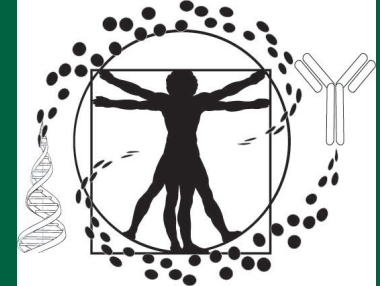


UAB THE UNIVERSITY OF
ALABAMA AT BIRMINGHAM.

UAB IMMUNOLOGY
INSTITUTE
The University of Alabama at Birmingham



UAB HSOM Immunology Institute



HEERSINK SCHOOL OF MEDICINE

<https://www.uab.edu/medicine/immunologyinstitute/>

Annual Open House 2025

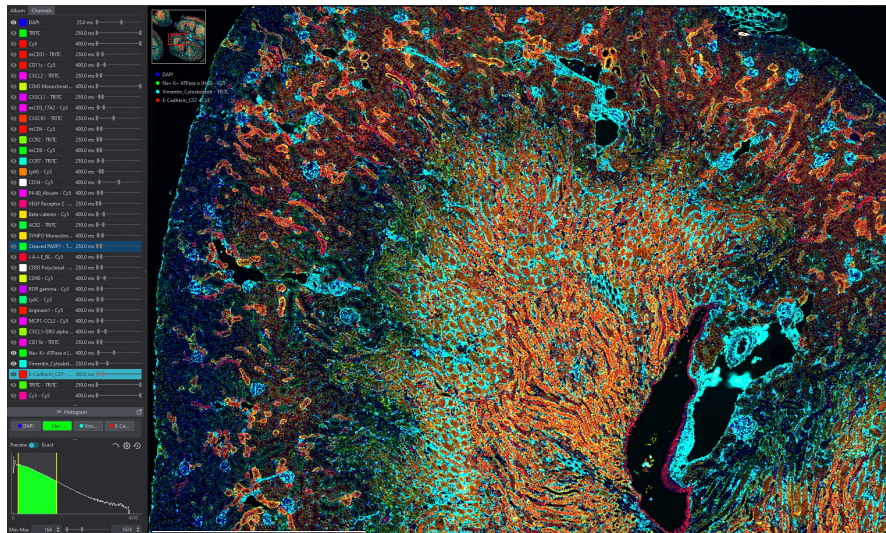
UAB HSOM Immunology Institute

UAB IMMUNOLOGY
INSTITUTE
The University of Alabama at Birmingham

An interdisciplinary research hub for faculty, researchers, trainees, clinicians, health policy experts, and educators who seek to advance the study of the immune system and its role in health and disease

Today's topics for presentation

1. Updates on resources available to support Immunology-relevant research at UAB!



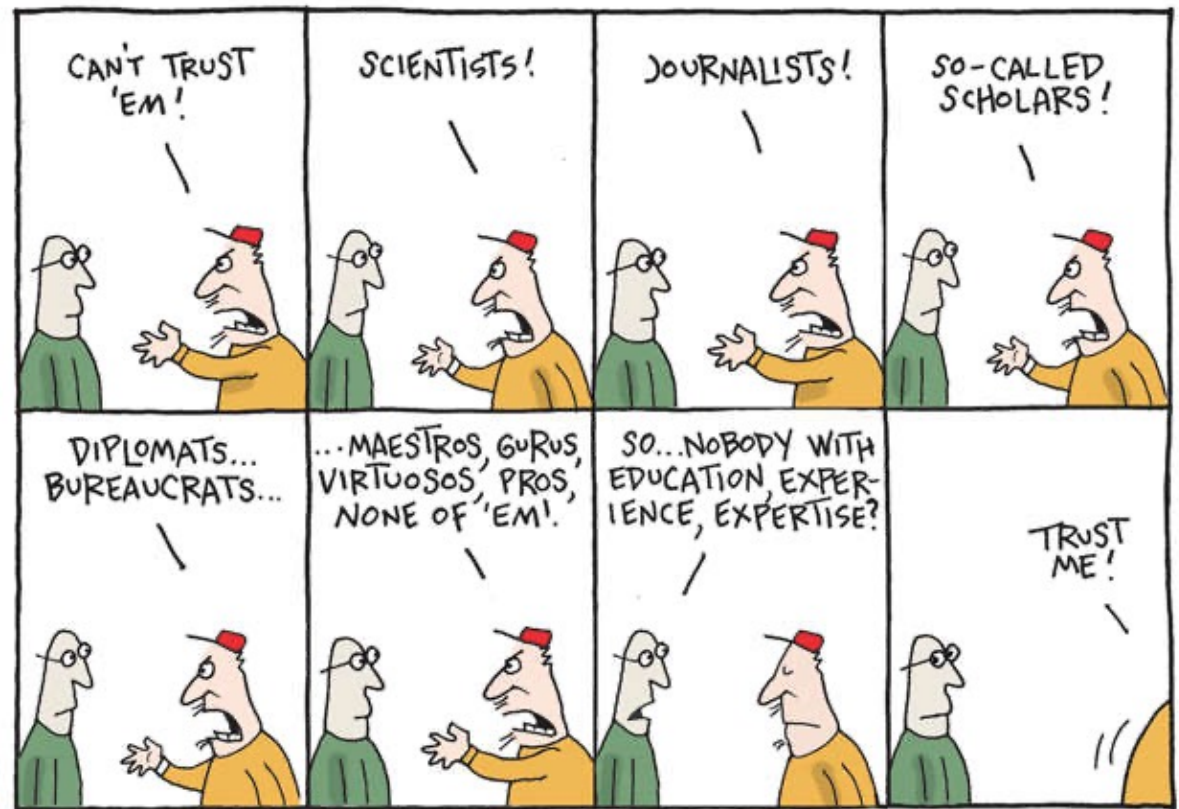
Mouse kidney – Jim George Lab
and Harish Pal Flow Cytometry and
Single Cell Core

For Discussion at the End- Interactive Survey

1. What technologies and infrastructure and education/training opportunities should we be investing in?
2. How should we be engaging the external community in a time when increasing numbers of Americans no longer trust scientists or vaccines?



<https://www.mentimeter.com/app/presentation/almusjgucmtxnj9kxw6m89ts6wb2kux9/edit?source=share-modal>

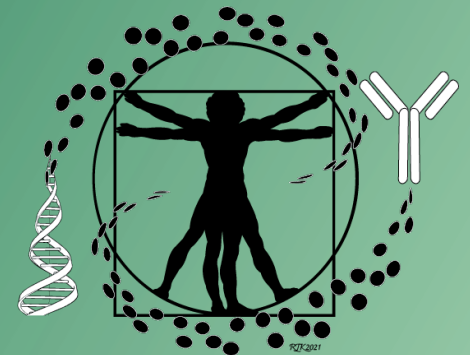


By: Joel Pett

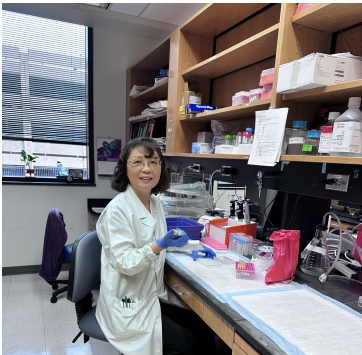


Wikipedia – definition of a snapshot

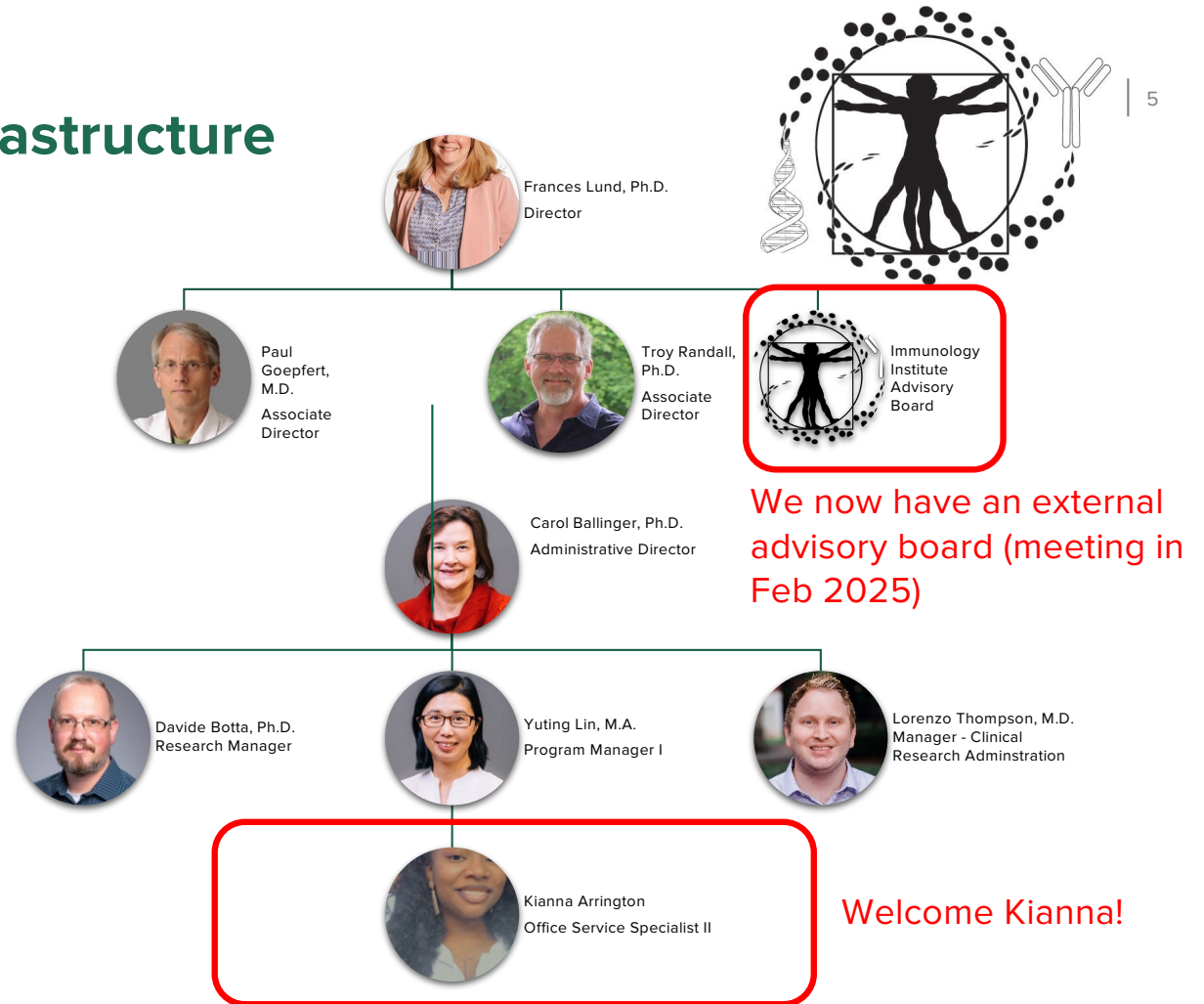
Snapshots of the HSOM Immunology Institute



Building the Institute – New Staff and New Infrastructure



We were at Core Day Jan 2024



Establishment of an External Advisory Board

6

First EAB meeting: February 12, 2025



Shannon Turley, Ph.D.
Genetech
Stromal cell function in inflammation
and cancer



E. John Wherry, Ph.D.
Univ. Pennsylvania
T Cell Exhaustion and Cancer
Immunotherapy



PJ Utz, M.D.
Stanford Univ.
Development of efficacious
immune-therapies and treatments.



Nadine Rouphael, M.D.
Emory Univ.
Vaccine Clinical Trial



David Masopust, Ph.D.
Univ. Minnesota
T cell migration, differentiation, and
memory development



Gwendalyn Randolph, Ph.D.
Washington Univ.
Immune cell trafficking and tissue-
specific transcriptional profiling



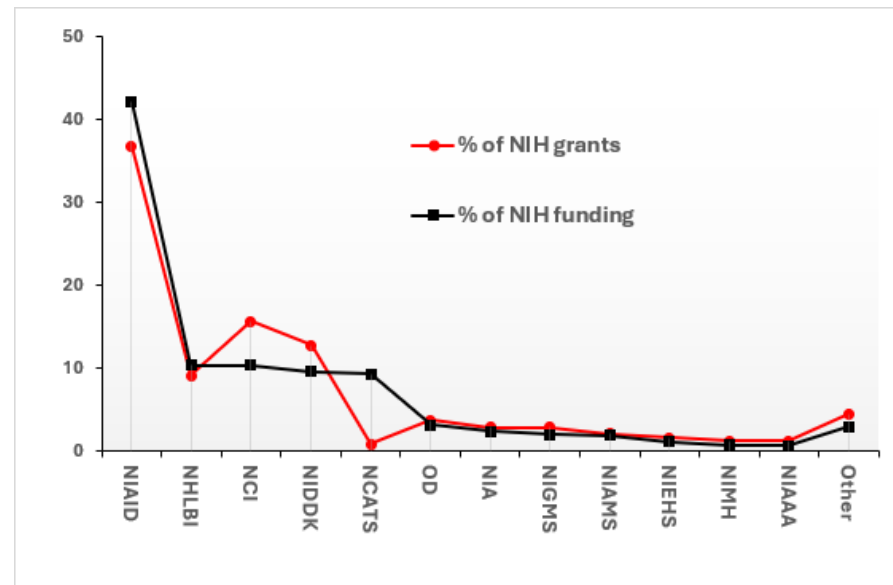
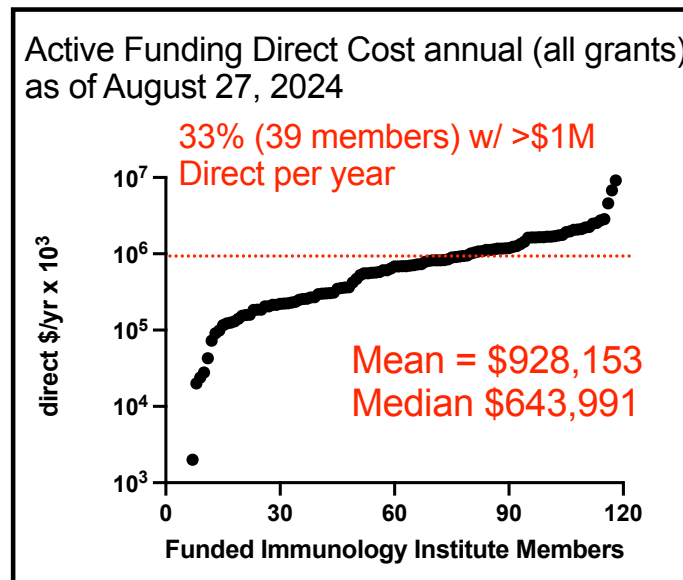
Miriam Merad, M.D. Ph.D.
Mount Sinai School of Medicine
Dendritic cell and macrophage
biology

The Immunology Institute Membership and Funding is continuing to grow

7

- Membership increased **20%**; **357** total (171 faculty+ 60 full time-staff + 126 trainees)
- The faculty membership includes **8** Instructors, **31** Assistant Professors, **38** Associate Professors and **94** Professors who are aligned with **7 University Schools** (HSOM 91%, SOD, SOHP, SOPH, SOO, SOE, CAS) and **51 Departments and Divisions**

Figure 1



11 members are publishing influential papers – a small set of examples that were highlighted by the HSOM

8



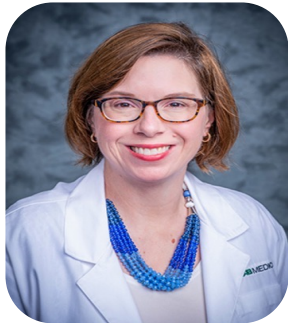
Casey Weaver and Carlene Zindl



Sunil Sudarshan



Troy Randall, Rebecca Arend, Selene Meza-Perez



Paige Porrett

Key role found for gut epithelial cells and their expression of MHCII in the defense against deadly diarrheal infections

L-2-hydroxyglutarate remodeling of the epigenome and epitranscriptome creates a metabolic vulnerability in kidney cancer models

Increasing arginine levels can be combined with immunotherapy to enhance immune responses and improve outcomes of cancer patients

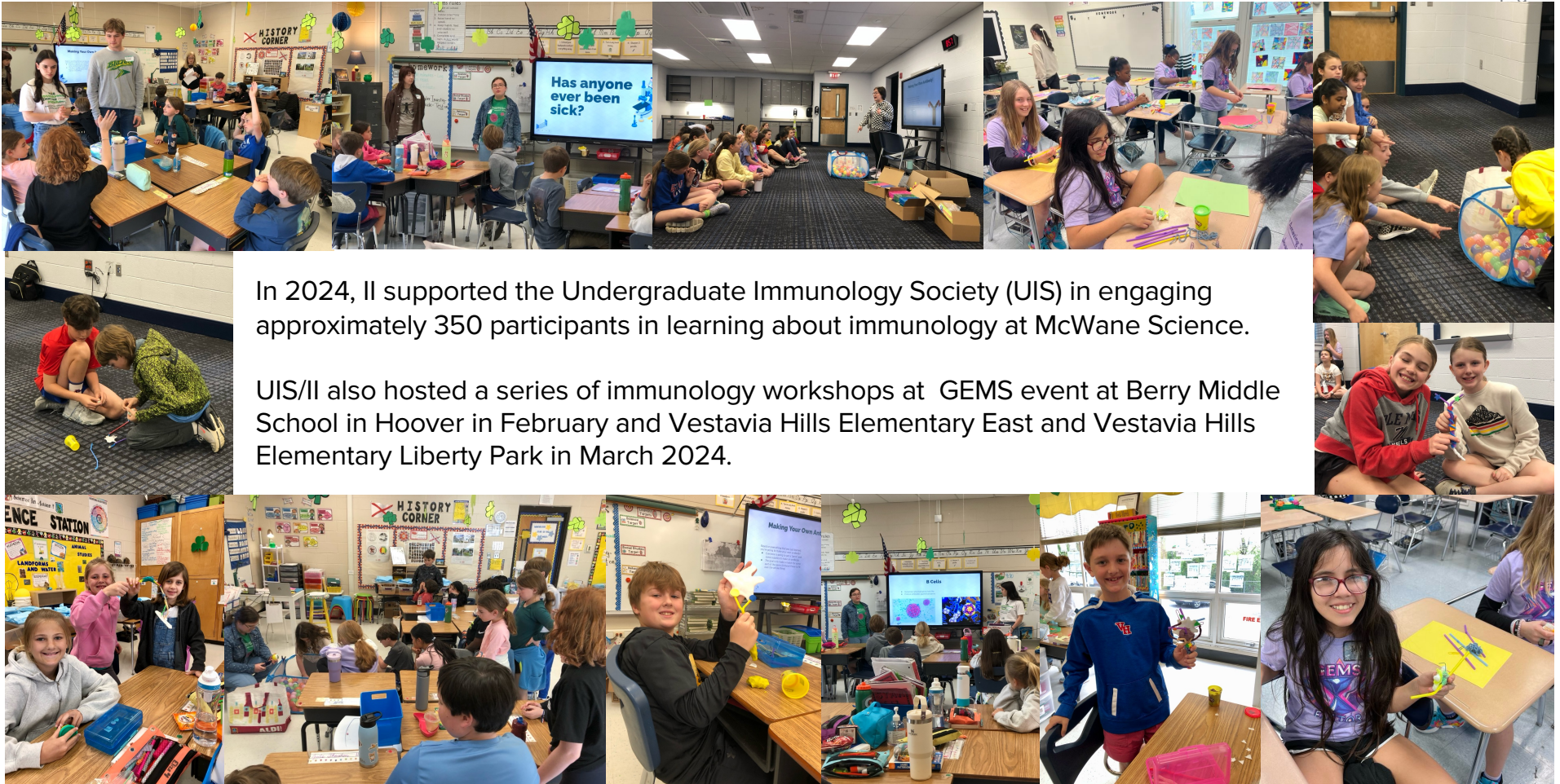
Spatiotemporal immune atlas of a clinical-grade gene-edited pig-to-human kidney xenotransplant

Enhanced brain delivery of antibodies heightens the potential to treat brain diseases



Masa Kamata

II trainees are participating in community engagement and education



(Under) Graduate Education and training

186 trainees and staff are II members, which includes 98 GBS/MSTP trainees

Activities for Trainees managed by II

- Trainee Research in Progress
- HSOM AMC21 Awardee Program
- Program in Immunology Seminar Series
- Annual Immunology Symposium and Va
- Southeastern Immunology Symposium



UAB IMMUNOLOGY INSTITUTE

RESEARCH IN PROGRESS

SEPT 12, 2024
3:30 - 4:30 PM
BORG 170

JESSICA LANE
Natural-Acquired Antibody Against Streptococcus

JESSICA LANE
PH.D. CANDIDATE
DEPARTMENT OF MICROBIOLOGY

CHARLES KUHLMANN
PH.D. CANDIDATE
GBS IMMUNOLOGY

CHARLES KUHLMANN
JNK signaling impacts CAR-T cell response

<https://www.uab.edu/medicine/immunologyinstitute/news-events/research-in-progress>

UAB IMMUNOLOGY INSTITUTE

RESEARCH IN PROGRESS

APRIL 18, 2024
3:30 - 5:00 PM
BORG 170

NESTOR PRIETO-DOMINGUEZ
Inhibition of Innate Immune Response in MIPs During Chemotherapy

NESTOR PRIETO-DOMINGUEZ
POSTDOCTORAL FELLOW
DEPARTMENT OF MICROBIOLOGY

ERIN YEPSEN EARNHARDT
PH.D. CANDIDATE
DEPARTMENT OF MEDICINE

ERIN YEPSEN EARNHARDT
Influenza A virus alters host defense in the airway epithelium via induced cystic fibrosis transmembrane conductance regulator dysfunction

UAB IMMUNOLOGY INSTITUTE

RESEARCH IN PROGRESS

JUNE 27, 2024
3:30 - 5:00 PM
BORG 170

GARRETT WILSON
A novel subset of colonocytes targeted by Citrobacter rodentium elicits epithelial MHCII-restricted help from CD4 T cells

GARRETT WILSON
MD-PhD STUDENT
DEPARTMENT OF PATHOLOGY

MATTHEW CHEUNG
MD-PhD STUDENT
NH MEDICAL SCIENTIST
MD-PhD TRAINING PROGRAM

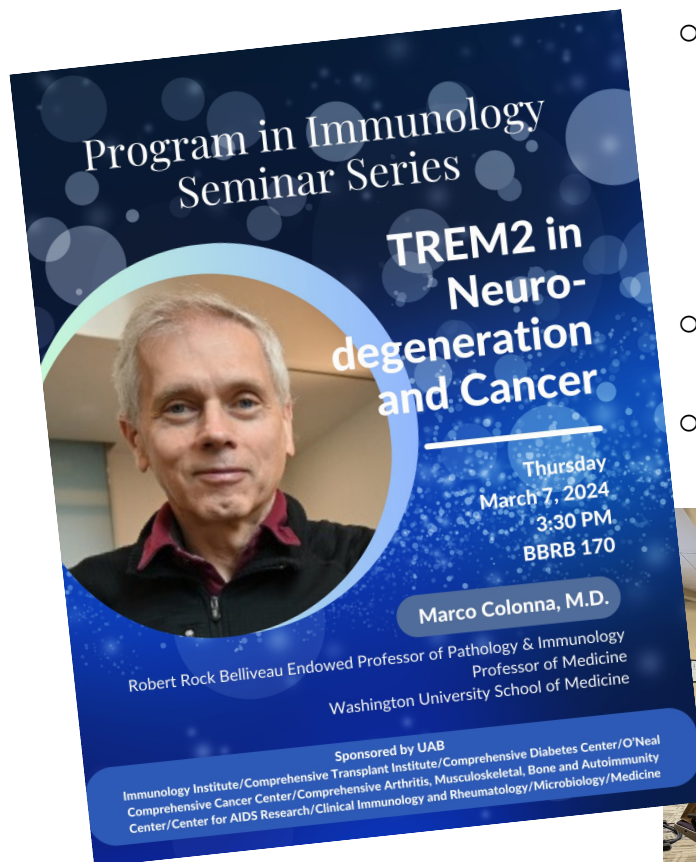
MATTHEW CHEUNG
Assessment of the immune response, microchimerism, and viral transmission during pig-to-human kidney xenotransplantation

JOIN US!

<https://www.uab.edu/medicine/immunologyinstitute/news-events/research-in-progress>

HEERSINK SCHOOL OF MEDICINE

Program in Immunology Seminar Series



- 2023/2024 PII seminar series - **19 external/8 internal speakers**, co-sponsored World AIDS Day, Research in Progress, John Volanakis (Marion Pepper, PhD) & Robert Stroud (Eddie-Williams Owiredu and Melissa Jennings) Immunology lectures
- Earlier start time & II hosts post-seminar reception to encourage networking
- Average attendance increased from **39 (FY23) to 60 (FY24)**; highest of 101 with Dr. Marco Colonna



The Eleventh Annual Southeastern Immunology Symposium in BIRMINGHAM

UAB trainees attended free with II vouchers!



Faculty/Staff/Vendors	177
Trainees	223
Total registrants	400
Faculty/Staff/Vendors	177
Institutions represented	21
	16 - AL, CA, FL, GA, IL, KY, LA, MA, MN, MO, NC, OH, SC, TN, TX, VA
States represented	
Abstracts submitted	208
Vendors sponsored	16



12

Regional Institution	Number of Attendees
Augusta University	25
Duke University	9
Emory University	39
Georgia Tech	2
LSU	2
MUSC	8
NIH	2
St. Jude Children's	3
UAB	158
UF Scripps	3
UFL	1
UNC	9
University of Alabama	1
University of South Alabama	5
University of Louisville	2
University of South Florida	2
University of Tennessee-Knoxville	5
UVA	29
Vanderbilt University	58
Virginia Tech	8
Wake Forest University	2
Total	373

NEW! Trainee Travel Awards -2024 and 2025

13



Lance Benson – Pollock lab
(APSS meeting)



Susan Cheetham – Randall lab
(AAI meeting)



Krishna Chinta – Steyn lab
(Gordon Conference)

Coming up – 10 \$500 travel awards for trainee members to attend upcoming 2025 AAI meeting in Hawaii (applications were due in December)

Garrett Wilson (Weaver lab), Susana Cheetham (Randall lab), Courtney Swain (Shevde-Samant), Angelica Cora Toro (Lal lab), Ashley Denslow (Lund lab), Covenant Adeboboye (Maynard lab), Jung-Shan Hsu (Maynard lab), Vickie Yang (Harms Lab), Xinran Wang (Randall lab)

Research in Progress – 4th year & above graduate students and postdoctoral fellows 14

10/5/23	Nicole Arroyo-Diaz	Andre Ballesteros-Tato's lab	IFN- γ production by Tfh cells is required for CXCR3 ⁺ pre-memory B cell differentiation and subsequent lung-resident memory B cell responses
10/5/23	Millie Perez	Olaf Kutsch's lab	CD151 ⁺ T Cell Frequencies as an Immunological Clock that Identifies Premature Immunological Aging in People With HIV
4/18/24	Erin Yepsen Earnhardt	Kevin Harrod's lab	Influenza A virus alters host defense in the airway epithelium via induced cystic fibrosis transmembrane conductance regulator dysfunction
6/27/24	Garrett Wilson	Casey Weaver's lab	A novel subset of colonocytes targeted by Citrobacter rodentium elicits epithelial MHCII-restricted help from CD4 T cells
6/27/24	Matthew D. Cheung	Anupam Agarwal's and James George's lab	Assessment of the immune response, microchimerism, and viral transmission during pig-to-human kidney xenotransplantation
9/12/24	Charles Kuhlmann	Masakazu Kamata's Lab	JNK signaling impacts CAR-T cell response
9/12/24	Jessica Lane	Carlos Orihuela's lab	Natural-acquired antibody against Streptococcus pneumoniae among healthy adults is primarily to biofilm-exclusive antigens

NEXT PRESENTERS: Those receiving the AAI travel awards 😊

Garrett Wilson (Weaver lab), Susana Cheetham (Randall lab), Courtney Swain (Shevde-Samant), Angelica Cora Toro (Lal lab), Ashley Denslow (Lund lab), Covenant Adeboboye (Maynard lab), Jung-Shan Hsu (Maynard lab), Vickie Yang (Harms Lab), Xinran Wang (Randall lab)

Research in Progress is valuable – we need more faculty to participate in the audience!!!

15

I thought it was a wonderful time. I had submitted my abstract in hopes to present (rather than travel award). Overall experience was great. My only feedback is I wish more faculty would attend the student presentations. While there were faculty there, it seemed like it was a majority of students, which then feels similar to our immunology theme meetings. Still really enjoyed it and appreciated the opportunity to share our work.

I thought the experience was extremely valuable overall. As a student, we don't have a ton of opportunities to present to faculty. Sure, we can have a committee meeting, but that is only 4 faculty who already know your project. The immunology seminar is a room full of faculty! Wow, I was so nervous to present. Of course, everything went fine. Overall, the experience helped to build confidence, to prepare for when I need to present to get a post doc or faculty position and helped me develop my project by getting outside feedback from faculty. I didn't have dinner with a speaker, but that was by my own omission. I hope the RIP seminar continues for future students.

I found the presentation helpful. I got good feedback and questions that helped me identify areas of my project that needed more work before putting together a manuscript. It was also helpful to have a longer talk to use as practice for post doc interviews. As a student, most of our opportunities to present are limited to 15 minutes, so having more time was a good experience.

Feedback from 3 presenters!!! Think about applying for an RIP talk

Build II Relevant Research Capabilities

The screenshot displays the website of the Immunology Institute at the University of Alabama at Birmingham. The browser address bar shows the URL: uab.edu/medicine/immunologyinstitute/research-cores/immunology-relevant-services. The website header includes the UAB logo and the text "THE UNIVERSITY OF ALABAMA AT BIRMINGHAM" on the left, and a search icon and "Explore UAB" link on the right. Below the header, the page title "Immunology Institute" is followed by "HEERSINK SCHOOL OF MEDICINE". A navigation menu contains links for "About", "Members", "Research", "Education", "News & Events", and "Give". On the left side, a sidebar menu lists "Research & Cores", "Cores and Infrastructure", "Immunology Relevant Services" (which is highlighted), "Antibody Characterization and Serology (ACS) Core", "Multiplex Immunofluorescence COMET™ Services", "Featured Discovery", "Healthy Donor Cohort", and "Pilot Grant". The main content area features a breadcrumb trail: "Home - Research & Cores - Immunology Relevant Services". The primary heading is "Immunology Relevant Services". Below this, four service links are listed: "Antibody Characterization and Serology (ACS) Core", "Multiplex Immunofluorescence COMET™ Services under Flow Cytometry and Single Cell (FCSC) Core", "Immunophenotyping Services under FCSC Core", and "Global Research Resource for Human Tuberculosis".

uab.edu/medicine/immunologyinstitute/research-cores/immunology-relevant-services

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM Explore UAB

Immunology Institute
HEERSINK SCHOOL OF MEDICINE

About Members Research Education News & Events Give

Research & Cores

Cores and Infrastructure

Immunology Relevant Services

Antibody Characterization and Serology (ACS) Core

Multiplex Immunofluorescence COMET™ Services

Featured Discovery

Healthy Donor Cohort

Pilot Grant

Home - Research & Cores - Immunology Relevant Services

Immunology Relevant Services

Antibody Characterization and Serology (ACS) Core

Multiplex Immunofluorescence COMET™ Services under Flow Cytometry and Single Cell (FCSC) Core



Immunophenotyping Services under FCSC Core

Global Research Resource for Human Tuberculosis

Administrative support for submission of *Multi-(FUNDED!!)* *Multi-Disciplinary* Grants

Human Immunology U19 Evolution and Durability of Human T and B Cell Responses (Lund, PD/PI) – Lund, Randall, Porrett, Green, King, Rosenberg – awarded 04/24 - **\$18,324,905 total**

NIAID R24 Global Research Resource for Human Tuberculosis (Steyn,PD/PI) – Steyn, Benson, Glasgow and AHRI -awarded 08/24 – **\$5,850,378 total**

<div><div>NIH Cooperative Centers on Human Immunology INFRASTRUCTURE AND OPPORTUNITY FUND</div><div>HOME ABOUT FUNDING MEMBERS NEWS CONTACT</div><div></div><div><h3>Advancing our understanding of the mechanisms regulating human immune response</h3><p>The <i>NIH Cooperative Centers on Human Immunology (CCHI)</i> were awarded in response to RFA-AI-22-069 to support research on human immune system regulation and function for the discovery and characterization of new principles of human immunology for the prevention and treatment of infectious and immune-mediated diseases. The CCHI U19 program supports mechanistic and hypothesis-testing studies to discover novel molecules, mechanisms, or regulatory pathways governing function of the human immune system in both healthy and vulnerable populations (i.e., across lifespan, organ/tissue transplant</p></div><div><div>Search This Site</div><div><input type="text" value="Search ..."/></div><div>Recent News</div></div></div>	<div><div>Global Research Resource for Human Tuberculosis HEERSINK SCHOOL OF MEDICINE</div><div>Home About the GRR-HTB Human TB Tissues Analytical Services Request Services Policies</div><div></div><div><h3>Our mission is to transform the landscape of global TB research by accelerating the study of human TB tissue.</h3><p>The GRR-HTB supports innovative TB research by providing confidential, personalized, investigator-requested analyses of human TB tissue specimens, enabling investigators worldwide to challenge existing paradigms of the cellular and pathological basis of human TB to improve diagnosis, prevention, and treatment of TB.</p></div></div>
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Immunology Institute Pilot Project Funds and Research Vouchers

18

Awarded 3 pilots on Jan 1, 2024
(\$50,000/yr for up to 2 years)

1. Sunil Sudarshan (Urology) and Lyse Norian (Nutrition Science): Oncometabolic Regulation of the Immune Response and Immunotherapy Efficacy in Kidney Cancer.
2. Chander Raman (Dermatology) and Lin Jin (Dermatology): Elucidating interactive network of NKT and NK cell populations and skin resident cells in Hidradenitis suppurativa (HS) pathogenesis..
3. Xu Feng (Pathology): RANK Signaling Mechanism in the Immune System.

2025 Research Vouchers

1. \$20K/COMET project (4 to be funded in Jan 2025)
2. ~\$30K/Xenium Project (3-4 to be funded in Spring 2025)
3. \$15K/Immunophenotyping project (3-4 to be funded in Summer 2025)

UAB Healthy Donor Cohort – up and running

19



862
Participants
Enrolled



83
Requests



34.5
Median Age
(18-86 yrs)



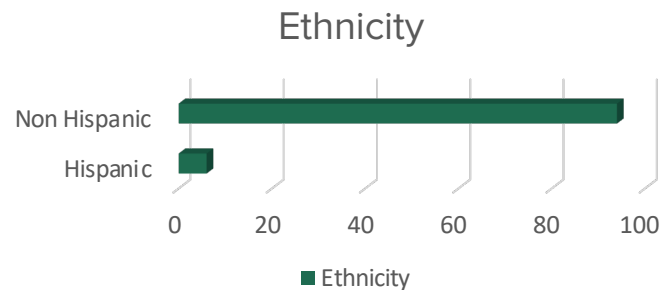
11
Labs



628
Female
(72.8%)



231
Samples



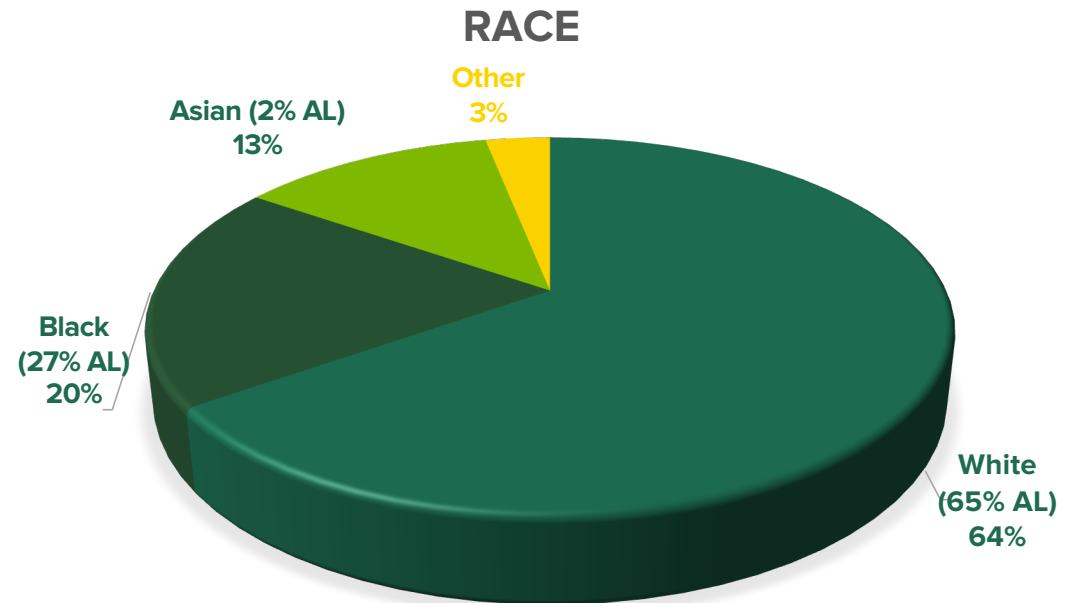
[Home](#) - [Research & Cores](#) - Healthy Donor Cohort

Healthy Donor Cohort

You are being asked to join a group of healthy adults who are willing to serve as participants in UAB research studies for which investigators need blood samples. There are no direct benefits to you for enrolling in this cohort although your donation will assist with UAB immunology research and increase our knowledge of how the immune system works.

HOW DOES IT WORK?

Enrollment: If you decide to enroll in this group (UAB HDC), we will ask you to complete a questionnaire (<https://redcap.link/uabhdco>) to collect basic information and verify that you are a healthy (no active cancer within the past 5 years, no diagnoses of autoimmune disorders, no diagnoses of anemia or lymphopenia, not treated with immune modulating drugs, and not currently treated for chronic viral infection(s)), non-pregnant adult (18 years of age or older) weighing at least 110 lbs. *consent to participate in the future and*



Using the UAB HDC for other studies – Flu vaccine study across the lifespan

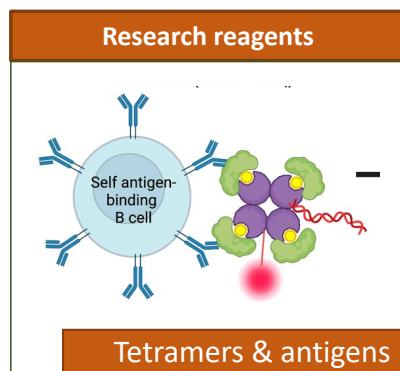
Goal enroll 20 individuals with specific DOB for flu vaccine – completed in 48 hrs!!

DOB Groups	Visit 1 Complete	Study Complete	DOB of Participants	M	F	Black	White
1947-1957 (N=5)	5	5	1948, 1950 (2), 1955, 1956	2	3	0	5
1957-1968 (N=7)	7	7	1959 (2), 1960, 1961, 1963, 1966, 1967	2	5	2	5
1968-1977 (N=8)	8	8	1969 (3), 1970, 1972, 1973 (2), 1974	4	4	4	4
Total	20	20	NA	8	12	6	14

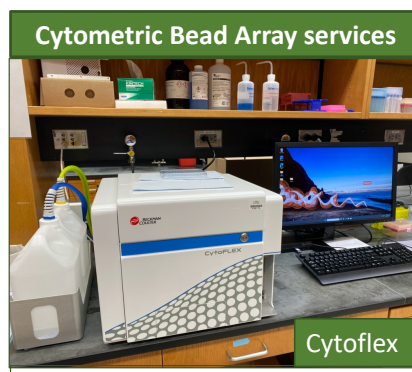
Antibody Characterization and Serology (ACS) Service Center

21

Multiplexed immunoassays and HTS technologies to quantitate soluble biomarkers in biologic samples



Reagents to follow B and T cell responses *in situ*



Quantitate antibody responses and antibody affinities in biologic samples

ACS users already span many HSOM departments and divisions

22



10

Depts/Divisions



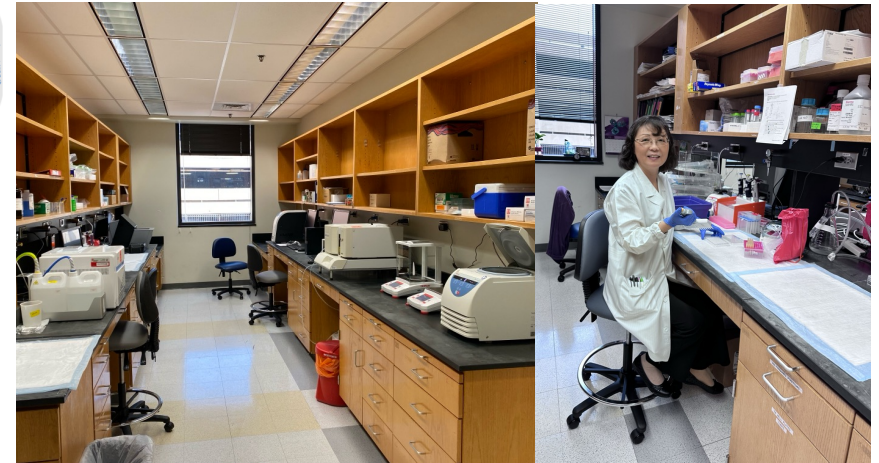
23

Grants supported



16

Labs supported



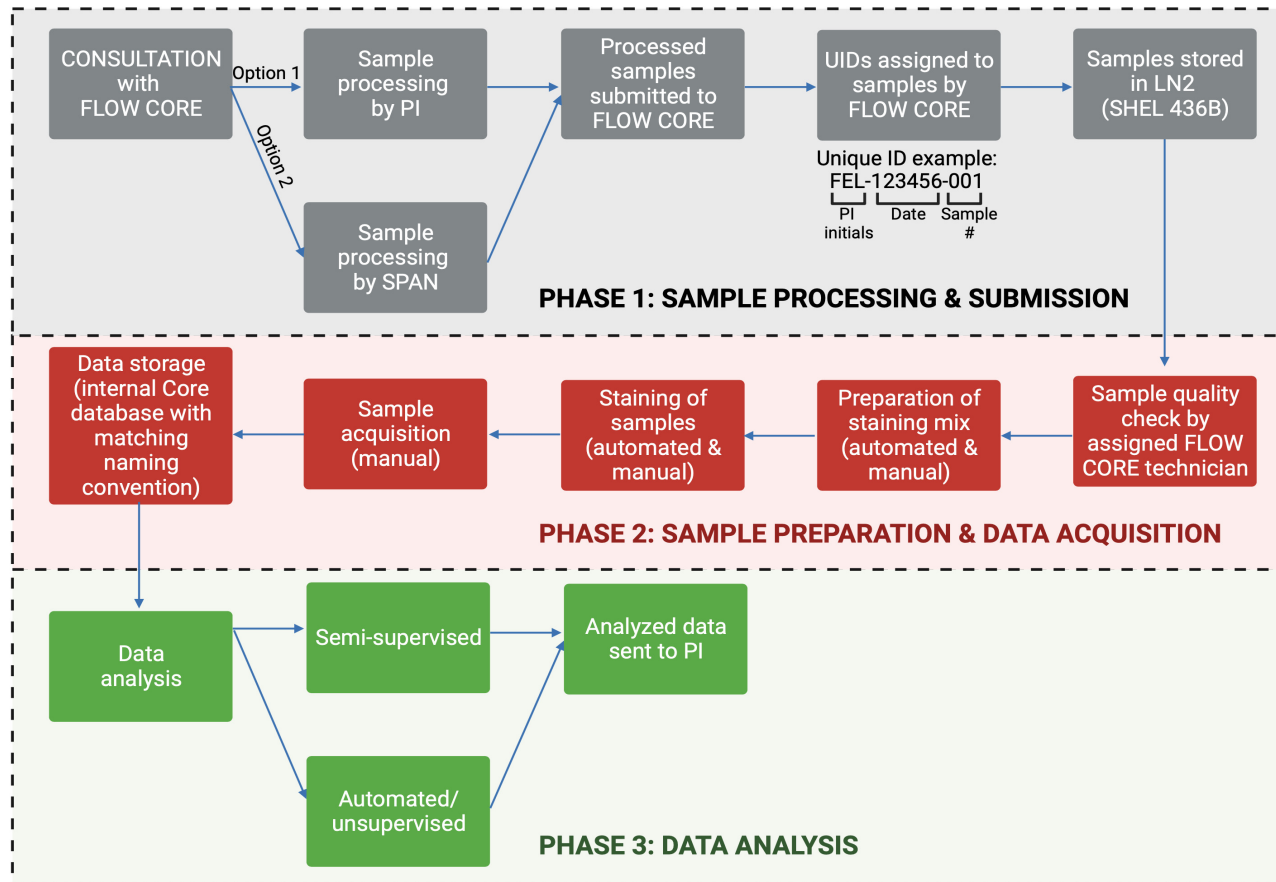
[Home](#) - [Research & Cores](#) - [Immunology Relevant Services](#) - Antibody Characterization and Serology (ACS) Core

Antibody Characterization and Serology (ACS) Core

ACS most often used for custom 80-plex soluble protein measurements

Immunophenotyping core service has launched

23



Immunophenotyping is a powerful approach to identify easily monitored biomarkers and cellular signatures that may be useful as diagnostic and prognostic indicators of disease. Immunophenotyping is particularly helpful when monitoring patients who are exposed to immunotherapies, such as checkpoint inhibitors and targeted immune modulators that are increasingly used in chronic disease settings.

24

Myeloid lineage panel (34 markers): optimizing in bone marrow samples

NKT Cells		NKT cell	CD19-/CD14-/CD56+/CD3+/CD56+
NK Cells		CD56bright CD16- NK Cell CD56+/dim CD16+ NK Cell CD56- CD16+ NK Cell	CD19-/CD14-/CD3-/CD56bright/CD16- CD19-/CD14-/CD3-/CD56+/dim/CD16+ CD19-/CD14-/CD3-/CD56-/CD16+
CD3+ Cells		CD3+ T Cell	CD19-/CD14-/CD56-/CD3+
CD4+ Cells		CD4+ T Cell CD4 Naive T cell (Nav) CD4 Central Memory T cell (CM) CD4 Effector Memory T cell (EM) CD4 Effector Memory RA+ T Cell (EMRA) CD4 Anergic CD4 Senescent CD4 No-Expression CD4 Exhausted	CD19-/CD14-/CD56-/CD16-/CD3+/CD4+ CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/CCR7+/CD45RA+ CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/CCR7-/CD45RA+ CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/CCR7-/CD45RA- CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/CCR7-/CD45RA- CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/PD1+/CD57+ CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/PD1-/CD57+ CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/PD1-/CD57- CD19-/CD14-/CD56-/CD16-/CD3+/CD4+/PD1+/CD57-
CD8+ Cells		CD8+ T Cell CD8 Naive T Cell (Nav) CD8 Central Memory T cell (CM) CD8 Effector Memory T cell (EM) CD8 Effector Memory RA+ T Cell (EMRA) CD8 Anergic CD8 Senescent CD8 No-Expression CD8 Exhausted	CD19-/CD14-/CD56-/CD16-/CD3+/CD8+ CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/CCR7+/CD45RA+ CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/CCR7-/CD45RA+ CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/CCR7-/CD45RA- CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/CCR7-/CD45RA- CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/PD1+/CD57+ CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/PD1-/CD57+ CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/PD1-/CD57- CD19-/CD14-/CD56-/CD16-/CD3+/CD8+/PD1+/CD57-
B Cells		B Cell Transitional B Cell Naive B Cell Unswitched Memory B Cell Switched Memory B Cell IgG+ Switched Memory B Cells True IgM+ Memory B Cells Double Negative IgG+ Double Negative IgM+ Double Negative DoubleNegative 2 Plasmablast Plasma Cell	CD3-/CD14-/CD56-/CD19+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27-/CD24++/IgM+ CD3-/CD14-/CD56-/CD19+/IgD+/CD27-/IgM+ CD3-/CD14-/CD56-/CD19+/IgD+/CD27+/IgM+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27+/IgG+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27+/IgM+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27-/IgG+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27-/IgM+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27-/CD11c+ CD3-/CD14-/CD56-/CD19+/IgD-/CD27++/CD38++/CD24-/CD138- CD3-/CD14-/CD56-/CD19+/IgG-/CD27++/CD38++/CD24-/CD138+
Monocytes		Classical Monocyte Intermediate Monocyte Non-Classical Monocyte	CD3-/CD19-/CD56-/CD8-/HLA-DR+/CD14+/CD16- CD3-/CD19-/CD56-/CD8-/HLA-DR+/CD14+/CD16+ CD3-/CD19-/CD56-/CD8-/HLA-DR+/CD14-/CD16+
DCs		DC CD1c+ Conventional DC CD141+ Conventional DC Plasmacytoid DC	CD3-/CD14-/CD16-/CD19-/CD56-/HLA-DR+ CD3-/CD14-/CD16-/CD19-/CD56-/CD11b-/HLA-DR+/CD11c+/CD141-/CD1c+ CD3-/CD14-/CD16-/CD19-/CD56-/CD11b-/HLA-DR+/CD11c+/CD1c-/CD141+ CD3-/CD14-/CD16-/CD19-/CD56-/CD11b-/HLA-DR+/CD11c-/CD123+/CD141+

Labs from 9
Depts/Divisions



Immunology Institute* supporting development and distribution of immunology-relevant clinical data bundles

25

- Rapidly obtain bundled clinical data sets that are semi-tailored for our research interests
- Can be used to determine whether potential cohort exists or to collect clinical information on an existing cohort
- Initial bundles are focused on diseases that are often treated with immune-modulating therapies

Immunology-relevant bundles

- ❖ **Respiratory infection/disease**
 - ❖ Acute and Long COVID
 - ❖ Viral and bacterial
- ❖ **Autoimmune Disease**
 - ❖ Lupus
 - ❖ RA etc
- ❖ **Cancer Immunology**
 - ❖ MM, Breast, Ovarian etc
- ❖ **Transplantation**
 - ❖ Kidney, lung etc

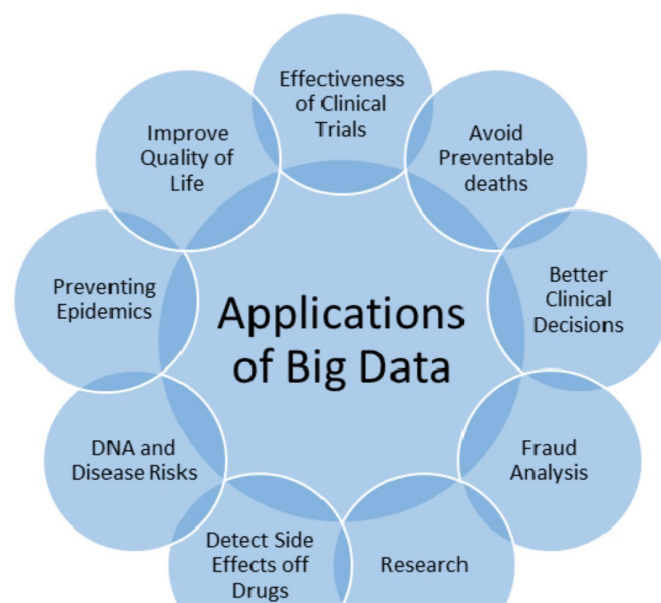
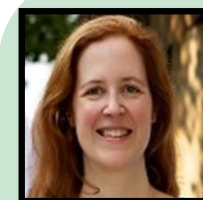


Figure 1 Applications of Big Data

Published in IEEE International Advance Computing Conference 2017
Big Data Security in Healthcare: Survey on Frameworks and Algorithms
Sudipta Chandra Soumya Ray R. T. Goswami



Greer Burkholder MD, MSPH
Assoc Professor,
Infectious Diseases,
RISC Director of Data
Services



Dale Johnson, MS
Informatics Dept,
Informatics Architect



Urva Tul Vusqa, MBBS
RISC Clinical Data
Specialist

*partners include RISC, DBIDS, CCTS, COERE

Example of a search for a group of patients

Find me all the patients seen at UAB in the last decade who had at least one clinical lab that was "hi" for anti-Smith or anti-RNP or anti-SSA

Data returned includes:

- ❖ Diagnoses 28,992 medical/concept codes (ie. 992 are autoimmune and 2187 are CKD)
- ❖ Vital Signs 148 medical/concept codes (ie BMI and Diastolic BP)
- ❖ Lab results 43 medical/concept codes (autoimmune specific)
- ❖ Medications 3650 medical/concept codes (ie. 1100 autoimmune meds with 12 for abatacept (different delivery routes)
- ❖ 1091 Columns of data for individuals (on 26 sheets)
 - ❖ Demographics (34 data points)
 - ❖ Emergency encounter no Admittance (26 data points)
 - ❖ In-patient encounter (29 data points)
 - ❖ In-patient maxO2 (7 data points)
 - ❖ Out-patient encounters (26 data points)
 - ❖ Labs (30 data points - autoimmune specific)
 - ❖ Meds order (30 data points – autoimmune specific)
 - ❖ Vital signs (26 data points)
 - ❖ Many others and then filtered by TAGS (focused on autoimmunity in this bundle, most recent, Y/N etc)



Created by Symbolon
from Noun Project

Find me patients at UAB in last decade with high labs for Smith, or RNP or SSA antibodies

Data returned on 3727 individuals. I found 3407 are still alive and 2073 were seen at least one time at UAB in 2024.

- ❖ ~90% are women and more than 50% are Black women - expected for these Autoantibodies (Lupus specific)
- ❖ ~10% are men (n=282)
- ❖ DRILL DOWN ON THE RARE MALE PATIENTS

Drug treatment	last 10 yrs	In 2024
Anti-CD20	17	15
Baracitinib	1	0
Belimumab	17	8
chloroquine	1	0
corticosteroid	199	96
Etanercept	1	0
IL-1 inhibitor	3	0
IL12/23 inhibitor	4	1
IL17 inhibitor	0	0
IL23 inhibitor	0	0
IL6 inhibitor	2	2
JAKi	2	1
TNFi	11	3



4.5 hr to run
20 min to sort

AutoAbs	# Patients
Anti-Smith (10 yrs)	127
Anti-Smith 2024	34
Smith+RNP+SSA scored (10yrs)	98
Smith scored 2024	4
RNP scored 2024	7
SSA scored 2024	18



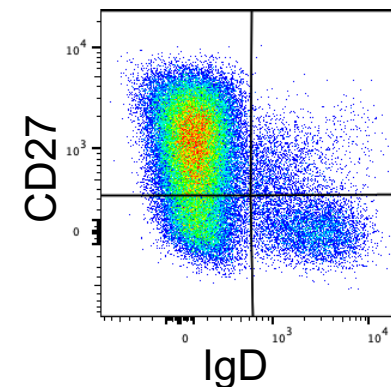
Patients MRNs	Next Appointment
XXXXXX	UAB PHYSICAL MED & REHAB MED WEST Carter, Johnny M 03/05/2025 02:40:00 PM
XXXXXX	TKC - ULTRASOUND RADIOLOGY ULTRASOUND 10/31/2024 02:00:00 PM
XXXXXX	GAR MRI RADIOLOGY MRI GARDENDALE 11/25/2024 09:30:00 AM
XXXXXX	TKC Infusion 5th Flr INFUSION POD C 11/08/2024 01:30:00 PM
XXXXXX	WHITAKER RHEUMATOLOGY Taylor, Adam Douglas MD 11/22/2024 11:20:00 AM
XXXXXX	TKC Cardiology McElderry, Hugh T MD 06/25/2025 09:00:00 AM
XXXXXX	TKC Infusion 5th Flr INFUSION POD B 11/06/2024 09:15:00 AM
XXXXXX	EMG EMG UH LABORATORY 11/06/2024 01:40:00 PM
XXXXXX	TKC-OTOLARYNGOLOGY Stone, Caitlin MCD CCC-SLP 11/07/2024 08:30:00 AM
XXXXXX	Acton Rd Infsn Thrpy ACTON ITU 1 10/31/2024 10:30:00 AM
XXXXXX	TKC Radiology Diagnostic RADIOLOGY GI TKC 11/25/2024 10:00:00 AM
XXXXXX	TKC Neurology Kazamel, Mohamed MD 10/30/2024 02:40:00 PM
XXXXXX	Wallace Tumor - Pet PET SCAN 11/14/2024 07:30:00 AM
XXXXXX	WHITAKER DERMATOLOGY Elewski, Boni E MD 11/22/2024 10:45:00 AM
XXXXXX	Cardio-Pulmonary Reh RADIOLOGY PULMONARY REHAB 10/29/2024 01:00:00 PM
XXXXXX	not scheduled
XXXXXX	not scheduled
XXXXXX	not scheduled
XXXXXX	not scheduled
XXXXXX	not scheduled

Spatial Biology – a critical component of immunology



What room is he in? Who is reflected in the window?
Who is he making a face for? Who are his neighbors?

A snapshot is a photograph that is “snapped” in the moment. Common subjects include the events of everyday life – often portraying family or friends. Snapshots give us an instantaneous, often humorous, slice of life, but rarely provide any context to the story.



What tissue did these cells come from?
What are all the other cells in that tissue?
What soluble mediators are these cells making and for whom?

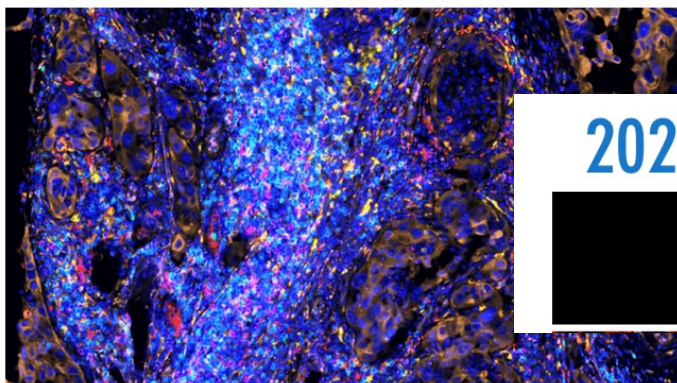
Studies of immune responses are often similar to this snapshot – interesting and memorable, but in many cases lacking enough context to fully understand what is happening.

Spatial Biology – the Google Maps View* of our Cells (and the future of single cell-omics) *Scientific American Dec 2014

29

Spatial Biology – The 2024 SciLifeLab
Science Summit

Allison Institute scientific symposium features spatial
biology breakthroughs, \$5 million gift to support further
efforts



2024 Spatial Biology Summit

3RD ANNUAL
SPATIAL BIOLOGY SUMMIT
SEPTEMBER 10-12, 2024
STANFORD, CA

[Home](#) > [Spatial Symposium 2024](#)

BioChain's 2nd Annual Spatial Symposium

Three Decades of Pioneering Precision Medicine, Enriching Science,
Shaping Futures



3rd Annual
**Spatial Biology for
Immuno-Oncology Summit**
28-30 January, 2025 | San Diego, CA

FREE PASS

RS-SINAI

Spatial Biology Symposium '24

March 7

Hosted by the Cedars-Sinai Spatial Molecular Profiling, Proteomics,
and Applied Genomics Shared Resources, Cancer Shared Resources,
and Academic Affairs

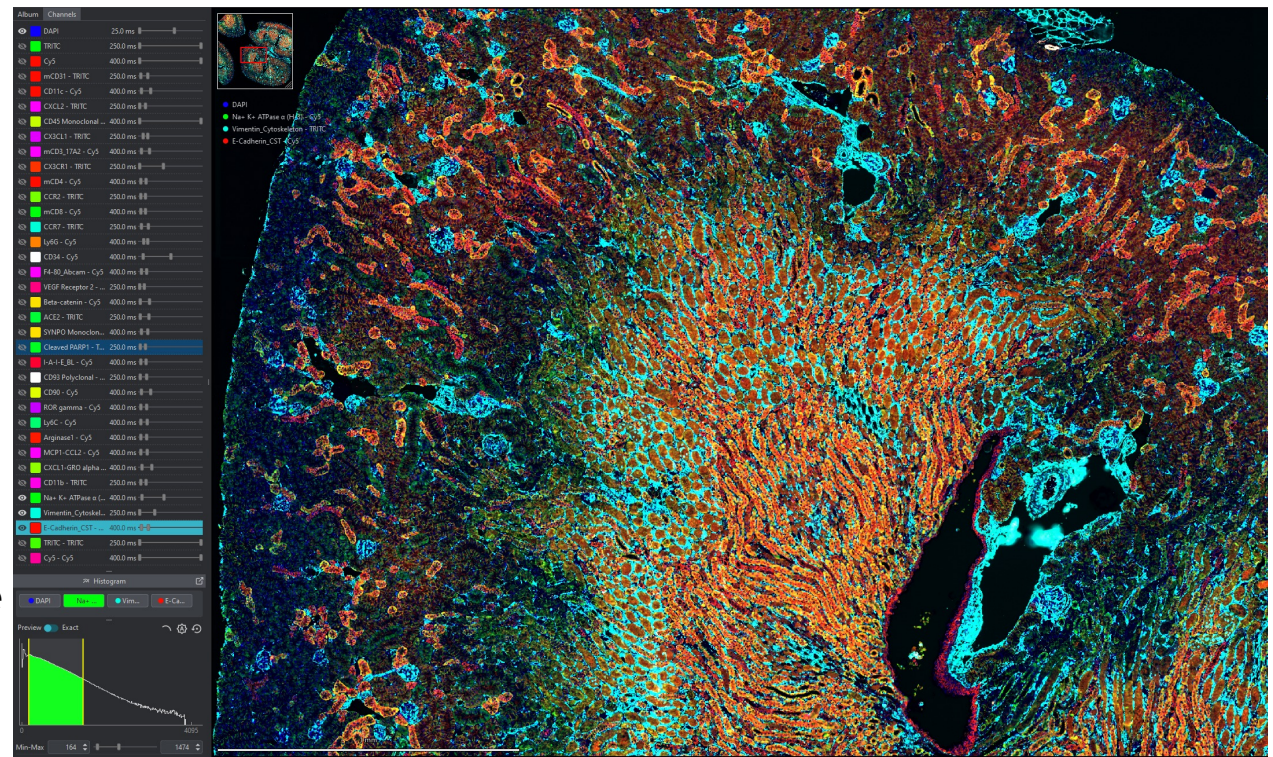
[WATCH THE REPLAY ON YOUTUBE](#)

Spatial Biology – understanding how cells interact in tissues

30

Definition from AI Google

The future of spatial biology lies in significantly enhancing our understanding of how cells interact within a tissue by providing detailed spatial information about gene expression and protein localization, enabling researchers to better study disease progression, therapeutic response, and develop more targeted treatments, particularly for complex diseases like cancer and neurodegenerative disorders, all while achieving higher resolution and multi-omics capabilities through advanced technologies and computational analysis.



Mouse kidney – Jim George Lab and Harish Pal

UAB Spatial Biology working group (organized and supported by II)

Team COMET

Julie Carstens (Heme-Onc)

Aaron Silva-Sanchez (Rheumatology)

Harish Pal (FCSC core)

Team Xenium

Shanrun Liu (FCSC core)

Basu Madhubanti (FCSC Core)

Team Informatics

Lara Ianov (BDS core)

Nilesh Kumar (BDS core)

Yanfeng Zhang (Genetics)

Y-Hua (Dean) Fang (Radiology)

Satwick Acharyya (Public Health)



Team Data management/infrastructure

William Warner (Research Computing)

Chris Risley (Micro)

Anna Sorace (Radiology)

Team Cheerleaders

Frances Lund (Micro) Troy Randall (Rheumatology)

Ralph Zottola (Research Computing)

Liz Worthey (Genetics)



Launching Spatial Biology platforms at UAB in 2024

32

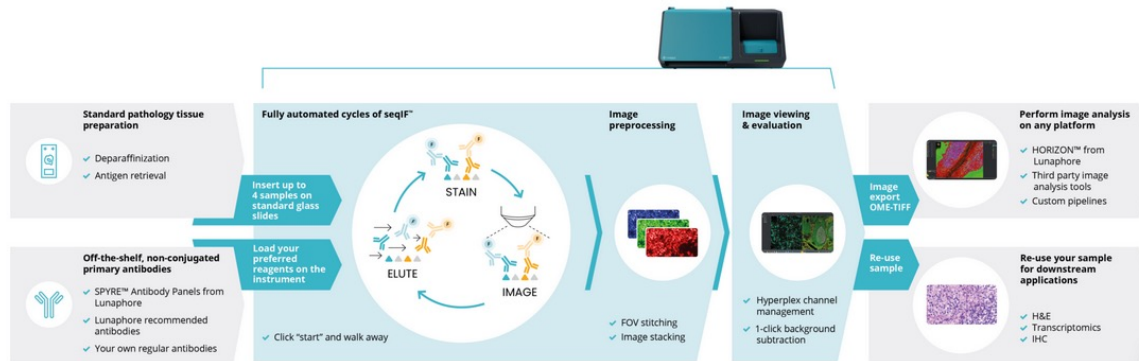
Single cell spatial proteomics

AI-driven spatial analytic platform



Hyperplex workflow without user intervention

A fully integrated system across staining, image acquisition and image pre-processing.



Up to 40-plex Markers



Stay ahead

Realize the potential of AI-driven precision pathology

[Get a demo](#) [Check out our Resources](#)

Lunaphore Comet and Visiopharm Analytic Software Suite

33

- ❖ Human antibodies validated (n=60)
- ❖ Mouse antibodies validated (n=60)****
- ❖ Preset staining panels
 - ❖ 7 human tissue
 - ❖ 7 mouse tissue
- ❖ Visiopharm AI-driven software
 - ❖ Deep learning-based algorithms
 - ❖ Kaltura channel training videos
 - ❖ Analytic seats available
 - ❖ Azure virtual computing systems
- ❖ Data management
 - ❖ Transfer data
 - ❖ Long-term storage
 - ❖ Short-term analysis



Julie Carstens



Harish Pal



Chris Risley



COMET 1.0 and now 2.0

COMET and Visiopharm are actively being used at UAB



22

Investigators



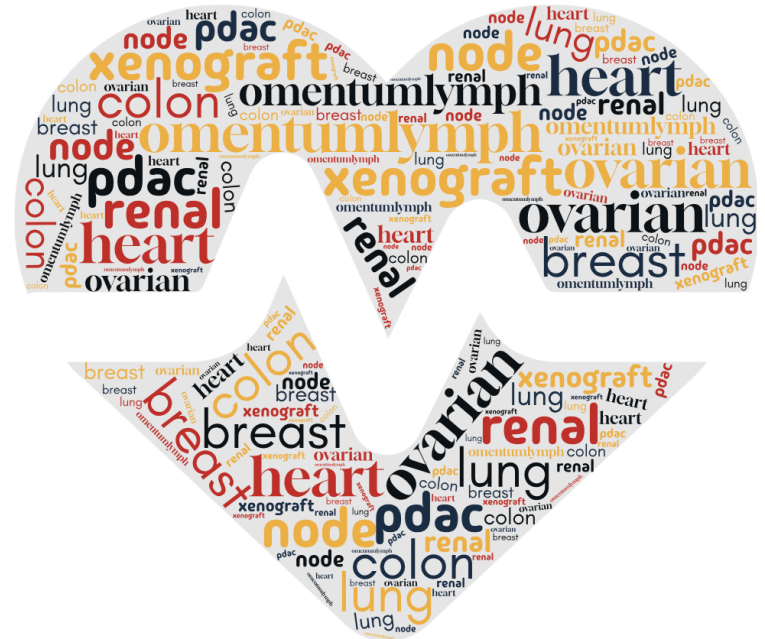
13

Departments/
Divisions

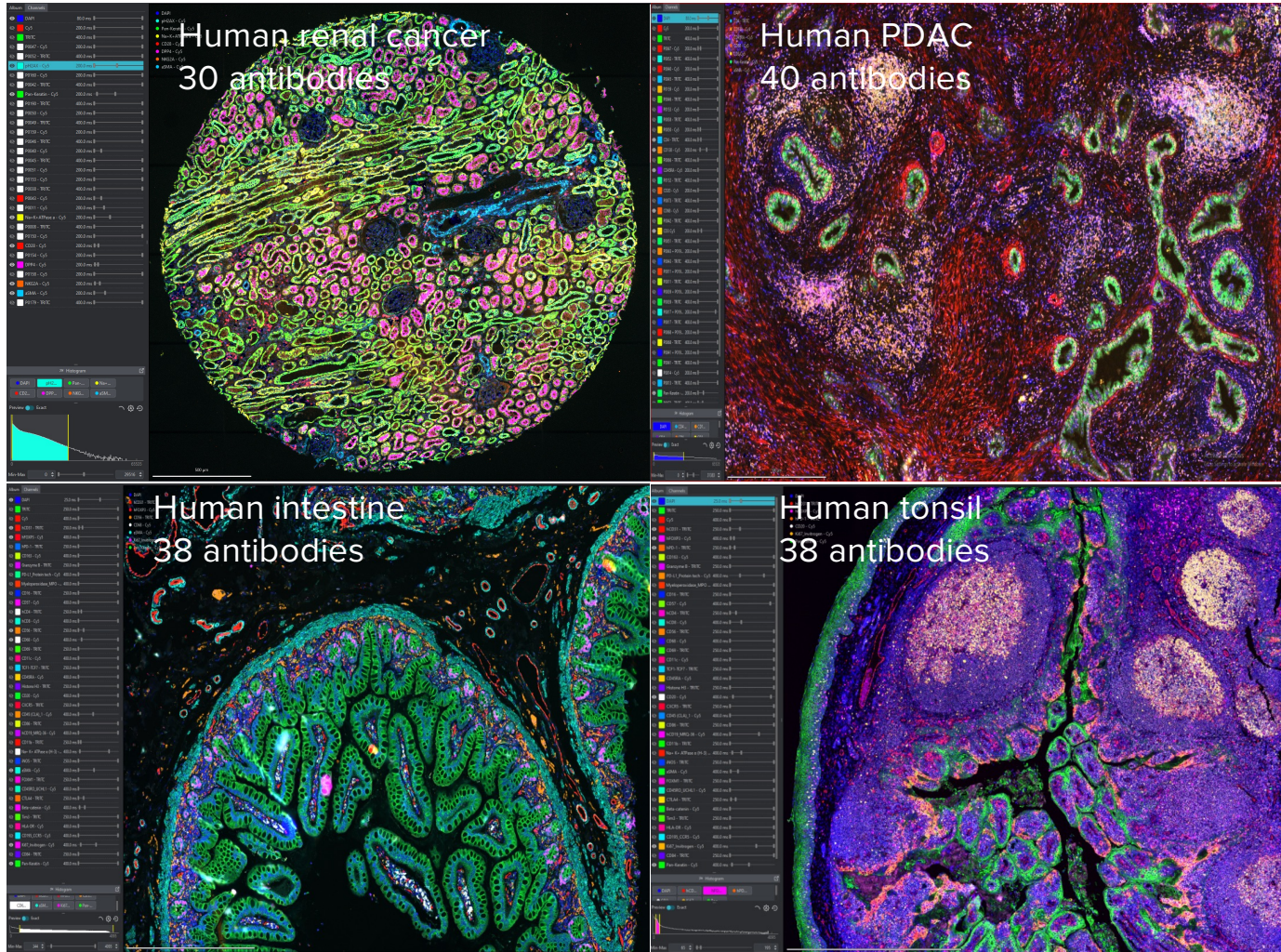


7 + 7

Mouse and
human tissues
interrogated



Examples of hyperplexed assays in different tissues



Slides
provided by
Harish Pal

Ongoing workshops to support spatial biology research

UAB Spatial Proteomics Day- October 8, 2024 (89 registrants)

UAB Spatial and Single Cell Day December 12, 2024 (~100 registrants)

Tapestri Single cell genomics January 8, 2025


Spatial Day
Featuring:
Lunaphore COMET Hyperplex System
and
Visiopharm Analysis Software

Join us for a workshop to
Learn how to get started using these
incredible spatial tools.

Presentations by
Lunaphore, Visiopharm and invited UAB speakers
Open round tables and Q&A with
Application Scientists and your FCSC support team

**October 8, 2024
8a- 4p
WTI 101**

Hosted by The Flow Cytometry and Single Cell Core
<https://www.uab.edu/medcore/immunologyinstitute/news-events/spatial-day>



Lunch Provided to
Registered
Attendees
Limited Seating
Closes Oct 1

Image Credit: Sayd Nadeem



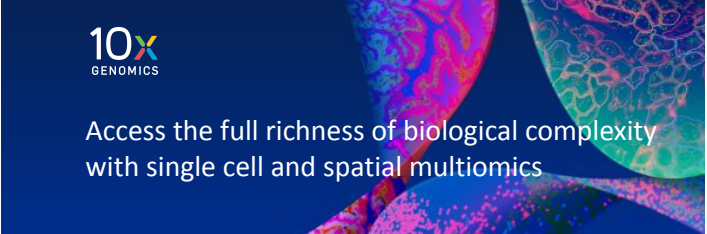
Tapestri Single-cell
Technologies Seminar at the
University of Alabama at
Birmingham

36

10x
GENOMICS

Access the full richness of biological complexity
with single cell and spatial multiomics

Thursday, December 12, 2024 | 11:00 AM–1:00 PM CT
Bevill Biomedical Sciences Research Building, Birmingham, AL



The vast complexities of biology require approaches to build a complete picture, starting from single cells to tissues and beyond. At 10x Genomics, we provide single cell, spatial, and in situ technologies that fuel scientific discoveries and drive exponential progress. Unravel highly complex biological systems, while bringing into focus the details that matter most. Join us to learn how Chromium Single Cell and Xenium In Situ platforms from 10x Genomics can help you push the boundaries of your research.

FEATURING



Leilani Marty Santos, PhD
Science & Technology Advisor
Genomics



Michelle Bell
Account Executive
10x Genomics



Joe Tolar, PhD
Science & Technology Advisor
10x Genomics

REGISTER



<https://10xgen.com/1J0>

LOCATION

Bevill Biomedical Sciences Research
Building, Room 170
845 19th St S
Birmingham, Alabama 35233

COMET Voucher RFA Released – 29 Applications

37

8 research projects will be funded this month (4 from II and 4 from I-4ward). Eligible applicants must hold a full-time UAB faculty appointment at any rank. Priority will be given to applications that have preliminary histologic data and demonstrate readiness to move to next level, 40-color analysis. Applications should share strong thematic overlap with either of the research missions of II (must be an II [member](#)) or I-4ward (focused on infectious or inflammatory diseases)

[Home](#) - [Research & Cores](#) - [Pilot Grant](#) - COMET™ Voucher RFA

COMET™ Voucher RFA

LUNAPHORE COMET™ IS AT UAB AND READY FOR YOUR EXPERIMENTS!!!!



The UAB Heersink School of Medicine **Immunology Institute (II)** and **I-4ward** (Inflammation, Infection, Immunity and Immunotherapy) strategic theme are requesting applications for a new voucher program designed to support experiments using the new [Lunaphore COMET™](#) single cell resolution proteomic platform which is now available here at [UAB](#). Investigators interested in using cutting-edge spatial biology tools to characterize migratory and resident inflammatory cells and tissue-specific cell populations within tissue samples isolated from patients and pre-clinical models (mouse) of acute and chronic disease are invited to apply.

The Lunaphore COMET™ fast fluidic exchange technology allows for staining of tissue sections (fixed and fresh frozen) with standard, off-the-shelf primary (non-conjugated) antibodies (Abs). The incubation time with each Ab is reduced from several hours to only a few minutes – which allows for hyper-multiplexing of 20+ different Abs* in just one day. The COMET™ microfluidic chip allows for controlled flow rate, flow pressure and chamber temperature, resulting in precise and consistent staining of tissue samples and high reproducibility across different tissue samples and experiments.

Single cell resolution spatial transcriptomics (Xenium) on the same tissue sample that is used for spatial proteomics

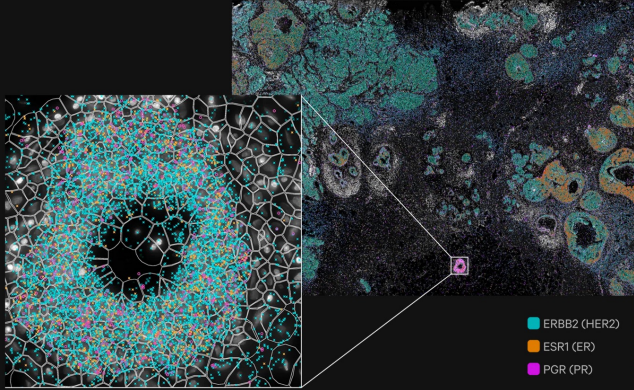
38

Single cell Resolution spatial transcriptomics in fresh frozen and FFPE tissue

Xenium In Situ

**High-performance
in situ from the
single cell leader**

[Request pricing](#) [See performance](#)



In this breast cancer sample (Stage II-B, ER+/PR-/HER2+), Xenium identifies a previously unknown triple-positive region.

Legend: ERBB2 (HER2) (red), ESR1 (ER) (green), PGR (PR) (blue)

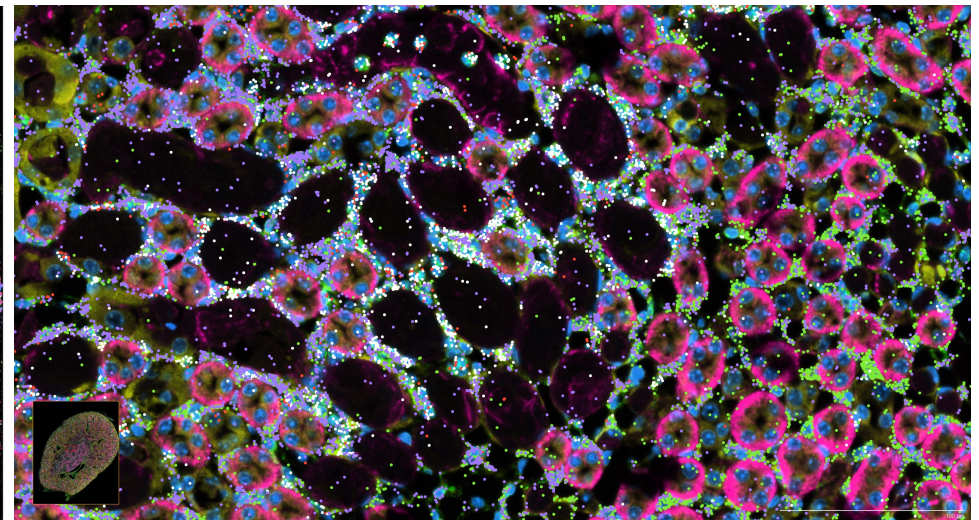
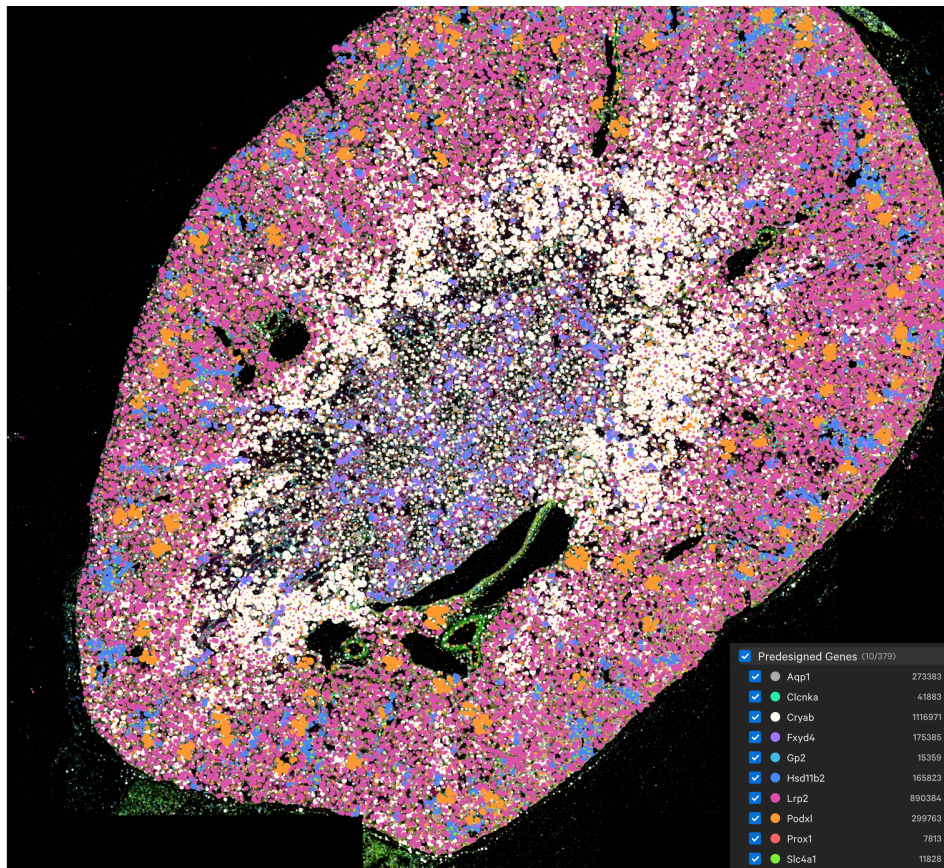
FIRST SAMPLES WERE RUN IN DECEMBER (Mouse BRAIN and KIDNEY) and are currently being analyzed

Pricing from core will come out in late January
Open for business ~in February
RFA to follow Spring 2025 (I-4ward, Brain Health, II sponsored)

- ❖ HSF-GEF Awarded \$180,000 to Immunology Institute (Lund), I-4ward and Brain Health (Jeremy Day and Fran Lund), Flow Cytometry and Single Cell Core (Troy Randall), Biologic Data Sciences Core (Liz Worthey)
- ❖ Matching Support: \$629,500
 - ❖ HSOM, SOE
 - ❖ UAB Centers and Institutes (n=14)
 - ❖ HSOM Departments and Divisions (n=11)
 - ❖ HSOM Strategic Research Groups
- ❖ full time bioinformatics support for pipeline development and tools

Single cell resolution spatial transcriptomics and proteomics of acute kidney injury model

39



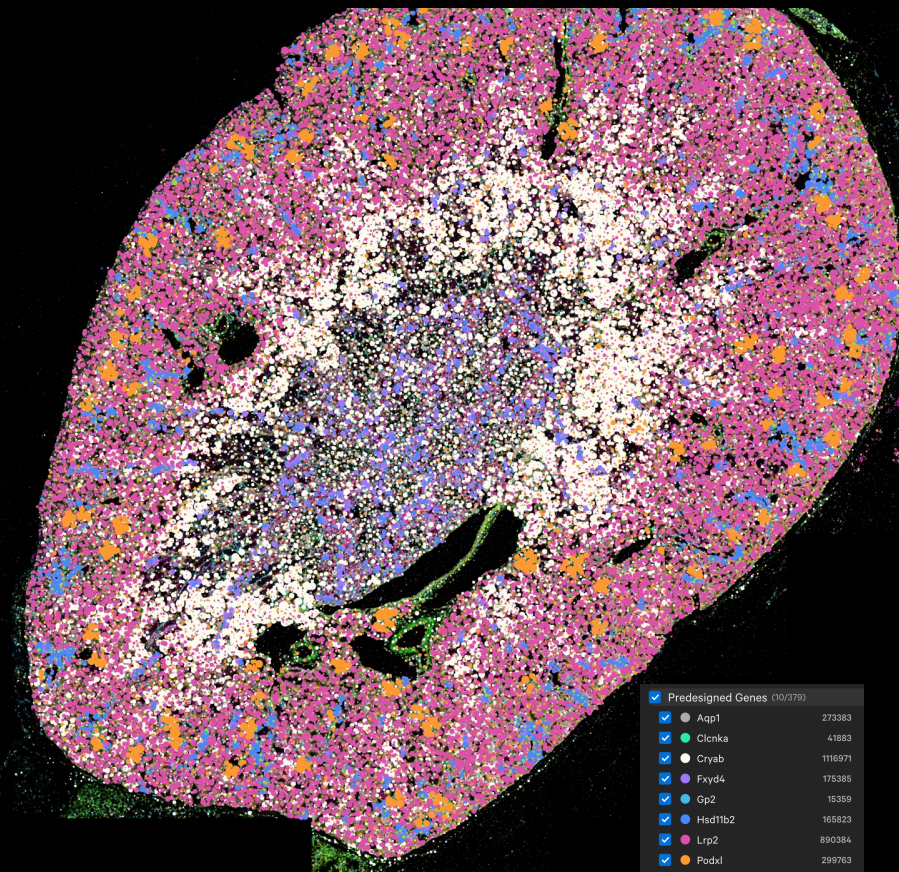
Jim George
UAB FCSC Core
UAB BDS Core
UAB Immunology Institute

Acute kidney injury model

- kidney structural cells (left)
- Macrophages interacting with smooth muscle cells (right)

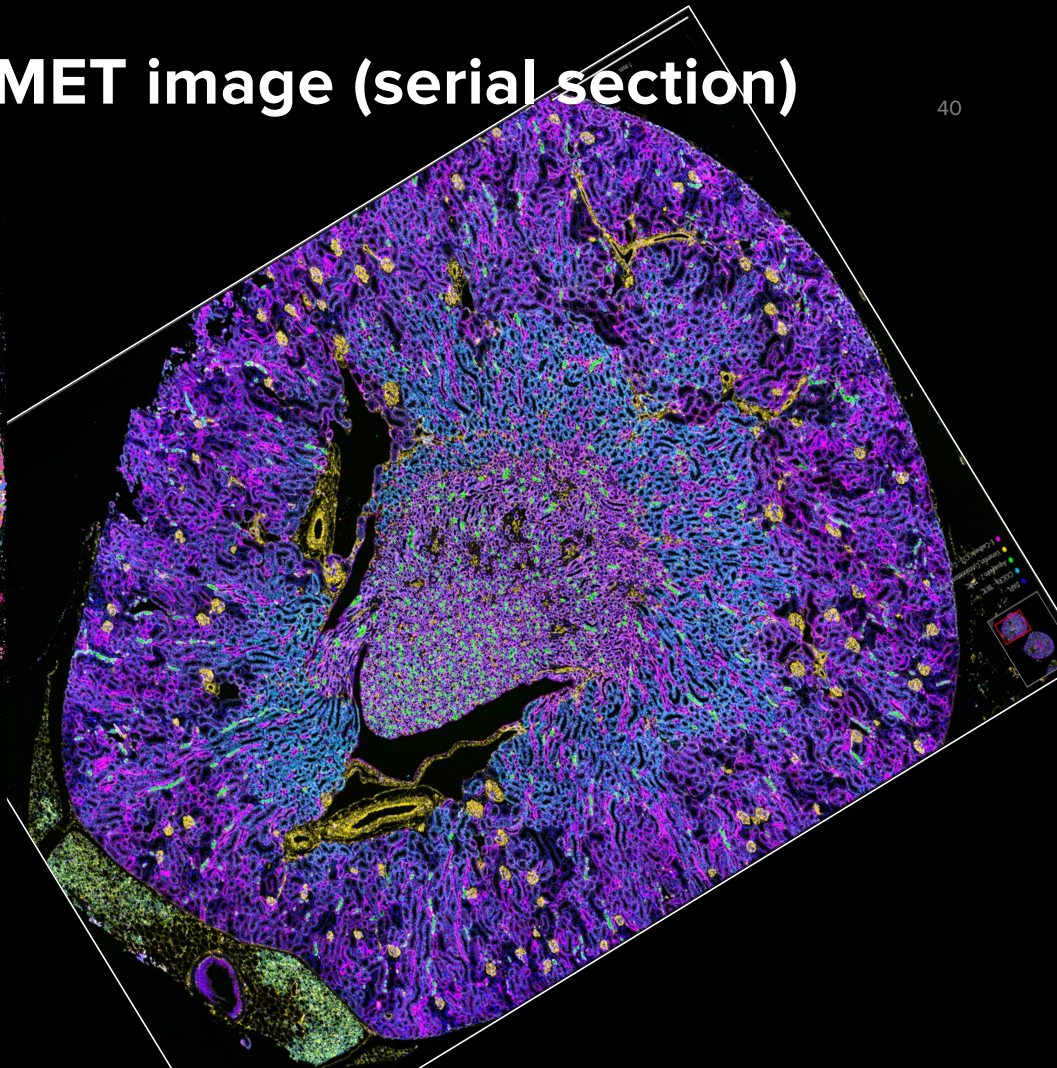
Comparison of Xenium to COMET image (serial section)

40



Predefined Genes (10/379)

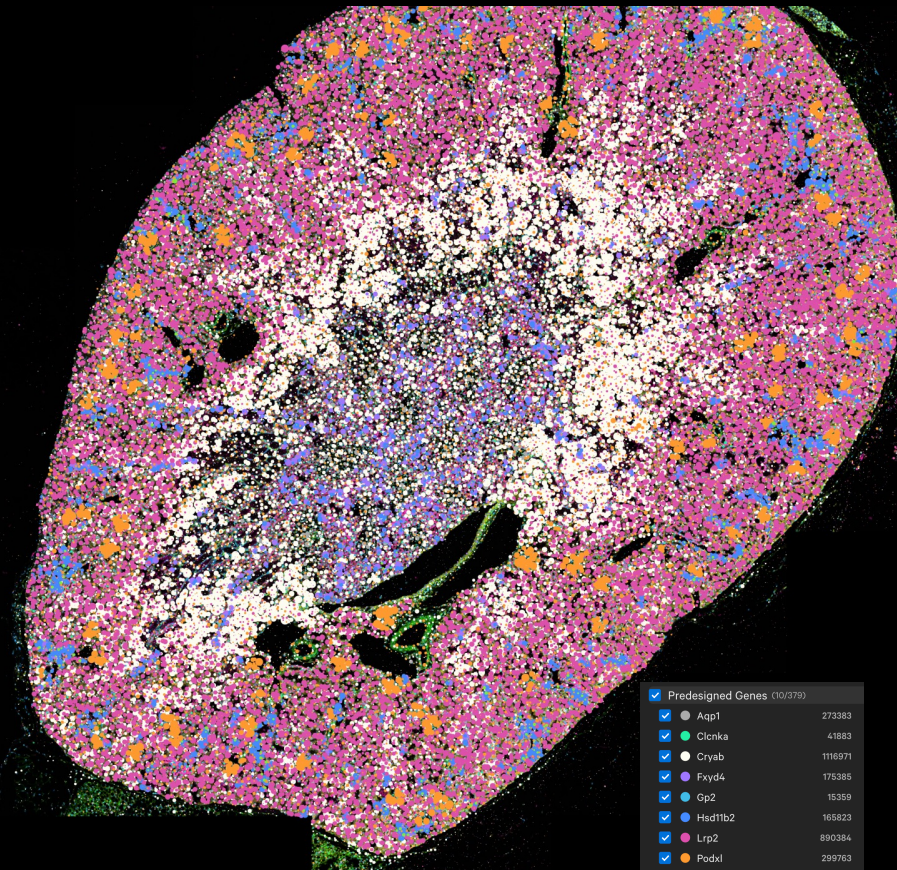
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<input checked="" type="checkbox"/>	Clnka	41883
<input checked="" type="checkbox"/>	Cryab	1116371
<input checked="" type="checkbox"/>	Fxyd4	175385
<input checked="" type="checkbox"/>	Gp2	15359
<input checked="" type="checkbox"/>	Hsd11b2	165823
<input checked="" type="checkbox"/>	Lrp2	890384
<input checked="" type="checkbox"/>	Podxl	299763
<input checked="" type="checkbox"/>	Prox1	7813
<input checked="" type="checkbox"/>	Slc4a1	11828



DAPI + CX3CR1 + Aquaporin 2 + Vimentin + E-Cadherin

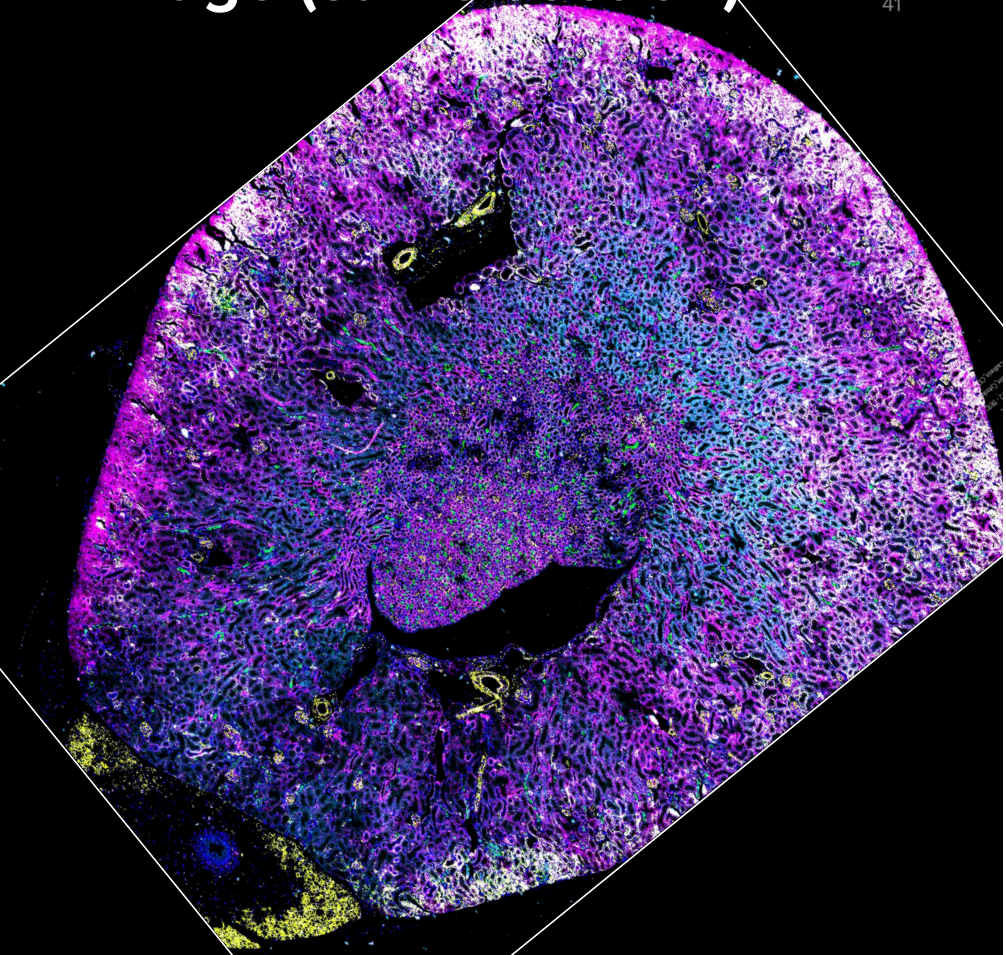
Comparison of Xenium to COMET image (same section)

41



Predefined Genes (10/379)		
<input checked="" type="checkbox"/>	Aqp1	273383
<input checked="" type="checkbox"/>	Clnka	41883
<input checked="" type="checkbox"/>	Cryab	1116371
<input checked="" type="checkbox"/>	Fxyd4	175385
<input checked="" type="checkbox"/>	Gp2	15359
<input checked="" type="checkbox"/>	Hsd11b2	165823
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<input checked="" type="checkbox"/>	Podxl	299763
<input checked="" type="checkbox"/>	Prox1	7813
<input checked="" type="checkbox"/>	Slc4a1	11828

DAPI + CX3CR1 + Aquaporin 2 + Vimentin + E-Cadherin



Example of working together to develop analytic tools

To perform single cell spatial transcriptomics, we need to be able to define edge of each cell

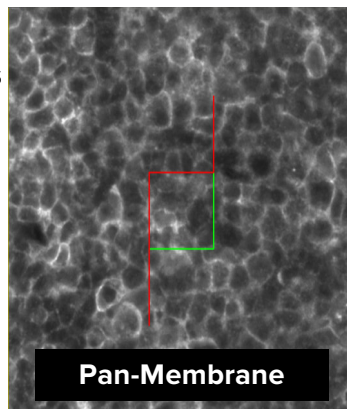
Using the COMET to define the cells



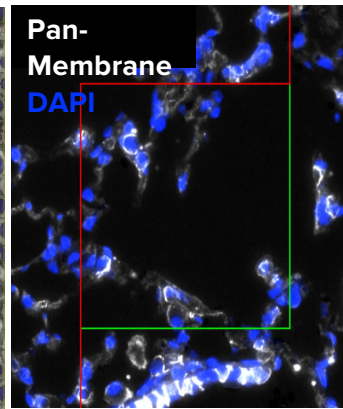
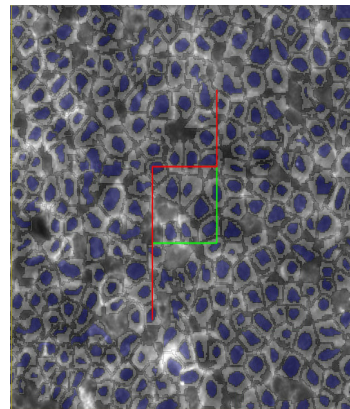
Julie Carstens



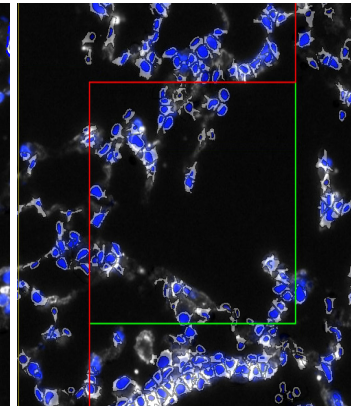
Lara Ivanov



Solid tissue LN



Challenging tissue - Lung



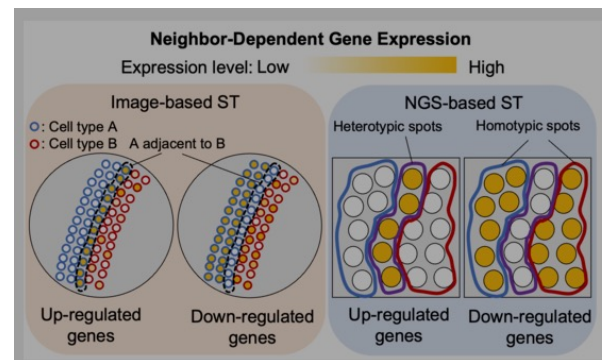
Nilesh Kumar



Dean Fang



Chris Risley



Using mathematical modeling and informatics to define neighbor interactions and how those interactions impact transcriptional programming of the cells

Example of working together to develop analytic tools

To identify the nearest neighbors and those cells that are more adjacent



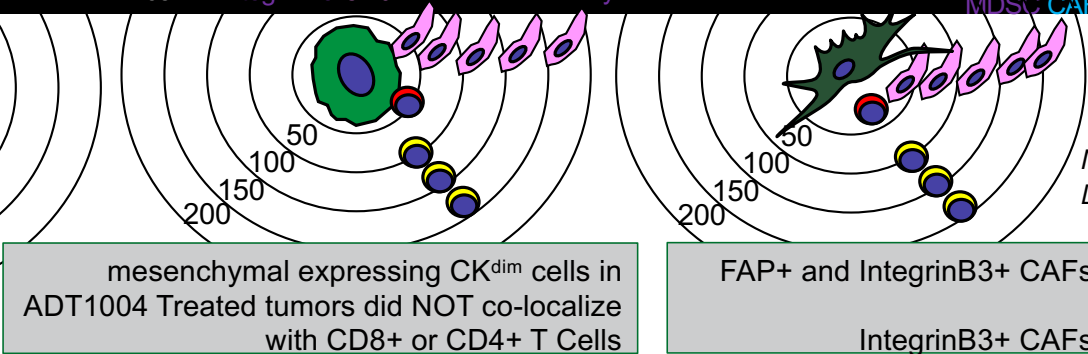
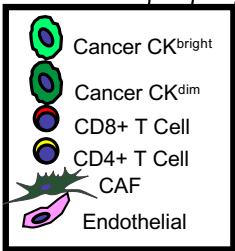
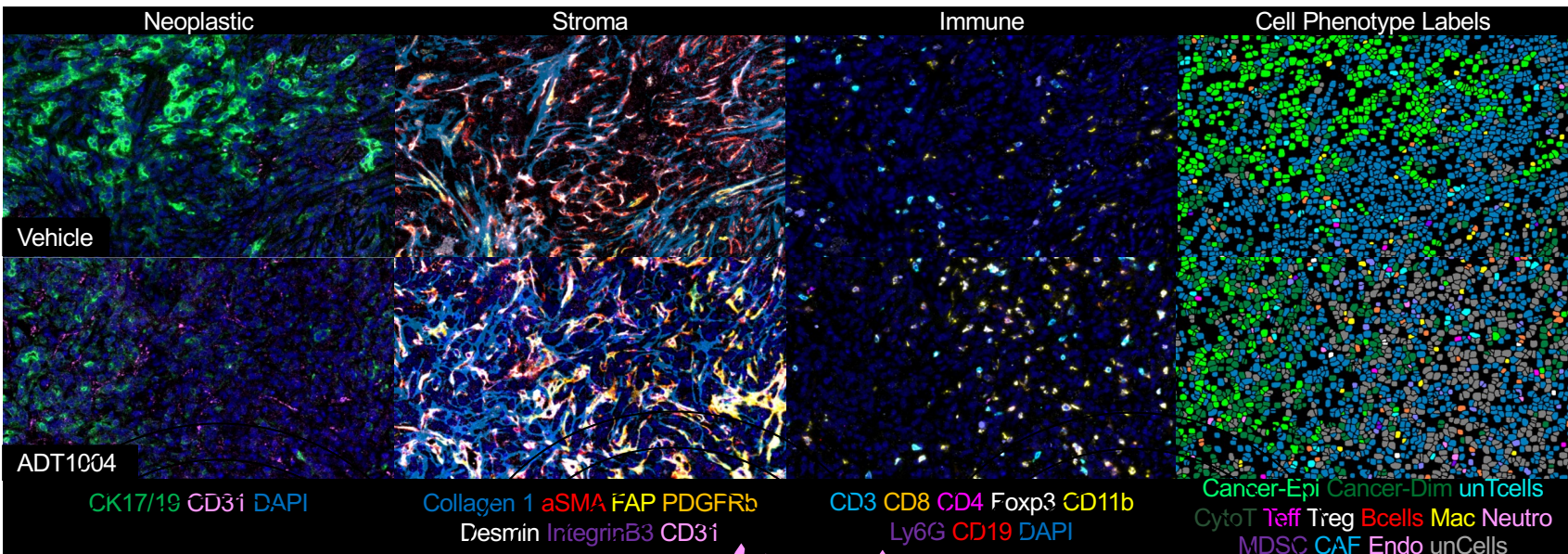
Julie Carstens



Dean Fang



Satwick Acharyya



Manuscript under Review
Do NOT post

Summary and interactive portion of the presentation

Resources Available

Support grants for education/outreach initiatives

Annual Research retreat and weekly seminar series

Student travel awards and research in progress opportunities

Faculty pilot grants, research vouchers and admin support for large programmatic grant applications

Healthy Donor Cohort – IRB, sample acquisition, recruitment for other studies

Antibody characterization and serology core – multiplex antibody and proteomic analyses (mouse and human)

Immunophenotyping core – human sample processing, storage, preparation, flow cytometry and analysis

Medical informatics data bundles – autoimmunity, infectious disease, transplantation, cancer

Spatial Biology platforms – equipment, infrastructure, informatics pipelines, workshops, SOPs

2025 Proposed services – which of these is something you might want/need/use?

Immunophenotyping Service

- RFA for Immunophenotyping core to generate preliminary data or publication data
- Develop standard 30-40 color mouse panel to capture major immune cell types

ACS Service Center

- Add other larger format serology/fluids services (think O-Link with up to 5000 analytes)
- Build high throughput serology cytometric bead arrays for protein antigens expressed by pathogens analyzed at UAB (already have for influenza and SARS-CoV-2)

Spatial Biology

- RFA for Xenium to generate preliminary or publication data (4 vouchers from II, 4 from I-4ward)
- RFA for combined Xenium + COMET (~2 vouchers from II)

Healthy Donor Cohort

- Collect other sample types from cohort (nasal wash, fat biopsy, skin punch, bone marrow biopsy)

Medical informatics

- Add bundles for viral and bacterial respiratory panels and cultures
- Add solid organ transplant and cancer registry data

2025 and beyond training/research opportunities

46

Annual Research Retreat

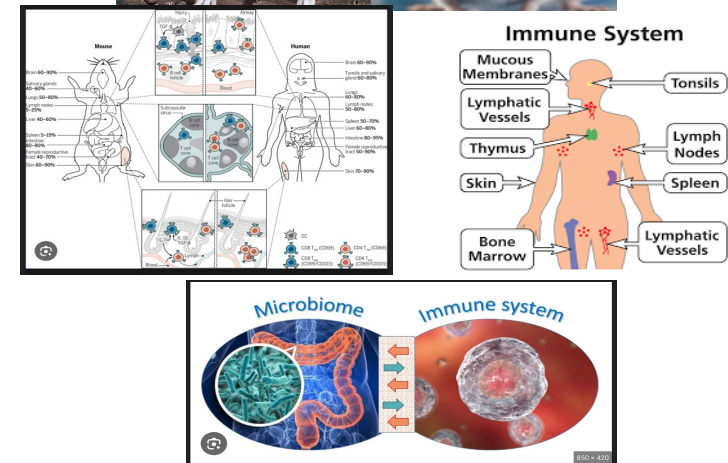
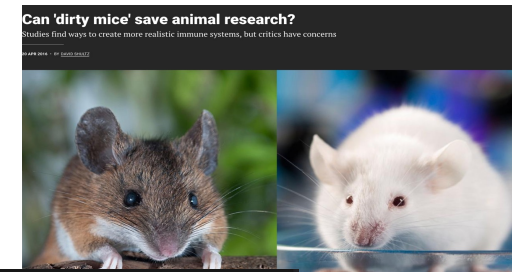
- Currently focused on vaccines (1/2 day) going to full day and increase topic areas and outside speakers
- Hold off-site in 2026? Weekend retreat?

Student Opportunities

- Continue RIP and travel awards?
- Develop certificate programs in areas like spatial biology?

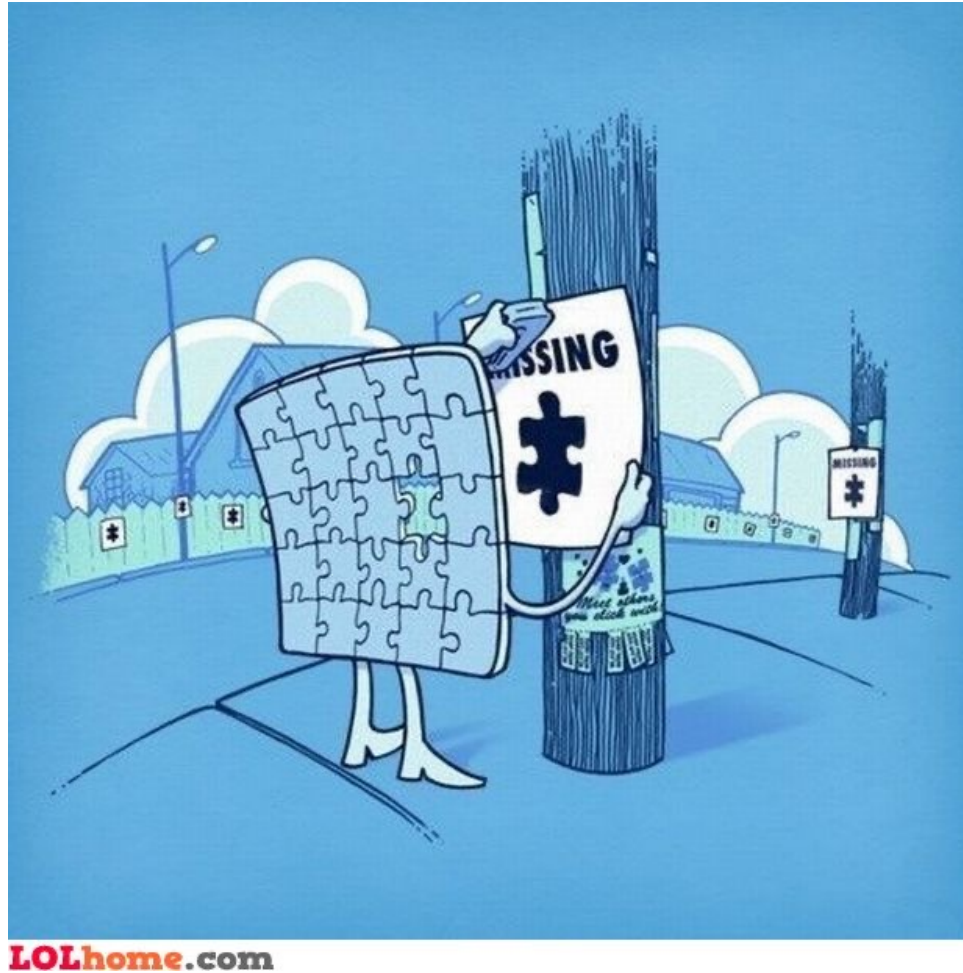
Future infrastructure investments

- Human LN biopsies, BM aspirates, fat biopsies
- Dirty mouse colony
- Microbiome/gnotobiotic initiatives
- SEBLAB Immunologic Assay Core
- Disease cohorts/samples
- Human Tissue-derived immune cell core
- Organoid capabilities (tonsil, lung, etc)



What immunology pieces are missing at UAB?

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LOLhome.com

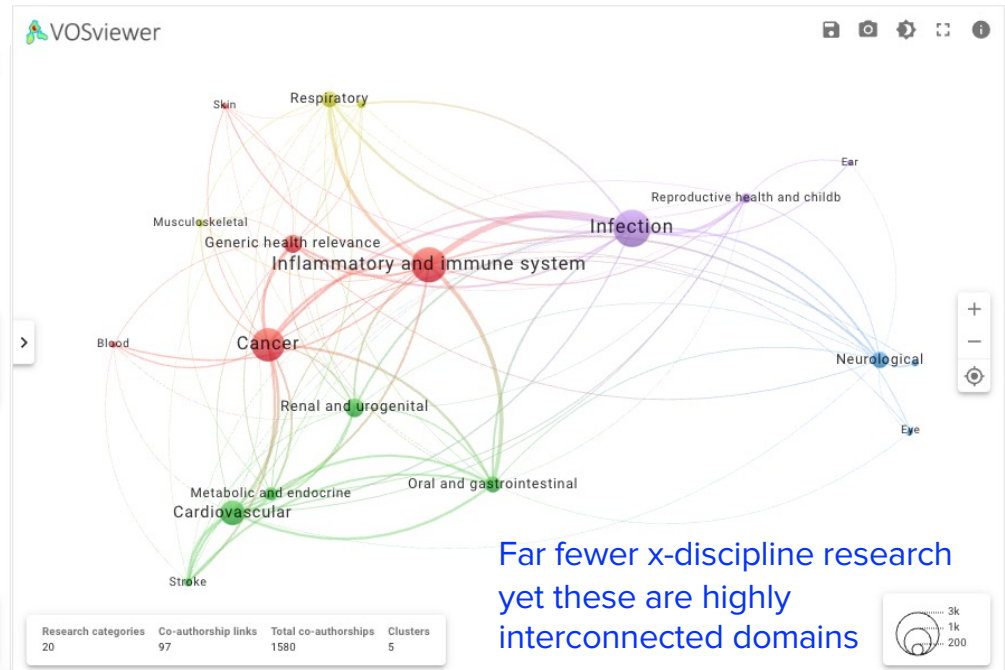
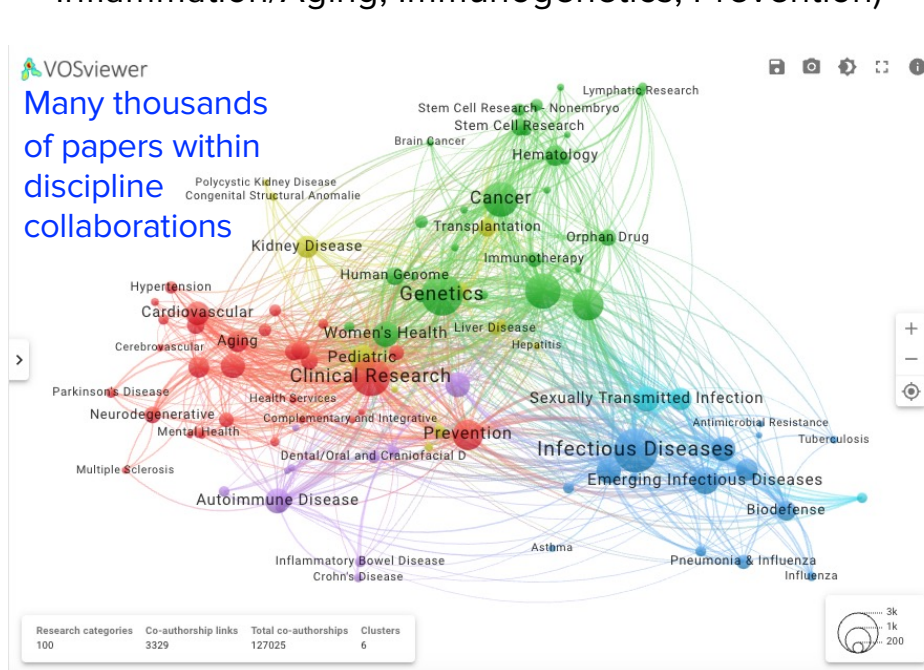
Research Networking between HSOM II Members

Dimensions analysis 2024

48

6 broad research category clusters (Infectious, Autoimmune, Cancer/Immunotherapy, Chronic Inflammation/Aging, Immunogenetics, Prevention)

Opportunity to increase connectivity across research categories



How do we foster multi-disciplinary immunologically-focused research at UAB?

How/when/where do we engage the community around vaccine hesitancy and fear?

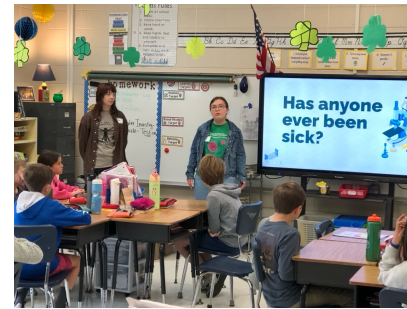


How/when/where do we engage the community around vaccine hesitancy and fear?

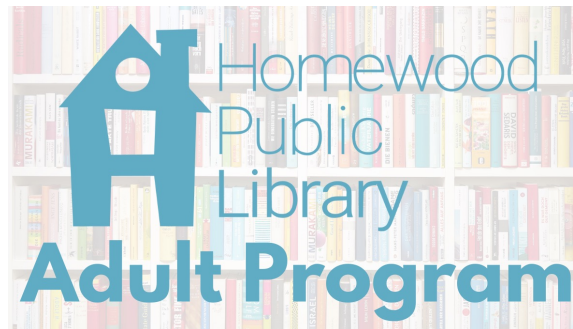
50



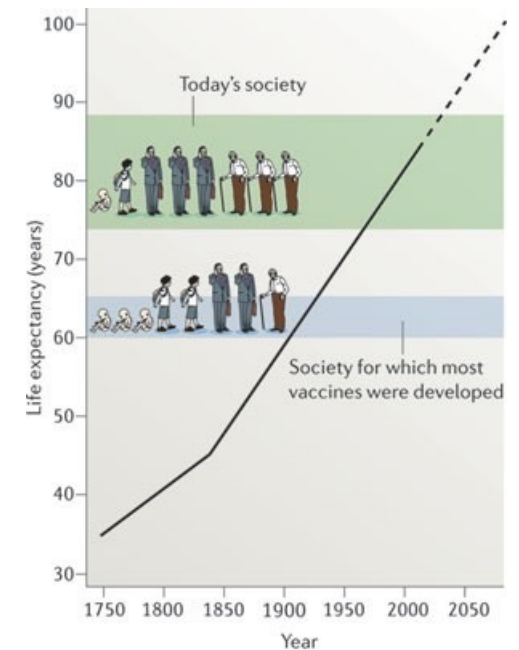
Invite community into labs to see what we do



Engage at an early age



Engage people where they are



Nature Reviews | Immunology

Join the Institute as a Member or Trainee!!!

<https://www.uab.edu/medicine/immunologyinstitute/>

The UAB Immunology Institute HUB



QUESTIONS and COMMENTS/SUGGESTIONS WELCOME!!

Take the Survey



<https://www.mentimeter.com/app/presentation/almusjgucmtxnj9kxw6m89ts6wb2kux9/edit?source=share-modal>