Stanford

Leonore A. Herzenberg

Department of Genetics Professor

CONTACT INFORMATION

- **Alternate Contact**

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Bio

ACADEMIC APPOINTMENTS

- Professor (Research), Genetics

ADMINISTRATIVE APPOINTMENTS

- Endowed Chair of Flow Cytometry and Genetics, Stanford University, (2015- present)

HONORS AND AWARDS

- Honorary Fellow, Royal Microscopical Society (2016)

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PROFESSIONAL EDUCATION

- D.Sc-equiv., University Paris V Sorbonne , Immunolgy (1981)

PATENTS

- Leonore Herzenberg, David Parks, Stephen Meehan, Wayne Moore. "United States System and Methods for Selecting a Multiparameter Reagent Combination for Automated Flourescence Compensations", Leland Stanford Junior University, May 20, 2014

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LINKS

- Laboratory Website: http://herzenberglab.stanford,edu
- Our Facebook Page: https://www.facebook.com/LAHerzenberg

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Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our laboratory focuses on understanding the basic mechanisms that determine and regulate gene expression and cell function in the immune system. Most recently, we have distinguished two functionally and physically distinct murine B cell lineages, only one of which (B-2) originates with the traditional bone marrow HSC and

displays the well known characteristics of B cells that develop from the continuously renewed HSC in adult bone marrow. The other lineage, B-1a, develops from phenotypically distinct progenitors that are only detectable during fetal and early neonatal life.and give rise to mature B-1a cells that develop de novo during the first 6-8 weeks of life and persist thereafter by division of the mature B cells.

Consistent with these life-style differences, our extensive IgH sequencing studies demonstrate that the antibody repertoires expressed by the two B cell lineages are shaped by forces that operate at different times during development, i.e., the B-1a repertoire is shaped by rearrangements that occur during fetal and neonatal life and are propagated by cell division thereafter, whereas the B-2 repertoire begins to develop around weaning (>6 weeks of age) and continues de novo development from HSC throughout life.

As might be expected from these decidedly distinct life styles, B-1a and B-2 show overlapping but clearly distinct IgH repertoire differences. B-1a have long known to be the source of many "anti-self" ("natural") antibodies as well as many antibodies reactive with many microorganisms. Intriguingly, we find very little difference (<10%) between the B-1a repertoire obtained from germ-free mice versus that obtained from conventionally-reared mice, indicating that exposure to self antigen conditions the B-1a anti-bacterial repertoire rather than vice versa.

In addition to our B cell studies, our laboratory maintains a strong interest in intracellular redox influences in health and and disease. In earlier work, we showed that as HIV infection progresses, intracellular glutathione (GSH) levels decrease, resulting ultimately in severe intracellular GSH deficiency. Excessive acetaminophen (Tylenol) use also results in severe GSH deficiency due to GSH consumption during acetaminophen detoxification. N-acetylcysteine (NAC), a non-toxic source of cysteine, is the accepted antidote for GSH depletion. We have established flow cytometry assays for evaluating GSH depletion and its repletion by N-acetylcysteine and continue to explore the medical consequences of GSH depletion.

These and many other biomedical findings rely heavily on cell analysis and sorting with the Fluorescence-Activated Cell Sorting(FACS), which our laboratory developed initially and to which we continually add new software and hardware functionality. The dedicated group of engineers, physicists, staticians, mathematicians, computer scientists and programmers in our FACS development group continues to make leading edge contributions to flow technology. Most recently, we developed new, user friendly and statistically reliable software to facilitate flow data analysis. We are making this software available free of charge to laboratories at .edu, .org, and similar non-profit institutions.

Overall, our laboratory operates as a community of scholars working in diverse but inter-related areas. We tend to be highly collaborative and often have students and fellows from other laboratories working at our benches. We are always open to new collaborations and new students and fellows interested in genetics, molecular biology, immunology, cell biology and/or in technology development related to these areas.

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Genetics (Phd Program)

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Publications

PUBLICATIONS

- **QFMatch: multidimensional flow and mass cytometry samples alignment** *SCIENTIFIC REPORTS*
  Orlova, D. Y., Meehan, S., Parks, D., Moore, W. A., Meehan, C., Zhao, Q., Ghosn, E. B., Herzenberg, L. A., Walther, G.
  2018; 8: 3291

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