsai, A. G., Arber, D. A., Hasserjian, R. P., Geyer, J. T., George, T. I., Czuchlewski, D. R., Foucar, K., Rogers, H. J., Hsi, E. D., Bryan Rea, B., Bagg, et al  
2016; 29 (8): 854-864
  - **Human lymphoid translocation fragile zones are hypomethylated and have accessible chromatin.** *Molecular and cellular biology*  
Lu, Z., Lieber, M. R., Tsai, A. G., Pardo, C. E., Müschen, M., Klädde, M. P., Hsieh, C.  
2015; 35 (7): 1209-1222
  - **BCL6 breaks occur at different AID sequence motifs in Ig-BCL6 and non-Ig-BCL6 rearrangements** *BLOOD*  
Lu, Z., Tsai, A. G., Akasaka, T., Ohno, H., Jiang, Y., Melnick, A. M., Greisman, H. A., Lieber, M. R.  
2013; 121 (22): 4551-4554
  - **Both CpG Methylation and Activation-Induced Deaminase Are Required for the Fragility of the Human bcl-2 Major Breakpoint Region: Implications for the Timing of the Breaks in the t(14;18) Translocation** *MOLECULAR AND CELLULAR BIOLOGY*  
Cui, X., Lu, Z., Kurosawa, A., Klemm, L., Bagshaw, A. T., Tsai, A. G., Gemmell, N., Mueschen, M., Adachi, N., Hsieh, C., Lieber, M. R.  
2013; 33 (5): 947-957
  - **IgH partner breakpoint sequences provide evidence that AID initiates t(11;14) and t(8;14) chromosomal breaks in mantle cell and Burkitt lymphomas** *BLOOD*  
Greisman, H. A., Lu, Z., Tsai, A. G., Greiner, T. C., Yi, H. S., Lieber, M. R.  
2012; 120 (14): 2864-2867
  - **Heterogeneity and Randomness of DNA Methylation Patterns in Human Embryonic Stem Cells** *DNA AND CELL BIOLOGY*  
Tsai, A. G., Chen, D. M., Lin, M., Hsieh, J. C., Okitsu, C. Y., Taghva, A., Shibata, D., Hsieh, C.  
2012; 31 (6): 893-907
  - **t(X;14)(p22;q32)/t(Y;14)(p11;q32) CRLF2-IGH translocations from human B-lineage ALLs involve CpG-type breaks at CRLF2, but CRLF2/P2RY8 intrachromosomal deletions do not** *BLOOD*  
Tsai, A. G., Yoda, A., Weinstock, D. M., Lieber, M. R.  
2010; 116 (11): 1993-1994
  - **The t(14;18)(q32;q21)/IGH-MALT1 translocation in MALT lymphomas is a CpG-type translocation, but the t(11;18)(q21;q21)/API2-MALT1 translocation in MALT lymphomas is not** *BLOOD*

Tsai, A. G., Lu, Z., Lieber, M. R.  
2010; 115 (17): 3640-3641

- **Nonhomologous DNA end joining (NHEJ) and chromosomal translocations in humans.** *Sub-cellular biochemistry*  
Lieber, M. R., Gu, J., Lu, H., Shimazaki, N., Tsai, A. G.  
2010; 50: 279-296
- **H3K4me3 Stimulates the V(D)J RAG Complex for Both Nicking and Hairpinning in trans in Addition to Tethering in cis: Implications for Translocations** *MOLECULAR CELL*  
Shimazaki, N., Tsai, A. G., Lieber, M. R.  
2009; 34 (5): 535-544
- **Conformational Variants of Duplex DNA Correlated with Cytosine-rich Chromosomal Fragile Sites** *JOURNAL OF BIOLOGICAL CHEMISTRY*  
Tsai, A. G., Engelhart, A. E., Hatmal, M. M., Houston, S. I., Hud, N. V., Haworth, I. S., Lieber, M. R.  
2009; 284 (11): 7157-7164
- **Unexpected complexity at breakpoint junctions in phenotypically normal individuals and mechanisms involved in generating balanced translocations t(1;22)(p36;q13)** *GENOME RESEARCH*  
GajECKa, M., Gentles, A. J., Tsai, A., Chitayat, D., Mackay, K. L., Glotzbach, C. D., Lieber, M. R., Shaffer, L. G.  
2008; 18 (11): 1733-1742
- **RAGs found "not guilty": cleared by DNA evidence** *BLOOD*  
Tsai, A. G., Lieber, M. R.  
2008; 111 (4): 1750-1750
- **Single-stranded DNA ligation and XLF-stimulated incompatible DNA end ligation by the XRCC4-DNA ligase IV complex: influence of terminal DNA sequence** *NUCLEIC ACIDS RESEARCH*  
Gu, J., Lu, H., Tsai, A. G., Schwarz, K., Lieber, M. R.  
2007; 35 (17): 5755-5762
- **HotPatch: A statistical approach to finding biologically relevant features on protein surfaces** *JOURNAL OF MOLECULAR BIOLOGY*  
Pettit, F. K., Bare, E., Tsai, A., Bowie, J. U.  
2007; 369 (3): 863-879
- **Analysis of non-B DNA structure at chromosomal sites in the mammalian genome** *DNA REPAIR, PT B*  
Raghavan, S. C., Tsai, A., Hsieh, C., Lieber, M. R.  
2006; 409: 301-316