Division of Hematopathology

Weill Cornell Medicine/NewYork-Presbyterian Hospital
• >30 laboratory and ancillary staff

• All faculty, fellows, and IHC/flow staff located on the 7th floor of NYP-Hospital, alongside bone marrow morphology, flow cytometry, immunohistochemistry, and digital pathology operations

• Approximate annual specimen volumes:
  • 2000 bone marrow biopsies
  • 1600 lymph node and extra-nodal tissues
  • 7000 flow cytometry studies
  • 400 cases in consultation/for secondary review

• 8 primary clinical faculty & 6 affiliated faculty in research, molecular hematopathology, and cytogenetics divisions

• >50 peer-reviewed publications authored by core hematopathology division and affiliated faculty since Jan. 2023
Flow Cytometry Laboratory

FACSCanto (4) [10 color]

FACSMelody (Clinical flow sorter)

FACSLyric (12 color)

Fortessa (20 color)
Immunohistochemistry Laboratory

Median 79,794 tests performed annually (2019-2023)
Immunohistochemistry Laboratory

Complete Test Menu (n=265 Antibodies)

- Hemepath (n=118)
- Surg & Renal & Derm (n=147)
- Duplex IHCs (n=11)
- ISH (n=8)

Ki-67 & CD20
Immunohistochemistry Laboratory (R&D)

Immunohistochemistry 7-Color Immunofluorescent Panel

Clinically validated immunostains are stained sequentially using tyramide-based fluorescent detection. Principle is the same as diaminobenzidine chromogenic staining where precipitate are covalently bonded with tyrosine residues within the proximity of the antigen of interest.

Benefits of doing multicolor fluorescent staining:
- Less tissue material needed to test for multiple markers
- Be able to test up to 6 biomarkers using the same tissue section
- Visualization of multiple targets seeing co-localization and interaction of cells
- Accurate quantification of co-expressing cells using third party software
Hematopathology Digital Pathology Program

<table>
<thead>
<tr>
<th>Digital Slides Scanned</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>701</td>
<td>1237</td>
</tr>
<tr>
<td>February</td>
<td>829</td>
<td>1455</td>
</tr>
<tr>
<td>March</td>
<td>771</td>
<td>1410</td>
</tr>
<tr>
<td>April</td>
<td>892</td>
<td>1141</td>
</tr>
<tr>
<td>May</td>
<td>579</td>
<td>1477</td>
</tr>
<tr>
<td>June</td>
<td>566</td>
<td>1426</td>
</tr>
<tr>
<td>July</td>
<td>497</td>
<td>916</td>
</tr>
<tr>
<td>August</td>
<td>602</td>
<td>3071</td>
</tr>
<tr>
<td>September</td>
<td>953</td>
<td>2443</td>
</tr>
<tr>
<td>October</td>
<td>2811</td>
<td>3142</td>
</tr>
<tr>
<td>November</td>
<td>776</td>
<td>4287</td>
</tr>
<tr>
<td>December</td>
<td>19</td>
<td>5873</td>
</tr>
<tr>
<td>Totals</td>
<td>9996</td>
<td>27878</td>
</tr>
</tbody>
</table>

Approx. 68,000 slides scanned in 2024 (as of Feb. 2024)

Digitized slides used for conference presentations

Leica GT450

Leica AT2
Fellowship Program

Our fantastic 2023-24 fellows: James and Nadia!
Overview

- 40 weeks on core rotations (“A” & “B”)
  - A = bone marrow pathology
  - B = Lymph node/tissues and non-BM flow cytometry
- 8 weeks on elective rotations
- 4 weeks vacation

Teaching opportunities

Conference Participation
- Lymphoma
- Myeloma
- MPN
- MDS/AML

Book ($500), travel ($1500), & funds for membership dues (e.g. USCAP)

Nearby hospital-affiliated housing
- [https://www.nyp.org/realestate/east-campus-housing](https://www.nyp.org/realestate/east-campus-housing)

Food stipend ($180/mo. meal card)

Example Schedule
Next-Generation Onco-pathology (T32 Program)

- Post-doctoral research training program for academically-oriented residents and fellows
- Funding for 2 years of wet and/or dry lab-based research
- 2 new positions per year
- Emphasis on training in emerging methods relevant for a successful translational research career in pathology
  - Multiparameter in situ tissue imaging
  - Genomics
  - Transcriptomics
  - Proteomics
  - Metabolomics
  - Computational pathology
Clinical Hematopathology Biobank

NEXT GENERATION BIOBANKING

Conventional Biobanks

Biomarker-based Biorepository

Live Biorepository
Hematopathology Biobank (as of January 2024)

Approx. 100,000 samples since 1991
• Single cell suspensions
• Viable tissue fragments
• Frozen tissues

All samples available for trainee research projects
Core Division Faculty
Dr. Giorgio Inghirami, M.D., Vice Chair for Hematopathology
Professor of Pathology and Laboratory Medicine

Areas of focus: T-cell lymphomas, CAR-T cell therapy, PDX modeling

Involvement in national/international organizations: Leukemia/Lymphoma Molecular Profiling Project (LLMPP)

Highlighted recent publication:

Dr. Amy Chadburn, M.D., Vice Chair for Clinical Operations and Quality
Professor of Pathology and Laboratory Medicine

Areas of focus: Immunodeficiency and immune dysregulation-related LPDs

Involvement in national/international organizations: USCAP, ASCP, ASH, Castleman Disease Collaborative Network Advisory Board, Alliance Pathology Cadre, AIDS Malignancy Consortium

Highlighted recent publication:
Dr. Julia Geyer, M.D.
Professor of Clinical Pathology and Laboratory Medicine

Areas of focus: Bone marrow pathology, myeloproliferative neoplasms

Involvement in national/international organizations: Latin American Society for Hematopathology (SOLAHP), Society for Hemepath (SH), European Assoc. for Haematopathology (EAHP), Bone Marrow Pathology Study Group (BMPSG), ASCP

Highlighted recent publication:

Dr. Sanjay Patel, M.D., M.P.H., Director, Hematopathology Fellowship Program & Director, MISI Laboratory
Associate Professor of Pathology and Laboratory Medicine

Areas of focus: Multiplex tissue imaging, hematopoiesis, NPM1-mutated myeloid neoplasms

Involvement in national/international organizations: Society for Hemepath (EHP Committee), CAP (PCEC), USCAP (Abstract Review Committee), Vice President of NY Path Society

Highlighted recent publication:
Sarachakov et al. Spatial mapping of human hematopoiesis at single cell resolution reveals topographic remodeling associated with aging. *Blood* 2023
**Dr. Rebecca Leeman-Neill, M.D., Ph.D.,**  
Associate Professor of Pathology and Laboratory Medicine

**Areas of focus:** B-cell genomic instability, mechanisms of B-cell lymphomagenesis

**Involvement in national/international organizations:** ASH, AACR, Society for Hematopathology

**Highlighted recent publication:**  

---

**Dr. Paul Simonson, M.D., Ph.D.,**  
Assistant Professor of Pathology and Laboratory Medicine

**Areas of focus:** Machine learning for flow cytometry diagnostics, multiparametric fluorescence imaging, digital image analysis

**Involvement in national/international organizations:** CAP Artificial Intelligence Committee, AIDS Malignancy Consortium Emerging Technologies Subcommittee

Dr. Madhu Ouseph, M.D., Ph.D., Director, Clinical Hematopathology Integration
Assistant Professor of Pathology and Laboratory Medicine

Areas of focus: Molecular basis of myeloid neoplasms, focus on myeloproliferative neoplasms and megakaryocyte pathobiology

Involvement in national/international organizations: Committee member in several organizations (Society for Hemepath, AMP, CAP, ClinGen)

Highlighted recent publication:
Ouseph MM, et al. Genomic alterations in patients with somatic loss of the Y chromosome as the sole cytogenetic finding in bone marrow cells. *Haematologica* 2021

Dr. Paul Barone, M.D.
Assistant Professor of Pathology and Laboratory Medicine

Areas of focus: Medical education, hematopathology, thoracic, and autopsy pathology

Highlighted recent publication:
Barone P and Patel S. Myelodysplastic syndrome: approach to diagnosis in the era of personalized medicine. *Seminars in Diagnostic Pathology* 2023
Faculty Contributions to WHO5 and ICC Schema

**WHO5**

The 5th edition of the World Health Organization Classification of Haematolymphoid Tumours: Lymphoid Neoplasms

Patel, S., Wei, A., and Weinberg, O.

**ICC**

International Consensus Classification of Myeloid Neoplasms and Acute Leukemias: integrating morphologic, clinical, and genomic data

Section on “Acute myeloid leukemia with mutated NPM1”

Patel, S., Wei, A., and Weinberg, O.
Faculty in the News

HEMATOPOIESIS AND STEM CELLS

Spatial mapping of human hematopoiesis at single-cell resolution reveals aging-associated topographic remodeling

Aleksandr Sarachakov,1 Arina Varlamova,1 Viktor Svekolkin,1 Margarita Polyakova,1 Itzel Valencia,2 Caitlin Urkenhola,2 Tania Pannellini,2 Ilia Galkin,1 Pavel Ovcharov,1 Dmitrii Tabakov,1 Ekaterina Postovalova,1 Nara Shin,1 Isha Sethi,1 Alexander Bagaev,1 Tomer Itkin,3 Genevieve Crane,1 Michael Kluk,3 Julia Geyer,3 Giorgio Inghirami,3 and Sanjay Patel1,5

Advanced Spatial Tools Map Hematopoietic Stem Cell Niches

New technologies and archival tissue biopsy samples enable exploration of changes in the bone marrow as people age.
Affiliated Faculty
Dr. Michael Kluk, M.D., Ph.D., Director, Molecular Hematopathology Laboratory
Associate Professor of Pathology and Laboratory Medicine

Areas of focus: Molecular hematopathology in myeloid neoplasia

Involvement in national/international organizations: AMP, USCAP, CAP Abstract Review Committee

Highlighted recent publication:
Lopez et al. Comparison of multiple clinical testing modalities for assessment of NPM1-mutant AML. Front Oncol 2021

Dr. Neal Lindeman, M.D., Vice Chair, Laboratory Medicine and Molecular Pathology
Professor of Pathology and Laboratory Medicine

Areas of focus: Molecular assay development/validation, clinical chemistry

Involvement in national/international organizations: ACLPS (past-president), CAP (Chair, Molecular Oncology Committee), AMP, ADLM (formerly AACC)

Highlighted recent publication:
Dr. Liming Bao, M.D., Director, Cytogenetics Laboratory  
Professor of Pathology and Laboratory Medicine

Areas of focus: Cancer cytogenetics

Involvement in national/international organizations: American Cytogenomics Conference, CAP

Highlighted recent publication:
Priest et al. Evolution of acquired resistance in a ROS1+ KRAS G12C+ NSCLC through the MAPK pathway. *NPJ Precision Oncology* 2023

Dr. Madhulatha Pantrangi, Ph.D., Associate Director, Cytogenetics Laboratory  
Assistant Professor of Pathology and Laboratory Medicine

Areas of focus: Cancer and constitutional cytogenetics, genetics of inherited ocular disorders

Involvement in national/international organizations: ClinGen (Expert panel member)

Highlighted recent publication:
Pantrangi, M., et al. Clinical sequencing of the retinitis pigmentosa gene RPGR in over 1,000 cases of vision loss. *Molecular Vision* 2024
Dr. Ethel Cesarman, M.D., Ph.D.,
Professor of Pathology and Laboratory Medicine

Areas of focus: HIV & EBV-associated lymphoproliferative disorders

Involvement in national/international organizations: AIDS Malignancy Consortium

Highlighted recent publications:

Dr. Anna Nam, M.D.
Assistant Professor of Pathology and Laboratory Medicine

Areas of focus: Single cell multi-omics for dissection of hematologic malignancies

Involvement in national/international organizations: American Society of Hematology

Highlighted recent publications:
2) Nam, AS. et al. Somatic mutations and cell identity linked by Genotyping of Transcriptomes. *Nature* 2019
Alumni
Graduated Fellows (last several years):

**Academia**
- James Yip (Current position: North Shore-Long Island Jewish Hospital)
- Nadia Demko (Current position: McGill University, Montreal, QC)
- Paul Barone (Current position: PGY4, WCM → Hematopathology faculty, July 2024)
- Andrew Plata (Current position: Charleston Area Medical Center, West Virginia)
- Miguel Cantu (Current position: UT-Southwestern, Dallas, TX)
- Kran Suknuntha (Current position: Mahidol University, Bangkok, Thailand)
- Tayler van den Akker (Current position: Mount Sinai Hospital, NY)
- Yahya Al-Ghamdi (Current position: King Abdullah Medical Center, Saudi Arabia)
- Mustafa al-Kawaaz (Current position: University of Louisville, Kentucky)

**Private Practice**
- Minh Mays (Current position: private practice, Nebraska)
- Shane Berman (Current position: St. Barnabas Medical Center, NJ)
- Sergei Guma (Current position: Valley Pathologists, Inc., Dayton, OH)
- Daher Hajje (Current position: Pathology Consultants of South Broward, Miramar, FL)

**Industry**
- Shajo Kunnath (Current position: Johnson & Johnson Innovative Medicine)