BIOGRAPHICAL SKETCH

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NAME: Silverstein, Jonathan

eRA COMMONS USER NAME (credential, e.g., agency login): jcsilverstein

POSITION TITLE: Chief Research Informatics Officer

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
University of Illinois at Urbana-Champaign, Urbana, Illinois	BS	05/1986	Microbiology
Washington University Medical School, St. Louis, Missouri	MD	05/1990	Medicine/Surgery
Harvard School of Public Health, Boston, Massachusetts	MS	05/1998	Clinical Epidemiology
Washington University Informatics Lab, St. Louis, Missouri	Other training	05/1991	Informatics
Rush-Presbyterian-St. Luke's, Chicago, Illinois	Resident	05/1996	Surgery

A. Personal Statement

In addition to seven years' experience as an academic attending surgeon (no longer in practice), and formal training in public health, I have expertise in: electronic health record deployment (both Cerner and Epic implementations); inter-institutional science collaboration leadership serving as PI for Federal peer-reviewed research in advanced biomedical computing infrastructures, being an application service provider for web-based systems and serving on Boards of the National Library of Medicine. I served as the Chief Medical Informatics Officer at Tempus, a cancer genomics company which collects, normalizes and combines clinical data and genomic data for oncologist decision support. Since 2017, in my role as Chief Research Informatics Officer at University of Pittsburgh School of Medicine, I am providing services for use of extraordinary data assets and technical capabilities and collaborating across research using phone sensor technologies, imaging, genomics, and secondary use of electronic health record data, focused on enhancing capabilities, and learning health systems. My office is home to Pitt/UPMC Health Record Research Request (R3) data provisioning system and honest broker system. In the Human BioMolecular Atlas Program (HuBMAP) I serve as MPI for the infrastructure and engagement (IEC) component in collaboration with Phil Blood. In the Cellular Senescence Network (SenNet) I serve as the Consortium Organization and Data Coordination Center (CODCC) Contact PI with Phil Blood as MPI. I also serve as Contact PI for the Breast Cancer Research Foundation Global Data Hub. The common theme of my research is bringing together complex data from many sources and dimensions and re-organizing and providing data back to other investigators in a "Science-as-a-Service" model.

1. Erberich SG, Silverstein JC, Chervenak A, Schuler R, Nelson MD, Kesselman C. Globus MEDICUS - federation of DICOM medical imaging devices into healthcare Grids. Stud Health Technol Inform. 2007;126:269-78. PubMed PMID: 17476069.
2. Börner K, Blood PD, Silverstein JC, Ruffalo M, Satija R, Teichmann SA, Pryhuber GJ, Misra RS, Purkerson JM, Fan J, Hickey JW, Molla G, Xu C, Zhang Y, Weber GM, Jain Y, Qaurooni D, Kong Y, Bueckle A, Herr BW 2nd. Human BioMolecular Atlas Program (HuBMAP): 3D Human Reference Atlas construction and usage. Nat Methods. 2025 Apr;22(4):845-860. PubMed Central PMCID: PMC11978508.

3. NIH SenNet Consortium to map senescent cells throughout the human lifespan to understand physiological health. Nat Aging. 2022 Dec;2(12):1090-1100. PubMed Central PMCID: PMC10019484.
4. Friedman CP, Allee NJ, Delaney BC, Flynn AJ, Silverstein JC, Sullivan K, Young KA. The science of Learning Health Systems: Foundations for a new journal. Learn Health Syst. 2017 Jan;1(1):e10020. PubMed Central PMCID: PMC6516721.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2017 -	Chief Research Informatics Officer, Biomedical Informatics, Univ. of Pittsburgh, Pittsburgh, PA
2016 - 2017	Chief Medical Informatics Officer, Tempus AI, Inc., Chicago, IL
2011 - 2016	Vice President and Head, Center for Biomedical Research Informatics (CBRI) Research Institute, NorthShore University HealthSystem, Manhasset, NY
2011 - 2016	Davis Family Chair of Informatics, Northshore University Health System, Chicago, IL
2007 - 2011	Associate Professor, Departments of Surgery, Radiology, and the Collegiate Division, Biological Sciences Division, University of Chicago, Chicago, IL
2006 - 2011	Associate Director, Computation Institute, Chicago, IL
2002 - 2011	Scientific Director, Chicago Biomedical Consortium, Chicago, IL
2001 - 2007	Assistant Professor, Department of Surgery, The University of Chicago (UC), Chicago, IL
1999 - 2001	Adjunct Appointments , Bioengineering, Radiology, Library and Information Science
1998 - 2001	Co-Director, UIC Virtual Reality in Medicine Laboratory (VRMedLab), Chicago, IL
1996 - 2001	Assistant Professor, School of Biomedical and Health Information Sciences, UIC, Chicago, IL
1996 - 2001	Assistant Professor, Dept. of Surgery, University of Illinois at Chicago (UIC), Chicago, IL

Honors

2009 - 2010	Chan Soon-Shiong Scholar, Chan Soon-Shiong Family Foundation
2018	Winning Team, NAACCR 2018, North America Association of Central Cancer Registriess
2006	Finalist, CityLIGHTS Award, Illinois I.T. Association (ITA)“The CityLIGHTS Award recognizes a business, education, media or government leader whose relentless efforts on behalf of the information technology industry have best promoted its growth and/or awareness of its vitality in Illinois to a range of audiences and raised the stature of the Illinois technology industry.”
2004	Top Five Poster Prize, Midwest Clinical Conference of Chicago Medical Society
2004	Most Outstanding Student Poster Presentation (Jesse Ehrenfeld), Charles B. Huggins Research Conference, The University of Chicago Department of Surgery
2003	Top Five Poster Prize, Midwest Clinical Conference of Chicago Medical Society
2002	Most Outstanding Faculty Poster Presentation,, Charles B. Huggins Research Conference, The University of Chicago Department of Surgery
2001	Class Act Award, University of Illinois at Chicago Medical Center “This employee is a role model who continuously demonstrates exceptional competence and compassion in the performance of his/her job responsibilities… an outstanding example of UIC Medical Center’s five values: Respect, Customer Service, Teamwork, Continuous Improvement and Pride.”, University of Illinois at Chicago Medical Center
1999	Jerry and Thelma Stergios Award for Excellence in Basic Science Research, University of Illinois at Chicago, Department of Surgery
1996	Resident Teacher of the Year, Department of Surgery, Rush-Presbyterian-St. Luke's Medical Center, Chicago, IL

C. Contribution to Science

1. Data warehousing and integration of complex biomedical data. Dr. Silverstein's research and professional duties are significantly focused on the warehousing, integration, and analyses of large-scale biomedical data resources.
   a. Maraganore DM, Frigerio R, Kazmi N, Meyers SL, Sefa M, Walters SA, Silverstein JC. Quality improvement and practice-based research in neurology using the electronic medical record. Neurol Clin Pract. 2015 Oct;5(5):419-429. PubMed Central PMCID: PMC4634157.
   b. Stear BJ, Mohseni Ahooyi T, Simmons JA, Kollar C, Hartman L, Beigel K, Lahiri A, Vasisht S, Callahan TJ, Nemarich CM, Silverstein JC, Taylor DM. Petagraph: A large-scale unifying knowledge graph framework for integrating biomolecular and biomedical data. Sci Data. 2024 Dec 18;11(1):1338. PubMed Central PMCID: PMC11655564.
   c. Suryadevara V, Hudgins AD, Rajesh A, Pappalardo A, Karpova A, Dey AK, Hertzel A, Agudelo A, Rocha A, Soygur B, Schilling B, Carver CM, Aguayo-Mazzucato C, Baker DJ, Bernlohr DA, Jurk D, Mangarova DB, Quardokus EM, Enninga EAL, Schmidt EL, Chen F, Duncan FE, Cambuli F, Kaur G, Kuchel GA, Lee G, Daldrup-Link HE, Martini H, Phatnani H, Al-Naggar IM, Rahman I, Nie J, Passos JF, Silverstein JC, Campisi J, Wang J, Iwasaki K, Barbosa K, Metis K, Nernekli K, Niedernhofer LJ, Ding L, Wang L, Adams LC, Ruiyang L, Doolittle ML, Teneche MG, Schafer MJ, Xu M, Hajipour M, Boroumand M, Basisty N, Sloan N, Slavov N, Kuksenko O, Robson P, Gomez PT, Vasilikos P, Adams PD, Carapeto P, Zhu Q, Ramasamy R, Perez-Lorenzo R, Fan R, Dong R, Montgomery RR, Shaikh S, Vickovic S, Yin S, Kang S, Suvakov S, Khosla S, Garovic VD, Menon V, Xu Y, Song Y, Suh Y, Dou Z, Neretti N. SenNet recommendations for detecting senescent cells in different tissues. Nat Rev Mol Cell Biol. 2024 Dec;25(12):1001-1023. PubMed Central PMCID: PMC11578798.
   d. Visweswaran S, McLay B, Cappella N, Morris M, Milnes JT, Reis SE, Silverstein JC, Becich MJ. An atomic approach to the design and implementation of a research data warehouse. J Am Med Inform Assoc. 2022 Mar 15;29(4):601-608. PubMed Central PMCID: PMC8922189.
2. Biomedical visualizations. Dr. Silverstein's research extends to research on the use of mapping and visualizations of organs and tissues. In our 2008 paper we addressed the problem of volume visualization for surgery and radiology, where grayscale is used because of unpredictable perceptual characteristics of pseudo-colored images. Our automated visualization retains grayscale characteristics (perceptual brightness) with the addition of color. We discovered a method to combine generic field data and an arbitrary map of the data to colors and apply perceptual contrast theory to adjust the colors for display perceptually correctly, gaining the contrast-enhancement typical of grayscale images without losing the color. In our recent paper in Nature Methods, we describe methods advancing tissue visualization with multiplexed antibody-based imaging that enables the detailed characterization of molecular and cellular organization in tissues. In our 2022 paper from Communications Biology, we discuss visualization interfaces to support human reference tissue and organ atlases.
   a. Börner K, Bueckle A, Herr BW 2nd, Cross LE, Quardokus EM, Record EG, Ju Y, Silverstein JC, Browne KM, Jain S, Wasserfall CH, Jorgensen ML, Spraggins JM, Patterson NH, Weber GM. Tissue registration and exploration user interfaces in support of a human reference atlas. Commun Biol. 2022 Dec 13;5(1):1369. PubMed Central PMCID: PMC9747802.
   b. Börner K, Blood PD, Silverstein JC, Ruffalo M, Satija R, Teichmann SA, Pryhuber GJ, Misra RS, Purkerson JM, Fan J, Hickey JW, Molla G, Xu C, Zhang Y, Weber GM, Jain Y, Qaurooni D, Kong Y, Bueckle A, Herr BW 2nd. Human BioMolecular Atlas Program (HuBMAP): 3D Human Reference Atlas construction and usage. Nat Methods. 2025 Apr;22(4):845-860. PubMed Central PMCID: PMC11978508.
   c. Quardokus EM, Saunders DC, McDonough E, Hickey JW, Werlein C, Surrette C, Rajbhandari P, Casals AM, Tian H, Lowery L, Neumann EK, Björklund F, Neelakantan TV, Croteau J, Wiblin AE, Fisher J, Livengood AJ, Dowell KG, Silverstein JC, Spraggins JM, Pryhuber GS, Deutsch G, Ginty

F, Nolan GP, Melov S, Jonigk D, Caldwell MA, Vlachos IS, Muller W, Gehlenborg N, Stockwell BR, Lundberg E, Snyder MP, Germain RN, Camarillo JM, Kelleher NL, Börner K, Radtke AJ. Organ Mapping Antibody Panels: a community resource for standardized multiplexed tissue imaging. Nat Methods. 2023 Aug;20(8):1174-1178. PubMed Central PMCID: PMC10406602.

d. Silverstein JC, Parsad NM, Tsirline V. Automatic perceptual color map generation for realistic volume visualization. J Biomed Inform. 2008 Dec;41(6):927-35. PubMed Central PMCID: PMC2651027.

3. The use of virtual reality in surgical applications is an area in which we have made several contributions and for which Dr. Silverstein is best known. Students, staff, and colleagues in Dr. Silverstein's lab did each of these publications under his NIH funding. Dr. Silverstein used these discoveries to teach anatomy to undergraduate students for six years in a course called "Immersive Virtual Anatomy".
   a. Kaspar M, Parsad NM, Silverstein JC. An optimized web-based approach for collaborative stereoscopic medical visualization. J Am Med Inform Assoc. 2013 May 1;20(3):535-43. PubMed Central PMCID: PMC3628048.
   b. Silverstein JC, Dech F. Precisely Exploring Medical Models and Volumes in Collaborative Virtual Reality. Presence: Teleoperators and Virtual Environments. 2005; 14(1):47-59. DOI: 10.1162/1054746053890233
   c. Silverstein JC, Dech F, Edison M, Jurek P, Helton WS, Espat NJ. Virtual reality: immersive hepatic surgery educational environment. Surgery. 2002 Aug;132(2):274-7. PubMed PMID: 12219023.
   d. Dobson HD, Pearl RK, Orsay CP, Rasmussen M, Evenhouse R, Ai Z, Blew G, Dech F, Edison MI, Silverstein JC, Abcarian H. Virtual reality: new method of teaching anorectal and pelvic floor anatomy. Dis Colon Rectum. 2003 Mar;46(3):349-52. PubMed PMID: 12626910.
4. General informatics. Dr. Silverstein has contributed to many general informatics advances, four of which are identified here. They demonstrate various skills, from natural language processing to analyses of data warehouses of clinical trials and patient outcomes.
   a. Chard K, Russell M, Lussier YA, Mendonça EA, Silverstein JC. A cloud-based approach to medical NLP. AMIA Annu Symp Proc. 2011;2011:207-16. PubMed Central PMCID: PMC3243210.
   b. Garcia-Recio S, Hinoue T, Wheeler GL, Kelly BJ, Garrido-Castro AC, Pascual T, De Cubas AA, Xia Y, Felsheim BM, McClure MB, Rajkovic A, Karaesmen E, Smith MA, Fan C, Ericsson PIG, Sanders ME, Creighton CJ, Bowen J, Leraas K, Burns RT, Coppens S, Wheless A, Rezk S, Garrett AL, Parker JS, Foy KK, Shen H, Park BH, Krop I, Anders C, Gastier-Foster J, Rimawi MF, Nanda R, Lin NU, Isaacs C, Marcom PK, Storniolo AM, Couch FJ, Chandran U, Davis M, Silverstein J, Ropelewski A, Liu MC, Hilsenbeck SG, Norton L, Richardson AL, Symmans WF, Wolff AC, Davidson NE, Carey LA, Lee AV, Balko JM, Hoadley KA, Laird PW, Mardis ER, King TA, Perou CM. Multiomics in primary and metastatic breast tumors from the AURORA US network finds microenvironment and epigenetic drivers of metastasis. Nat Cancer. 2023 Jan;4(1):128-147. PubMed Central PMCID: PMC9886551.
   c. Jacobs MA, Schmidt S, Hall DE, Stitzenberg KB, Kao LS, Brimhall BB, Wang CP, Manuel LS, Su HD, Silverstein JC, Shireman PK. A Surgical Desirability of Outcome Ranking (DOOR) Reveals Complex Relationships Between Race/Ethnicity, Insurance Type, and Neighborhood Deprivation. Ann Surg. 2024 Feb 1;279(2):246-257. PubMed Central PMCID: PMC10787813.
   d. Marsolo K, Kiernan D, Toh S, Phua J, Louzao D, Haynes K, Weiner M, Angulo F, Bailey C, Bian J, Fort D, Grannis S, Krishnamurthy AK, Nair V, Rivera P, Silverstein J, Zirkle M, Carton T. Assessing the impact of privacy-preserving record linkage on record overlap and patient demographic and clinical characteristics in PCORnet®, the National Patient-Centered Clinical Research Network. J Am Med Inform Assoc. 2023 Feb 16;30(3):447-455. PubMed Central PMCID: PMC9933062.

<u>Complete List of Published Work in My Bibliography:</u>

https://www.ncbi.nlm.nih.gov/myncbi/1vsMqqMOojIkO/bibliography/public/