

CURRICULUM VITAE

Miriam Braunstein, Ph.D.

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Education

Ph.D. Princeton University, Princeton NJ (1992-1996) Molecular Biology

M.A. Princeton University, Princeton NJ (1990-1992) Molecular Biology

B.S. Tufts University, Medford MA (1986-1990) Biology

Professional Experience

Professor (2013-Present), Department of Microbiology and Immunology
University of North Carolina School of Medicine, Chapel Hill, NC

Visiting Scientist (1/2016-6/2016), UNC awarded sabbatical
RTI University Scholar, RTI International, Research Triangle Park, NC

Visiting Scientist (6/2015-12/2015) UNC awarded sabbatical
Calibr (California Institute for Biomedical Research), La Jolla CA

Associate Professor (2008-2013), Department of Microbiology and Immunology
University of North Carolina School of Medicine, Chapel Hill, NC

Assistant Professor (2001-2008), Department of Microbiology and Immunology
University of North Carolina School of Medicine, Chapel Hill, NC

Postdoctoral Fellow/Research Associate (1996-2001) with Dr. William Jacobs, Jr.,
Howard Hughes Medical Institute, Albert Einstein College of Medicine, Bronx, NY

Predoctoral Student (1990-1996) with Dr. James R. Broach, Princeton University,
Princeton, NJ

Research Assistant (1989-1990) with Dr. William G. Shanabruch, Tufts University,
Medford, MA

Assistant Lab Technician (1988) with Dr. David A. Thorley-Lawson, Tufts University
Medical School, Boston, MA

Research Assistant (1988) with Dr. Edward A. Carter, Massachusetts General Hospital,
Boston, MA

Honors and Awards

American Academy of Microbiology Fellow (2020)

UNC Outstanding Teaching Performance (2016)

RTI International University Scholar (2016)

UNC Senior Faculty Research and Scholarly Leave Award (2015) – funded sabbatical at Calibr, La Jolla CA

American Society of Microbiology Chair-Elect/Chair/Councilor Division U Mycobacteriology (2010-2013)

Burroughs Wellcome Fund Investigator in the Pathogenesis of Infectious Disease (2008)

Life Sciences Research Fellowship; Howard Hughes Medical Institute Fellow (1996-1999)

NIH Cellular and Molecular Biology Training Grant (1990-1993)

Phi Beta Kappa (1990)

Paul A. Warren Award in Genetics (1990)

Magna Cum Laude, Tufts University (1990)

National Science Foundation REU Undergraduate Research Program (1989)

Publications

Book Chapters:

1. **Braunstein, M.**, Bensing, B.A. and Sullam, P.M. (2019). The two distinct types of SecA2-dependent export systems. *In Protein Secretion in Bacteria*. Eds. Christie, P., Cascales, E. and Sandkvist, M. (American Society for Microbiology Press). p.29-42.
2. Van Winden, W.J.C., Houben, E.N.G. and **Braunstein, M.** (2019). Protein export into and across the atypical diderm cell envelope of mycobacteria. *In Gram Positive Pathogens 3rd Edition*. Eds. Fischetti, V.A., Novick, R.P., Ferritti, J.J., Portnoy, D.A., **Braunstein, M.** and Rood, J.I. (American Society for Microbiology Press). p. 1129-1153.
3. Young, E.F., Hickey, A.J. and **Braunstein, M.** (2016). Testing inhaled drug therapies for treating tuberculosis. *In Drug delivery systems for tuberculosis prevention and treatment (Advances in Pharmaceutical Technology)*, Hickey, A.J., Misra, A. and P.B. Fourie Eds. (A.J. John Wiley and Sons, Ltd). p. 113-130.
4. McCann, J.R., Kurtz, S. and **Braunstein, M.** (2009). Secreted and exported proteins important to *Mycobacterium tuberculosis* pathogenesis. *In Bacterial Protein Secretion Systems*. Woolridge, K. ed. (Horizon Press). p. 265-298.
5. McDonough, J. A. and **Braunstein, M.** (2008). Protein transport pathways in *Mycobacterium tuberculosis*. *In Handbook of Tuberculosis: Molecular Biology and Biochemistry*. S.H.E. Kaufmann and Rubin, E. eds. (Wiley-VCH Publisher). p. 111-130.
6. Kurtz, S. and **Braunstein, M.** (2005) Protein secretion and export in *Mycobacterium tuberculosis*. *In Mycobacterium: Molecular Microbiology*. Parish, T. ed. (Horizon Press). p. 71-138.

7. Belisle, J.T., **Braunstein, M.**, Rosenkrands, I. and Andersen P. (2004) The proteome of *Mycobacterium tuberculosis*. In *Tuberculosis*. S. Cole, K. Eisenach, B. Gicquel, W.R. Jacobs Jr. and D. McMurray eds. (American Society for Microbiology Press). p. 235-260.
8. **Braunstein, M.**, Bardarov, S.S. and Jacobs, W.R. Jr. (2002). Genetic methods for deciphering virulence determinants of *Mycobacterium tuberculosis*. In *Methods in Enzymology, Vol. 358, Bacterial Pathogenesis, Part C*, V.L. Clark and P.M. Bavoil, eds. (Academic Press). p. 67-99.
9. **Braunstein, M.** and Belisle, J.T. (2000). Genetics of Protein Secretion. In *Molecular Genetics of Mycobacteria*, G.F. Hatfull and W.R. Jacobs, Jr., eds. (American Society for Microbiology Press). p. 203-220.
10. **Braunstein, M.**, Holmes, S.G. and Broach, J.R. (1998). Heterochromatin and regulation of gene expression in *Saccharomyces cerevisiae*. In *Nuclear Organization, Chromatin Structure and Gene Expression*, R.van Driel and A.P. Otte, eds. (Oxford University Press).p. 250-275.
11. Holmes, S.G., **Braunstein, M.** and Broach, J.R. (1996). Transcriptional silencing of the yeast mating-type genes. In *Epigenetic Mechanisms of Gene Regulation*, V.E.A. Russo, R. Martienssen and A. Riggs, eds. (Cold Spring Harbor Press). p. 467-488.

Book Editor:

1. Gram-Positive Pathogens 3rd Edition. (2019). Eds. Fischetti, V.A., Novick, R.P., Ferretti, J.J., Rood, J., Portnoy D.A., **Braunstein, M.** and Rood, J.I. (American Society for Microbiology Press)

Refereed Papers:

1. Rank, L.M., Herring, L.E. and **Braunstein, M.** (2021). Evidence for the mycobacterial Mce4 transporter being a multiprotein complex. *Journal of Bacteriology*. 21;203(10):e00685-20.
2. Schmalstig, A.A., Freidy, S., Hanafin, P.O., **Braunstein, M.*** and Rao, G.G.* (2021). Reapproaching old treatments: considerations for PK/PD studies on phage therapy for bacterial respiratory infections. *Clinical Pharmacology & Therapeutics*. 109(6):1443-1456. *co-corresponding authors
3. Gonzalez-Juarrero, M., Lukka, P.B., Wagh, S., Walz, A., Arab, J., Pearce, C., Ali, Z., Ryman, J.T., Parmar, K., Temrikar, Z., Munoz-Gutierrez, J., Robertson, G.T., Liu, J., Lenaerts, A.J., Daley, C., Lee, R.E., **Braunstein, M.**, Hickey, A.J., and Meibohm B. (2021) Preclinical Evaluation of Inhalational Spectinamide-1599 Therapy against Tuberculosis. *ACS Infect Dis*. 7:2850-2863.
4. Bird, K.E., Xander, C., Murcia, S., Schmalstig, A.A., Wang, X., Emanuele, M.J., **Braunstein, M.*** and Bowers, A.A.* (2020). Thiopeptides induce proteasome-independent activation of cellular mitophagy. *ACS Chem Biol*. 15:2164-2174. *co-corresponding authors

5. **Braunstein, M.**, Hickey, A.J. and Ekins, S. (2019). Why wait? The case for treating tuberculosis with inhaled drugs. *Pharmaceutical Research*. 36:166.
6. Miller, B.K., Hughes, R., Ligon, L.S., Rigel, N.W., Malik, S., Anjuwon-Foster, B.R., Sacchettini, J.C. and **Braunstein, M.** (2019). SatS is a chaperone for the SecA2 export pathway of *Mycobacterium tuberculosis*. *eLIFE* 8:e40063.
7. Wahl A, De C, Abad Fernandez M, Lenarcic EM, Xu Y, Cockrell AS, Cleary RA, Johnson CE, Schramm NJ, Rank LM, Newsome IG, Vincent HA, Sanders W, Aguilera-Sandoval CR, Boone A, Hildebrand WH, Dayton PA, Baric RS, Pickles RJ, **Braunstein M**, Moorman NJ, Goonetilleke N, Victor Garcia J. (2019). Precision mouse models with expanded tropism for human pathogens. *Nat Biotechnol*. 37:1163-1173.
8. Walz, A., Lukka, P.B., Pearce, C., Creissen, E., **Braunstein, M.**, Hickey, A.J., Meibohm, B. and M. Gonzalez-Juarrero. (2019). Sterilization of *Mycobacterium tuberculosis* infected samples using methanol preserves anti-tuberculosis drugs for subsequent pharmacological testing studies. *Tuberculosis*(Edinb). 117:52-55.
9. Stewart, I.E., Lukka, P.B., Liu, J., Meibohm, B., Gonzalez-Juarrero, M., **Braunstein, M.**, Lee, R.E. and Hickey, A.J. (2019) Development and characterization of a dry powder formulation for anti-tuberculosis drug spectinamide 1599. *Pharmaceutical Research*. 36:136.
10. Rathi C, Lukka PB, Wagh S, Lee RE, Lenaerts AJ, **Braunstein M**, Hickey A, Gonzalez-Juarrero M, and Meibohm B. (2019). Comparative pharmacokinetics of spectinamide 1599 after subcutaneous and intrapulmonary aerosol administration in mice. *Tuberculosis* (Edinb). 114:119-122.
11. Montgomery, S.A., Young, E.F., Durham, P.G., Zulauf, K.E., Rank, L., Miller, B.K., Hayden, J.D., Welch, J.T., Hickey, A.J. and **Braunstein, M.** (2018). Efficacy of pyrazinoic acid dry powder aerosols in resolving necrotic and non-necrotic granulomas in a guinea pig model of tuberculosis. *PLOS ONE* 13(9):e0204495.
12. Zulauf KE, Sullivan JT, and **Braunstein M.** (2018). The SecA2 pathway of *Mycobacterium tuberculosis* exports effectors that work in concert to arrest phagosome and autophagosome maturation. *PLOS Pathogens*. 14(4):e1007011.
13. Santos K, Lukka PB, Grzegorzewicz A, Jackson M, Trivedi A, Pavan F, Chorilli M, **Braunstein M**, Hickey A, Meibohm B, and Gonzalez-Juarrero M. (2018). Primary Lung Dendritic Cell Cultures to Assess Efficacy of Spectinamide-1599 Against Intracellular *Mycobacterium tuberculosis*. *Front Microbiol*. 9:1895.
14. Perkowski, E.F., Zulauf, K.E., Weerakoon, D., Hayden, J.D., Ioerger, T.R., Oreper, D., Gomez, S.M., Sacchettini, J.C., and **Braunstein, M.** (2017). The EXIT Strategy: An approach for identifying bacterial proteins exported during host infection. *mBio*. 8(2): e00333-17.
15. Durham, P.G., Hanif, S.N., Contreras, L.G., Young, E.F., **Braunstein, M.**, and Hickey, A.J. (2017). Disposable dosators for pulmonary insufflation of therapeutic agents to small animals. *J. Vis. Exp.* 121: doi: 10.3791/55356.

16. Miller, B.K., Zulauf, K.E. and **Braunstein, M.** (2017). The Sec pathways and exportomes of *Mycobacterium tuberculosis*. *Microbiol. Spectrum*. 5(2):TBTB2-0013-2016.
17. Young, E.F., Perkowski, E., Malik, S., Hayden, J.D., Durham, P.G., Zhong, L., Welch, J.T. **Braunstein, M.*** and Hickey, A.J.* (2016). Inhaled pyrazinoic acid esters for the treatment of tuberculosis. *Pharmaceutical Research*. 33(10):2495-2505. *co-corresponding authors
18. Durham, P.G., Young, E.F., **Braunstein, M.**, Welch, J.T., Hickey, A.J. (2016). A dry powder combination of pyrazinoic acid and its n-propyl ester for aerosol administration to animals. *International Journal of Pharmaceutics*. 514(2):384-391.
19. Swanson S, Ioerger T, Rigel N, Miller B, **Braunstein M**, Sacchettini, J. (2016). Structural similarities and differences between two functionally distinct SecA proteins: the *Mycobacterium tuberculosis* SecA1 and SecA2. *Journal of Bacteriology*. 198:720-730.
20. Perkowski EF, Miller BK, McCann JR, Sullivan JT, Malik S, Allen IC, Godfrey V, Hayden JD, **Braunstein M.** (2016). An orphaned Mce-associated membrane protein of *Mycobacterium tuberculosis* is a virulence factor that stabilizes Mce transporters. *Mol. Microbiology*. 100:90-107.
21. Feltcher, M.E, Gunawardena, H.P., Zulauf, K., Malik, S., Griffin, J.E., Sasseti, C.M., Chen, X. and **Braunstein, M.** (2015). Label-free quantitative proteomics reveals a role for the *Mycobacterium tuberculosis* SecA2 pathway in exporting solute binding proteins and Mce transporters to the cell wall. *Molecular and Cellular Proteomics*. 14:1501-1516.
22. Cheng, N., Porter, M.A., Frick, L.W., Nguyen, Y., Hayden, J.D., Young, E.F., **Braunstein, M.S.**, Hull-Ryde, E.A., Janzen, W.P. (2014) Filtration improves the performance of a high-throughput screen for anti-mycobacterial compounds. *PLoS One*. May 2;9(5):e96348.
23. Gunawardena, H.P., Feltcher, M.E., Wrobel, J.A., Gu, S., **Braunstein, M.*** and Chen, X.* (2013) Comparison of the membrane proteome of virulent *Mycobacterium tuberculosis* and the attenuated *Mycobacterium bovis* BCG vaccine strain by label-free quantitative proteomics. *Journal of Proteome Research*. 12: 5463-5474. *co-corresponding authors
24. Ligon, L. S., Rigel, N. W., Romanchuk, A., Jones, C.D., and **Braunstein, M.** (2013) Suppressor analysis reveals a role for SecY in the SecA2-Dependent protein export pathway of mycobacteria. *Journal of Bacteriology*. 195(19):4456-65.
25. Hayden, J. D., Brown, L. R., Gunawardena, H. P., Perkowski, E. P., Chen, X. and **Braunstein, M.** (2013) Reversible acetylation regulates acetate and propionate metabolism in *Mycobacterium smegmatis*. *Microbiology*. 159(Pt Pt_9):1986-1999.
26. Shoen, C., DeStefano, M., Hager, C., Tham, K-Y., **Braunstein, M.**, Allen, A., Gates, H., Cynamon, M. and Kernodle, D. (2013) A modified BCG vaccine with reduced activity of antioxidants and glutamine synthetase exhibits enhanced protection of mice despite diminished *in vivo* persistence. *Vaccines*. 1(1):34-57.

27. Allen, I. C., McElvania TeKippe, E., Lich, J.D., Arthur, J.C., Sullivan, J.T, **Braunstein, M.** and Ting, J.P.Y. (2013) Characterization of NLRP12 during the *in vivo* host immune response to *Klebsiella pneumoniae* and *Mycobacterium tuberculosis*. *PLoS One*. Apr 5;8(4):e60842.
28. Feltcher, M.E., Gibbons, H.S., Ligon, L.S. and **Braunstein, M.** (2013) Protein export by the mycobacterial SecA2 system is determined by the preprotein mature domain. *Journal of Bacteriology*. 195(4):672-81.
29. Feltcher, M.E. and **Braunstein, M.** (2012) Emerging themes in SecA2-mediated protein export. *Nature Reviews Microbiology*. 10:779-89.
30. Bashiri, G., Perkowski, E.F., Turner, A.P., Fetcher, M.E., **Braunstein, M.** and Baker, E.N. (2012) Tat-Dependent Translocation of an F₄₂₀-Binding Protein of *Mycobacterium tuberculosis*. *PLoS One*. Oct 22;7(10):e45003.
31. Sullivan, J.T, Young, E.F., McCann, J.R. and **Braunstein, M.** (2012) The *Mycobacterium tuberculosis* SecA2 system subverts phagosome maturation to promote growth in macrophages. *Infection and Immunity*. 80:996-1006.
32. Ligon, L.S., Hayden, J.D. and **Braunstein, M.** (2012) The Ins and Outs of *Mycobacterium tuberculosis* protein export. *Tuberculosis*. 92:121-32.
33. McCann, J.R., McDonough, J.A., Sullivan, J.T., Feltcher, M.E. and **Braunstein, M.** (2011) Genome-wide identification of *Mycobacterium tuberculosis* exported proteins with roles in intracellular growth. *Journal of Bacteriology*. 193:854-861.
34. Feltcher, M.E., Sullivan, J.T. and **Braunstein, M.** Protein export systems of *Mycobacterium tuberculosis*: novel targets for drug development? (2010) *Future Microbiology*. 5:1581-1597.
35. McElvania TeKippe, E., Allen, C. I., Hulseberg, P. D., Sullivan, J.T., McCann, J.R., Sandor, M., ***Braunstein, M.** and ***Ting, J. P-Y.** (2010) Granuloma formation and host defense in chronic *Mycobacterium tuberculosis* infection requires PYCARD/ASC but not NLRP3 or caspase-1. *PLoS One*. Aug 20;5(8). pii: e12320 **co-corresponding authors*
36. Lu D, Garcia-Contreras L, Muttill P, Padilla D, Xu D, Liu J, **Braunstein M,** McMurray DN, Hickey AJ. (2010). Pulmonary immunization using antigen 85-B polymeric microparticles to boost tuberculosis immunity. *AAPS J*. 12(3):338-47.
37. Sadagopal, S., **Braunstein, M.**, Hager, C.C., Wei, J., Daniel, A.K., Bochan, M.R., Crozier, I., Smith, N.E., Gates, H.O., Barnett, L., Van Kaer, L., Price, J.O., Blackwell, T.S., Kalams, S.A., and Kernodle, D.S. (2009). Reducing the activity and secretion of microbial antioxidants enhances the immunogenicity of BCG. *PLoS One*. 4: e5531.
38. Rigel, N.W., Gibbons, H.S., McCann, J.R., McDonough, J.A, Kurtz, S. and **Braunstein, M.** (2009). The accessory SecA2 system of mycobacteria requires ATP binding and the canonical SecA1. *Journal of Biological Chemistry*, 284:9927-36.
39. Hall, J.D., Kurtz, S.L., Rigel, N.W., Gunn, B.M., Taft-Benz, S., Morrison, J.P., Fong, A.M., Patel, D.D., **Braunstein, M.**, and Kawula, T.H. (2009). The impact of chemokine receptor CX3CR1 deficiency during respiratory infections with *Mycobacterium*

- tuberculosis* or *Francisella tularensis*. *Clinical and Experimental Immunology*, 156:278-84.
40. McDonough, J.A., McCann, J.R., McElvania Tekippe, E. Silverman, J.S., Rigel, N.W. and **Braunstein, M.** (2008). Identification of functional Tat signal sequences in *Mycobacterium tuberculosis* proteins. *Journal of Bacteriology*, 190:6428-6438.
 41. Hou, J.M., D'Lima, N.G., Rigel, N.W., Gibbons, H.S., McCann, J.R., ***Braunstein, M.** and ***Teschke, C.M.** (2008). ATPase activity of *Mycobacterium tuberculosis* SecA1 and SecA2 proteins and its importance to SecA2 function in macrophages. *Journal of Bacteriology*, 190:4880-4887. ***co-corresponding authors**
 42. Rigel, N.W. and ***Braunstein, M.** (2008) A new twist on an old pathway – accessory Sec systems. *Molecular Microbiology*. 69:291-302.
 43. Mohamedmohaideen, N.N., Palaninathan, S.K., Morin, P.M., Williams, B.J., **Braunstein, M.**, Tichy, S.E., Locker, J., Russell, D.H., Jacobs, W.R. Jr., and Sacchettini, J.C. (2008) The structure and function of the virulence-associated high temperature requirement A of *M. tuberculosis*. *Biochemistry* 47:6092-6102.
 44. McCann, J.R., McDonough, J.M., Pavelka, M.S. and **Braunstein, M.** (2007). β -lactamase can function as a reporter of bacterial protein export during *Mycobacterium tuberculosis* infection of host cells. *Microbiology*, 153:3350-3359.
 45. Lu, D., Garcia-Contreras, L., Xu, D., Kurtz, S.L., Liu, J., **Braunstein, M.**, McMurray, D.N. and Hickey, A.J. (2007). Poly (Lactide-co-Glycolide) microspheres in respirable sizes can enhance an *in vitro* T cell response to Recombinant *Mycobacterium tuberculosis* Antigen 85B. *Pharmaceutical Research*, 24:1834-1843.
 46. Hinchey, J., Lee, S., Manjunatha, V., Chen, B., Basaraba, R.J., Jeon, B.Y., Derrick, S.C., Chan, J., **Braunstein, M.**, Orme, I.M., Morris, S.L., Jacobs, W.R. and Porcelli, S.A. (2007). Enhanced priming of adaptive immunity by a mutant of *Mycobacterium tuberculosis* that is defective in inhibition of host cell apoptosis. *Journal of Clinical Investigation*, 117: 2279-2288.
 47. Gibbons, H.S., Wolschendorf, F., Abshire, M., Niederwies, M. and **Braunstein, M.** (2007) Identification of two *Mycobacterium smegmatis* lipoproteins exported by the SecA2-dependent export pathway. *Journal of Bacteriology*, 189: 5090-5100.
 48. Guo, X.V., Monteleone, M., Klotzsche, M., Kamionka, A., Hillen, W., **Braunstein, M.**, Ehrt, S. and Schnappinger, D. (2007). Silencing essential protein secretion in *Mycobacterium smegmatis* by using tetracycline repressors. *Journal of Bacteriology*, 189: 4614-4623.
 49. Kurtz, S., McKinnon, K.P., Runge, M.S., Ting, J.P. and **Braunstein, M.** (2006). The SecA2 secretion factor of *Mycobacterium tuberculosis* promotes growth in macrophages and limits host cell activation. *Infection and Immunity*, 74: 6855-6864
 50. McDonough, J.A., Hacker, K.E., Flores, A.R., Pavelka, M.S. and **Braunstein, M.** (2005). The twin-arginine translocation (Tat) pathway of *Mycobacterium smegmatis* is functional and required for the export of mycobacterial beta-lactamases. *Journal of Bacteriology*, 187:7667-7679.

51. Williams, K.L., Lich, J.D., Rallabhandi, P., Reed, W., Kurtz, S., Coffield, N., Su, L., Vogel, S.N., **Braunstein, M.** and Ting, J.P.-Y. (2005). The CATERPILLER protein Monarch-1 is an antagonist of toll-like-receptor-, tumor necrosis factor alpha, and Mycobacterium tuberculosis-induced pro-inflammatory signals. *Journal of Biological Chemistry*, 280:39914-39924.
52. **Braunstein, M.**, Espinosa, B., Chan, J., Belisle, J.T. and Jacobs, W.R. Jr. (2003). SecA2 functions in the secretion of superoxide dismutase A and in the virulence of *Mycobacterium tuberculosis*. *Molecular Microbiology*, 48:453-464.
53. Sharma, V., Arockiasamy, A., Ronning, D.R., Savva, C.G., Holzenburg, A., **Braunstein, M.**, Jacobs, W. R. Jr. and Sacchettini, J. C. (2003). Crystal Structure of *M. tuberculosis* SecA, a Preprotein Translocating ATPase. *Proceedings of the National Academy of Sciences*, 100:2243-2248.
54. **Braunstein, M.***, Brown, A.M., Kurtz, S. and Jacobs, W.R. Jr. (2001). Two nonredundant SecA homologues function in mycobacteria. *Journal of Bacteriology*, 183:6979-6990. *corresponding author
55. **Braunstein, M.**, Griffin, T.J.IV, Kriakov, J.I., Friedman, S.T., Grindley, N.D.F. and Jacobs, W.R. Jr. (2000). Identification of genes encoding exported *Mycobacterium tuberculosis* proteins using a Tn552'phoA in vitro transposition system. *Journal of Bacteriology*, 182:2732-2740.
56. Bi, X., **Braunstein, M.**, Shei, G-J. and Broach, J.R. (1999). The yeast *HML I* silencer defines a heterochromatin domain boundary by directional establishment of silencing. *Proceedings of the National Academy of Sciences*, 96:11934-11939.
57. **Braunstein, M.**, Sobel, R.E., Allis, C.D., Turner, B.M. and Broach, J.R. (1996). Efficient transcriptional silencing in yeast requires a heterochromatin histone acetylation pattern. *Molecular and Cellular Biology*, 16:4349-4356.
58. **Braunstein, M.**, Rose, A.B., Holmes, S.G., Allis, C.D. and Broach, J.R. (1993). Transcriptional silencing is associated with reduced nucleosome acetylation. *Genes and Development*, 7:592-604.

Patents

Mycobacterial Mutants Affecting Host Apoptosis. Issued August 2011, filed January 2006. Inventors: Jacobs, W.R., Porcelli, S.A., Briken, V., and **Braunstein, M.** This patent is licensed by the Aeras Global TB Vaccine Foundation.

Mycobacterial SecA2 Mutants. Assignment of Invention, UNC OTD 06-0057, issued January 2012, filed January 2006. Inventors: Jacobs, W.R., Porcelli, S.A., and **Braunstein, M.** This patent is licensed by the Aeras Global TB Vaccine Foundation.

Tuberculosis therapeutic compounds and methods. Provisional Patent November, 2017 Inventors: Hickey, A.J., **Braunstein, M.**, Young, E., and Durham, P.

Invited Presentations

2020:

University of North Carolina Asheville (postponed)

2019:

University Notre Dame (2019)

Duke University (2019)

International Inhaled Therapies and Other Infectious Disease Meeting, Groningen Netherlands (2019)

Tuberculosis Keystone Meeting, Banf Canada (2019)

2018:

US Food and Drug Administration, Silver Spring MD (2018)

Washington University, St. Louis MO (2018)

Texas Tech University El Paso TX (2018)

2017:

International Inhaled Therapies and Other Infectious Disease Meeting, Durham NC (2017)

Wadsworth Center, Albany NY (2017)

Washington State University, Pullman WA (2017)

Retreat Molecular Basis of Infectious Disease, Houston TX (2017)

Albert Einstein College of Medicine (2017)

ASM Conference on Tuberculosis: Past, Present, Future, Brooklyn NY (2017)

2016:

Zing Conference: Protein Secretion in Bacteria, Tampa FL (2016)

Gordon Conference: Microbial Toxins and Pathogenicity, Waterville Valley NH (2016)

Rutgers University (2016)

Hofstra University (2016)

2015:

San Diego State University (2015)

California Institute for Biomedical Research (2015)

Stony Brook University (2015)

Oregon State University (2015)

2014:

University of North Carolina Epithelial Cell Biology Seminar Series (2014)

Jefferson Medical College (2014)

Vanderbilt University Medical Center, Symposium on Infection and Immunity (2014)

Johns Hopkins School of Medicine (2014)

Grand Valley State University (2014)

Emory University (2014)

2013:

Texas A & M University (2013)

2012:

American Society for Biochemistry and Molecular Biology Meeting, San Diego, CA (2012)
University of Texas Health Science Center at Tyler (2012)
University of Texas Health Science Center at San Antonio (2012)
University of North Carolina Epithelial Cell Biology Seminar Series (2012)

2011:

FASEB Summer Conference on Microbial Pathogenesis: Mechanisms of Infectious Disease, Snowmass, Colorado (2011)
Keystone Meeting: Mycobacteria: Physiology, Metabolism and Pathogenesis - Back to the Basics, Vancouver Canada (2011)

2010:

Gordon Conference: Bacterial Cell Surfaces, Colby-Sawyer College New Hampshire (2010)
College of William and Mary (2010)

2009:

North Carolina State University (2009)
American Society for Microbiology General Meeting, Philadelphia USA (2009)
Weill Cornell Medical School (2009)

2008:

University of Georgia (2008)
University of North Carolina Cell Biology Seminar Series (2008)

2007:

University of Pennsylvania (2007)
Becton Dickinson Technologies (2007)
American Society for Microbiology General Meeting, Toronto Canada (2007)
University of Wisconsin-Madison (2007)
University of North Carolina Infectious Disease Conference Series (2007)

2006:

University of Rochester (2006)
University of Maryland (2006)
Duke Center for AIDS Research (2006)

2005:

University of Connecticut Storrs (2005)
Wake Forest University School of Medicine (2005)

2003:

Albert Einstein College of Medicine (2003)
University of North Carolina Genetics Seminar Series (2003)

2002:

Colorado State University (2002)
East Carolina University (2002)
College of Veterinary Medicine North Carolina State University (2002)

2001:

Cold Spring Harbor Microbial Pathogenesis and Host Response Meeting (2001)
University of North Carolina Greensboro (2001)

2000:

American Society for Microbiology Conference on Tuberculosis, NY (2000)
American Society for Microbiology General Meeting, Los Angeles USA (2000)
Max-Planck-Institute for Infection Biology (2000)
Northeastern University (2000)
Boston University (2000)
University of Medicine and Dentistry of New Jersey (2000)
Wesleyan University (2000)
University of North Carolina Chapel Hill (2000)

1999:

Annual New York City Tuberculosis Conference, NY (1999)

1994:

Yeast Genetics and Molecular Biology Meeting, WA (1994)

1993:

FASEB Research Conference: Chromatin and Transcription, CO (1993)

1992:

New Jersey Regional Fungal Genetics Meeting, NJ (1992)

Teaching Record

Course Director:

BBSP902 BBSP First Year Group 2011, 2012, 2013, 2014, 2015,

MCRO710 Topics in Microbial Research 2010, 2011, 2012, 2013

MCRO635 Bacteriology/Microbial Pathogenesis I 2006, 2008, 2009, 2010

MCRO210 Seminar in Prokaryotic Molecular Biology Topic: Polarity and Protein
Localization in Bacteria 2005

MCRO135 Bacteriology 2004

Lectures:

MCRO710 Topics in Microbial Research /Seminar Tutorial in Prokaryotic Molecular
Biology 2010, 2012, 2013, 2017, 2021 - Responsible for 5 classes comprised of
lecture, paper discussions, and a writing assignment. Class size 15 students.

MCRO635 Microbial Pathogenesis I: Bacteriology 2006-2021– Responsible for 3-7 lectures
to Graduate students. Class size 5-15 students.

MCRO795 Research Concepts, Grant Writing Course 2016, 2017, 2018 -Responsible for
14 lectures/discussions with Graduate students. Class size 15 students.

BIO62 First Year Seminar: Mountains Beyond Mountains: The Biology of Infectious Disease in the Developing World. 2021. Guest Lecturer. Delivered 1 lecture to 20 undergraduates.

UNC School of Medicine TEC Respiratory Course 2015, 2017-2021, Responsible for 1 lecture to Medical students. Class size 160 students.

BBSP902 BBSP First Year Group Faculty Co-Mentor 2019, 2020 Responsible for leading 5 discussions, including some Responsible Conduct of Research Trainings, to incoming graduate students. Class size 16 students. Also served as a faculty advisor to these students while completed research rotations and selected a thesis laboratory.

IDST194 Modes of Inquiry 2018, Responsible for 1 lecture to Undergraduate students. Class size 25 students.

MEDI128 Medical Microbiology 2003-2014- Responsible for 2-4 lectures to Medical students. Class size 160 students.

MCRO112/DENT115 Dental Microbiology 2003-2015, 2017-present – Responsible for 2-6 lectures to Dental students. Class size 80 students.

EPI690 Emerging and Re-Emerging Infectious Diseases 2010-2012, 2014, 2017, 2018 – Responsible for 1 lecture to Graduate students. Class size 20 students

MEDI128 Medical Microbiology Laboratory section 2003, 2004, 2006, 2007, 2008 Responsible for leading 10-16 small group laboratory and case discussions with Medical students. Class size 20-30 students.

BIOL115 Strategies of Host-Microbe Interactions 2006 – Responsible for 1 lecture to Undergraduate students. Class size 10.

MCRO140 Microbial Pathogenesis 2002-2006– Responsible for 4-5 lectures to Graduate students. Class size 5-15 students.

MCRO210 Seminar in Prokaryotic Molecular Biology Topic: Polarity and Protein Localization in Bacteria 2005– Responsible for 10 classes comprised of lectures and discussions. Class size 10 students.

SPCL91 Special Topics: Modes of Inquiry 2005– Responsible for 1 lecture to Undergraduate students. Class size 10.

MCRO135 Bacteriology 2002, 2004– Responsible for 5 lectures to Graduate students. Class size 5-12 students. This course is now listed as MCRO635.

Research Supervision

Research Advisor for Microbiology and Immunology Ph.D. Graduate Students:

Christian Xander (2017-present)

Laura Rank (2014-2021) Current Position: Collaboration Pharmaceuticals Inc. Raleigh, NC

Brittany Miller (2013-2018). Current Position: Postdoctoral fellow with Dr. Patrick Brenwald, University of North Carolina, Chapel Hill NC

Kate Zulauf (2012-2017). Current Position: Locus Biosciences, Scientist, Morrisville NC

Ellen Foot Perkowski (2010-2015). Current Position: Lead Scientist, Q2 Solutions, Morrisville NC

Lauren Ligon (2009-2013) Current Position: Formatting Manager, Research Square, Durham NC

Meghan Feltcher Wolfgang (2008-2013) Current Position: Senior Scientist at BD Technologies, Research Triangle Park, NC.

Jon Tabb Sullivan (2007-2012) Current Position: Research Scientist, Integral Molecular, Philadelphia PA

Erin McElvania Tekippe (2006-2010) Current Position: Assistant Professor, Southwestern Medical Center, Director of Microbiology at Children's Hospital, Dallas TX

Jessica McCann (2004-2009) Current Position: Research Associate with Dr. John Rawls, Duke University, Durham NC

Nathan Rigel (2003-2008) Current Position: Associate Professor, Hofstra University, Hempstead NY

Justin McDonough (2002-2007) Current Position: Scientist Jackson Laboratory for Genomic Medicine, Farmington CT

Research Advisor for Microbiology MS Graduate Students:

Sherry Kurtz (2004-2007) Current Position: Biologist, FDA-CBER, Silver Spring MD

Research Advisor for Postbaccalaureate Students:

Debbie Badillo – PREP program (2021-current)

Ninecia Scott – PREP program (2013-2014) Current Position: Postdoctoral fellow with Dr. Carlos Orihuela, University of Alabama Birmingham

Lanisha Brown – PREP program (2011-2012) Current Position: Graduate student, North Carolina State University

Research Advisor for Postdoctoral Fellows:

Alan Schmalstig Ph.D. (2019-present)

Jennifer Hayden Ph.D. (2010-2014) Current Position: Assistant Professor, Cedar Crest College, Allentown PA

Seidu Malik, Ph.D. (2012-2014) Current Position: Bioinformatics Scientist in the Critical Care Division of Medicine, National Institutes of Health, Bethesda MD

Dilan Weerakoon, Ph.D. (2008-2010)

Henry Gibbons, Ph.D. (2003-2007) Current Position: Research Microbiologist, US Army Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD

Yoshihiko Murata, MD, Ph.D. (2002) Current Position: Director Clinical Research, Merck Research Laboratories, North Wales PA

Research Advisor for Undergraduate Research:

Andorra Bastien, SURE program - 2021
Aryan Talati, UNC Undergraduate - 2021
AJ Robinson UNC Undergraduate; BIO395 Faculty advisor - 2020
Dalan Smallwood UNC Undergraduate/Chancellor's Science Scholar Program -2018
Kevin Liu UNC Undergraduate -2017-present BIO395 Faculty advisor
Neisha Santiago-Rios SOLAR program - 2017
Ashley Fromm UNC Undergraduate/SMART program – 2016- 2017
Ayano Annis UNC Undergraduate/Chancellor's Science Scholar Program, BIO295 Faculty advisor – 2015-2018
Sarah Johnson UNC Undergraduate; BIO395 Faculty advisor – 2014-2016
Billy Harris UNC Undergraduate; BIO395 Faculty advisor – 2014
Andrew Krusell UNC Undergraduate; BIO395 Faculty advisor – 2012-2013
Rangoli Bhattacharjee UNC Undergraduate - 2013
Kalyani Avva UNC Undergraduate - 2012
Chelsea Moriarty - SURE program - 2011
Courtney Sutphen - SURE program - 2009
Preeyam Patel UNC Undergraduate - 2009
Chad Riggsbee - SURE program - 2008
Mary Christoph UNC Undergraduate; BIO98 Faculty advisor - 2007
Jason Silverman - SURE program - 2006
Tammi Duncan - SPRGE Program - 2005
Alan Woodruff UNC Undergraduate - 2004
Naman Shah UNC Undergraduate; APPL99 Faculty advisor - 2004
Tiffany Sergent UNC Undergraduate; BIO98 Faculty advisor - 2003
Michelle Abshire UNC Undergraduate; BIO98 Faculty advisor - 2002-2003
Ben Habdas - SURE program – 2002

Graduate Student Thesis Committees:

Jarrett Pelton UNC School of Pharmacy (2021-present)
Shekhar Yeshwante UNC School of Pharmacy (2020-present)
Mercedes Warren Department Microbiology and Immunology (2020-present)
Claire Johnson Department Microbiology and Immunology (2019-present)
Ashelyn Sidders Department Microbiology and Immunology (2019-present)
Jenna Beam Department Microbiology and Immunology (2019-present)
Marguerite Little Department of Pharmacology (2017-present)
Brent Eason Department Microbiology and Immunology – Masters thesis (2017-2019)
Laura Kincer Department Microbiology and Immunology – Masters thesis (2017-present)
Ashley Bone Department Microbiology and Immunology (2016-present)
Zachary Nash Department Microbiology and Immunology (2015-present)
Kara Eichelberger Department Microbiology and Immunology (2015-present)

Thesis Committee Chair
Melinda Grosser Department Microbiology and Immunology (2013-2016) –
Thesis Committee Chair
Erich Scheller Department Microbiology and Immunology (2013-2015)
Brian Garrett Department of Biochemistry (2012-2015)
Shaun Steele Department Microbiology and Immunology (2012-2015)
Jason Brunton Department Microbiology and Immunology (2011-2015)
Kara Jenson Department Microbiology and Immunology (2011- 2013) –
Thesis Committee Chair
Cheryl Miller Department Microbiology and Immunology (2011-2013) –
Thesis Committee Chair
Eliza Mason Department Microbiology and Immunology (2011-2013)
Shauna Swanson Department Microbiology and Immunology (2009-2014) –
Thesis Committee Chair
Erica Washington Department of Biology (2009-2013)
Erin Steinbach Department Microbiology and Immunology (2011-2013)
Eliza Peterson Department of Biochemistry (2010-2013)
Christopher Noel Thesis Committee (2009-2012)
Brittany Mortenson Thesis Committee (2009-2011)
Sunny Shi UNC School of Pharmacy (2008-2010)
Jim Fuller Department Microbiology and Immunology (2006-2008)
Robin Craven Department Microbiology and Immunology (2005-2008)
Joshua Hall Department Microbiology and Immunology (2005-2008)
Dongmei Lu UNC School of Pharmacy (2005-2007)
Robert Fulcher Department Microbiology and Immunology (2002-2007)

Graduate Student Preliminary Exam Committees:

Anchal Mehra - Department Microbiology and Immunology -2021
Liliana McKay- Department Microbiology and Immunology -2021
Lillian Lowry- Department Microbiology and Immunology -2021
Mercedes Warren Department Microbiology and Immunology -2020
Ashelyn Sidders Department Microbiology and Immunology -2019
Claire Johnson Department Microbiology and Immunology -2019
Jenna Beam Department Microbiology and Immunology -2019
Dominika Trzilova - Department of Microbiology and Immunology - 2017
Ashley Bone - Department of Microbiology and Immunology - 2016
Brandon Anjuwon-Foster - Department of Microbiology and Immunology - 2014
Brandon Linz – Department of Microbiology and Immunology - 2013
Shaun Steele – Department of Microbiology and Immunology - 2012
Nikolas, Stasulli – Department of Microbiology and Immunology - 2011
Kara Jensen - Department of Microbiology and Immunology - 2010
Cheryl Miller - Department of Microbiology and Immunology - 2010
Eliza Peterson – Department of Biochemistry - 2010
Brittany Mortenson – Department of Microbiology and Immunology - 2009
Kimberly Coggan - Department of Microbiology and Immunology - 2009

Erica Washington - Department of Biology - 2009
Todd Kijek – Department of Microbiology and Immunology - 2008
Chenchen Wang – UNC School of Pharmacy - 2007, 2008
Janelle Arthur – Department of Microbiology and Immunology - 2007
Beth Mole – Department of Microbiology and Immunology - 2006
Nicki Wagner – Department of Microbiology and Immunology - 2006
Katie Tyson - Department of Microbiology and Immunology - 2005
Leanna Nosbisch – Department of Microbiology and Immunology - 2004, 2005
Robin Craven – Department of Microbiology and Immunology - 2004
Joshua Hall – Department of Microbiology and Immunology - 2004
Emily Sterrett - Oral Biology Curriculum – 2003
Robert Fulcher - Department of Microbiology and Immunology - 2002
Samantha Elliot - Department of Microbiology and Immunology - 2001

Invited Outside Reviewer:

Dennis Wong Department of Medicine, University of British Columbia, Vancouver (2012)

Administrative Leadership Positions

2020-present Chair Education and Training Committee, Microbiology and Immunology Department
2019-present PI/Director of UNC REU Summer Undergraduate Research Experience (SURE) Program
2010-present Director UNC Department of Microbiology and Immunology Special Masters Program
2011-2016 UNC Biological and Biomedical Sciences Program (BBSP) First Year Graduate Student Group Leader
2008-2012 Co-Director of UNC REU Summer Undergraduate Research Experience (SURE) Program

Mentoring/Leadership Training and Activities:

UNC Women ADVANCE Leadership Workshop - 2021
UNC Respecting All Workshop – 2021
UNC Unconscious Bias Training - 2020
BBSP First Year Group Faculty Mentor – 2011-2015, 2019-2021
Mentoring Group Leader for the Initiative Maximizing Student Development (IMSD) – 2017-present
UNC Faculty Mentoring Workshop – 2018
Opening Doors Diversity Workshop - 2017
Women in Science Discussion Group – 2009
Mentor on Bridges Grant Program with North Carolina A&T State University – 2006-2007
Faculty Advisor for UNC Tuberculosis Awareness Group– 2004, 2005
Mentor in the Womentoring Carolina Leadership Program -2003
Mentor in the Expanding Your Horizons workshop for 7th grade girls - 2003, 2004

Mentor on Training Grants:

1) Infectious Disease Pathogenesis Research Training Grant
Director: David Margolis
NIH Grant T32AI07151

2) Medical Scientist Training Program (MSTP)
Director: Toni Darville and Mohanish Deshmukh
NIH T32 GM08719

Grant Support

Active:

1) Multi PI: Braunstein and Sacchettini
NIH R01 AI149727

A novel protein export chaperone of *Mycobacterium tuberculosis*

1/03/2020-12/31/2024 (40% effort)

This project is to determine the mechanism of a newly discovered protein export chaperone that exists in *M. tuberculosis*. This chaperone, named SatS, contributes to *M. tuberculosis* pathogenesis by promoting the delivery of a subset of virulence effectors into the host environment. The project will employ genetic, biochemical and structural techniques to define the mechanism of SatS and to identify the substrates exported by SatS.

2) PI: Braunstein
NIAID R21 AI163677-01

Effect of Microenvironment on the Activity of Mycobacteriophages for Treating *Mycobacterium abscessus*

07/01/2021-06/30/2023 (10%)

Working with matched sets of *M. abscessus* and mycobacteriophages, we will determine if mycobacteriophages can kill mycobacteria residing in macrophages, in biofilms or in normal or pathological mucus.

3) PI: Braunstein, Co-PI: Peifer

NSF Research Experience for Undergraduates (REU)

REU Site: Summer Undergraduate Research Experience in Biological Mechanisms

3/1/2021-2/29/2024 (3% effort)

This REU program will support the training of 10 students for 10 weeks during the summers of 2021-2023. The goals of the program are to inspire, train, and enhance diversity in the next generation of biological researchers by extending the research opportunities of UNC to talented undergraduates who attend other institutions.

4) PI: Cassell, G. (IDRI/PAI Life Sciences), subcontract PI: Braunstein

FY17 PMRP-Technology/Therapeutic Development Award: PR171209

DOD Peer-Reviewed Medical Research Program

2/1/2021-1/31/2023

Aerosol delivery of CPZEN-45 for treatment of nontuberculous mycobacterial (NTM) infections

This project is to develop and test an inhaled dry powder of CPZEN-45 as a treatment for NTM infections using a guinea pig model of NTM disease.

5) PI: Gonzalez-Juarrero, M (CSU), Co-PI: Braunstein
Subcontract NIH R01AI120670-01

Aerosol spectinamide-1599 therapy against tuberculosis

6/10/2016-5/31/2021 NCE (5% effort)

This project is to develop a powder formulation and inhalation therapy regimen for spectinamide-1599. The subcontract to Dr. Braunstein is to test in vivo efficacy in the guinea pig model of tuberculosis.

6) PI: Rao, Co-I: Braunstein
UNC Center For AIDS Research Supplement

The relationship between pyrazinamide pharmacokinetics, tuberculosis disease, and host immune responses

8/1/2019-7/31/2020 NCE (5% effort)

In this project we will use experimental data from the guinea pig model of TB disease and treatment to build a quantitative systems pharmacology (QSP) model to predict more efficacious dosing strategies that will reduce treatment time, disease relapse and emergence of drug resistant TB.

7) PI: Hickey (UNC); Co-I: Braunstein
Potts Memorial Foundation Award
A novel treatment for persistent tuberculosis

11/1/2019-10/31/2020 NCE (5%)

This project is to perform an efficacy study to evaluate inhaled pyrazinoic acid dry powders for their ability to treat tuberculosis in a guinea pig model of disease.

Pending:

PI: Braunstein
NIAID T32 AI162635-01A1

Predocctoral Training Program in Respiratory Pathogens

07/01/2021-06/30/2026 (10% effort cost-shared)

This proposal is to establish a T32 Predocctoral Training Program in Respiratory Pathogens at The University of North Carolina Chapel Hill. The mission of this program is to train the next generation of pathogenesis researchers in the skills necessary to advance our understanding of respiratory infectious diseases. To achieve this mission we will do the following: 1) provide a diverse cohort of predocctoral students with in-depth, rigorous training in scientific reasoning, experimental approach, and knowledge of respiratory pathogens and infectious diseases; 2) bring together basic, translational, and physician scientists with expertise in respiratory viruses, bacteria, and immunology to provide an integrated multidisciplinary training experience; and 3) provide students with professional skills training and career awareness opportunities.

Completed Grant Support from past 10 years:

1) PI: Braunstein

Cystic Fibrosis Foundation Unfunded Award -Bridge Award

Investigation of bacteriophages to treat NTM infection in cystic fibrosis

04/01/2021-03/31/2023 (8%)

Working with matched sets of *M. abscessus* and mycobacteriophages, we will determine if mycobacteriophages can kill mycobacteria residing in macrophages, in biofilms or in normal or pathological mucus. This award was terminated once NIAID funding on the same project was obtained.

1) Multi PI: Braunstein and Hickey (RTI)

NIH R21AI131241

Inhaled pyrazinoic acid therapy for tuberculosis

7/14/2017-6/30/2019

This project is to perform a PK study of inhaled pyrazinoic acid in guinea pigs and to test the efficacy of this formulation in an animal model of tuberculosis disease.

2) PI: Braunstein

NIH R21 AI135899

Systematic analysis of components of mycobacterial Mce transporters

1/7/2018-12/31/2019

We will use the *M. smegmatis* Mce4 transporter as a model system to characterize the mechanism of Mce transporters, which are a new family of lipid uptake systems that function in pathogenesis. We will identify the core Mce components and functional residues and domains in these proteins. We will also identify protein interactions and Mce transporter complexes in mycobacteria.

3) Multi PI: Braunstein and Bowers (UNC)

NIH R21AI138058

Dual mechanism thiopeptide analogs for TB drug development

5/10/2018-4/30/2020

We will revisit the therapeutic potential of thiopeptides for tuberculosis therapy. We will use our innovative chemoenzymatic approach to thiopeptide synthesis to produce non-natural thiopeptide analogs with improved aqueous solubility. Analogs will be tested for activity against *M. tuberculosis* in vitro and for autophagy inducing activity on macrophages. Quantitative structure-activity relationship modeling will inform subsequent rounds of synthesis and improvement. The most tractable compounds for will be tested for efficacy on *M. tuberculosis* infected macrophages.

4) PI: Eakins, S (Collaborations Phamaceuticals, Inc); Subcontract PI: Braunstein

FY17 PRMRP-Discovery Award: W81XWH-17-PRMRP-DA

DOD Peer-Reviewed Medical Research Program – Discovery Award

Novel inhaled antibody-drug conjugates for treating tuberculosis

9/30/2018-9/29/2019

This project is to synthesize and test the efficacy of inhaled antibody-drug conjugates for treating *M. tuberculosis* in primary guinea pig macrophages and the guinea pig model of disease.

5) PI: Gonzalez-Juarrero, M (CSU); Co-PI: Braunstein

Supplement to Subcontract NIH R01AI120670-01

Aerosol spectinomamide-1599 therapy against tuberculosis

Establishing a model for testing inhaled therapies on Mtb Erdman infected guinea pigs

6/1/2017-5/31/2018

The current model for testing inhaled therapies on Mtb infected guinea pigs utilizes animals chronically infected with the H37Rv strain of Mtb. This administrative supplement is to establish a model to additionally enable testing of inhaled therapies on guinea pigs infected with the Erdman strain of *M. tuberculosis*.

6) PI: Braunstein

Potts Memorial Foundation

Assigning function to exported virulence factors of *Mycobacterium tuberculosis*: the role of Rv0199 as an orphaned Mce-associated protein.

1/1/16-12/31/16

This project is to develop approaches for studying the roles of *M. tuberculosis* exported virulence factors of unknown function.

7) PI: Braunstein

Burroughs Wellcome Fund

Investigators in the Pathogenesis of Infectious Disease Award

Identification of *In Vivo*-Secreted Proteins of *Mycobacterium tuberculosis* with Roles in Host-Pathogen Interactions.

7/1/2008-6/30/2015

The proposed research seeks to identify proteins secreted by *M. tuberculosis* only during infection of mice. Such *in vivo*-secreted proteins are strong candidates for being factors that manipulate the host, and they will be further studied for roles in virulence.

Experiments to identify interacting host proteins will also be undertaken.

8) Multi-PI: Braunstein and Hickey (RTI)

NCTraCS

Development of Aerosol Delivered Pyrazinoic Acid Esters as a Novel Therapy for Treating Tuberculosis

7/1/2015-6/30/2016

This project is to formulate pyrazinoic acid esters as dry powders suitable for inhalation therapy and to compare the efficacy of dry powder formulations versus liquid formulations in treating *M. tuberculosis* infected guinea pigs.

9) PI: Braunstein

UNC Senior Faculty Research and Scholarly Leave Award

7/1/2015-5/31/2016

This award supported a sabbatical visit to California Institute for Biomedical Research (Calibr) LaJolla CA to work in their tuberculosis drug discovery group.

10) PI: Braunstein

RTI (Research Triangle International) University Scholar

1/1/2016-6/30/2016

This award supported a sabbatical visit to RTI Research Triangle Park NC to work in their Discovery Sciences division.

11) PI: Braunstein

NIH R01 AI099969-01

Developing High-Throughput Assays for *M. tuberculosis* Tat Pathway Inhibitors

3/1/2012-2/28/2015

This research project will develop robust high-throughput screening (HTS) assays for identifying inhibitors of the *M. tuberculosis* Tat pathway. Whole-cell phenotypic assays will be developed using a primary screen dependent on the β -lactam sensitivity of *tat* mutants.

12) Multi-PI: Braunstein and Frye

NIH R21/R33 AI111667-01

Targeting SecA1 of *Mycobacterium tuberculosis* for Novel Drug Development

3/1/14 – 2/26/16

We will develop whole-cell assays that can be used in quantitative high-throughput screening (qHTS) for identifying inhibitors of *M. tuberculosis* SecA1.

13) PI: Braunstein

NIH RO1 AI54540-01

Protein Secretion Pathways of *Mycobacterium tuberculosis*

1/1/04-6/30/14

The proposed research will characterize the SecA2 protein export pathway of *M. tuberculosis*. It will investigate the role of SecA2 in limiting host responses and in promoting *M. tuberculosis* growth in macrophages and mice. It will also characterize SecA2 function by determining its role in localizing newly identified cell envelope proteins and identifying SecA2-interacting proteins.

14) Multi-PI: Braunstein and Hickey(RTI)

Subcontract NIH R01 AI091882-01

Inhaled Caprazamycin for Tuberculosis Therapy

8/1/2011-7/31/2014

Evaluation of a new drug derived from caprazamycin (CPZEN) delivered as an aerosol in the treatment of tuberculosis in the guinea pig model of infection.

15) Multi-PI: Braunstein and Hickey (RTI)

ACTG Supplement for HIV/AIDS and TB-FY2012

Inhaled Pyrazinoic Acid Esters for the Treatment of Tuberculosis

1/1/2013-12/31/2013

Production and efficacy testing of aerosols of pyrazinoic acid esters for the treatment of tuberculosis in a guinea pig model of infection.

16) PI: Swanstrom; Program Director: Braunstein

NIH Center For Aids Research (CFAR) Administrative Supplement

HIV-TB co-infection of macrophages: Impact on *Mtb* and antigen presentation

9/01/2012- 8/31/2013

Both HIV and *Mycobacterium tuberculosis* (*Mtb*) are known to infect macrophages, but little is known about how HIV-infection of macrophages influences the course of *Mtb* infection. In the proposed work we will develop a well-defined model for studying HIV-*Mtb* co-infection of macrophages. We will then use this model to test our hypothesis that HIV infection of macrophages promotes *Mtb* intracellular replication and reduces surface localization of macrophage receptors that are important to *Mtb* antigen presentation.

Grants to support members of my laboratory:

NIH Infectious Disease Pathogenesis Research T32AI07151

Award to Post-doctoral Fellow Alan Schmalstig (8/1/21 – 7/31/23)

UNC Graduate School Dissertation Completion Fellowship

Award to PhD student Brittany Miller (8/31/16-4/30/17)

UNC Graduate School Dissertation Completion Fellowship

Award to PhD student Kate Zulauf (8/31/16-4/30/17)

Society of Fellows - Dissertation Completion Fellowship UNC Graduate School

Award to PhD student Ellen Perkowski (8/31/14 – 4/30/15)

Society of Fellows - Dissertation Completion Fellowship UNC Graduate School

Award to PhD student Jessica McCann (8/31/08 – 4/30/09)

Morehead Fellowship UNC

Award to PhD student Jon Tabb Sullivan (8/17/06-8/31/11)

Society of Fellows - Dissertation Completion Fellowship UNC Graduate School

Award to PhD student Justin McDonough (8/31/06 – 4/30/07)

NIH Infectious Disease Pathogenesis Research T32AI07151

Award to Post-doctoral Fellow Henry S. Gibbons (1/1/06 – 12/31/07)

NIH Cell and Molecular Biology Training Grant T32GM008581

Award to PhD student Jessica McCann (8/1/04-3/31/06)

NIH Training in Sexually Transmitted Diseases and AIDS Grant T32AI07001

Award to PhD student Justin McDonough (11/1/03-11/31/05)

Heiser Program for Research in Leprosy and Tuberculosis

Award to Postdoctoral Fellow Henry S. Gibbons (10/6/03-10/5/05)

National Institute of Health NRSA F32AI10578

Award to Clinical Fellow Yoshi Murata (3/1/02-3/19/03)

Professional Service

Editorial Board Membership:

2013-present Editorial Board *Journal of Bacteriology*

2014-2017 Editorial Advisory Board *Molecular Microbiology*

2012-2017 Associate Editor *Microbiology Journal of the Society for General Microbiology*

Reviewer for Journals: *eLIFE, Science, Proceedings of the National Academy of Sciences, MBio, Journal of Clinical Investigation, PLoS Pathogens, PLoS Biology, Molecular Microbiology, Infection and Immunity, Journal of Infectious Disease, Journal of Bacteriology, Tuberculosis, Microbiology, Frontiers in Microbiology, PLoS One, Proteomics, Cellular Microbiology, Analytical Biochemistry, BMC Microbiology, FEMS Microbiology Letters, Microbes and Infection*

NIH Grant Review Panels:

2021 NIH DDR Study Section

2020 NIH Bacterial Pathogenesis Special Emphasis Panel ZRG1 IDM Y 02

2013-2019 Member NIH BACP Bacterial Pathogenesis Study Section

2005, 2006, 2008, 2009, 2010, 2011, 2012 NIH ZRG1 IDM-A 80 Topics in Bacterial Pathogenesis Study Section

2011 NIH PCMB Prokaryotic Molecular and Cell Biology Study Section

2011 NIH RFA Study Section Chemical Approaches to Target Validation for Drug Resistant Pathogens

2010 NIH Special Emphasis Panel/Scientific Review Group ZRG1 IDM-A (02)

2009 NIH Special Emphasis Panel/Scientific Review Group ZRG1 IDM-A (03)

2003 NIH BM1 Study Section

Other Grant Review Panels:

2018 UK Future Leaders Fellowship (MRC)

2016 Netherlands Organisation for Scientific Research (NWO)

2014 Sigma Delta Epsilon Graduate Women in Science Fellowship

2012 Netherlands Organisation for Health Research and Development (ZonMw)

2011 Netherlands Genomics Initiative; Horizon Programme

2009, 2013 Medical Research Council (MRC), UK

2007, 2009 National Science Foundation

2006 Michael Smith Foundation for Health Research

2005 Veterans Affairs Infectious Diseases

2003, 2010 Wellcome Trust

Meeting Organizer and Society Positions:

2005, 2008, 2010, 2012, 2014, 2017 Organizer Southeastern Mycobacteria Meeting
2020

2010, 2011, 2012 Chair-elect, Chair, Councilor American Society of Microbiology Division U

UNC Service/Committees:

2021-present Department of Microbiology & Immunology Faculty Search Committee
2021-present Chemical Biology Interface T32 Training Program Advisory Committee
2020-present Infectious Disease Pathogenesis T32 Advisory Committee
2020 Chair Education & Training Committee Microbiology & Immunology Department
2019-2021 Post-tenure Review Committee School of Medicine
2019-2020 Department of Microbiology & Immunology Retreat Committee
2019-present Department of Microbiology & Immunology Trainee Award Committee
2019 Department of Microbiology & Immunology Manire Award Selection Committee
2018 School of Medicine LCME Faculty Subcommittee
2018 School of Medicine Strategic Plan Immunology and Infectious Disease Working Group
2018-present Manire Award Department of Microbiology & Immunology selection committee
2018-present Foundation Paper Selection Committee for Microbiology & Immunology Preliminary Exam
2018 UNC Committee to select Searle, Pew and Mallinckrodt applicants
2017 Post-tenure Review Committee School of Medicine
2017 Initiative for Maximizing Student Diversity (IMSD) Advisory Committee
2017-present Faculty mentor for IMSD cohort
2016-present Microbiology & Immunology Graduate Studies Advisory Committee
2016 Chancellor's Scholars Interview Committee
2016 Boka Hadzija Graduate Student Award Selection Committee
2014 School of Medicine Advisory Committee for Faculty Affairs
2014-2015 Department of Microbiology & Immunology Faculty Search Committee
2014 School of Medicine Bridge Funding Review Panel
2013-2016 School of Medicine Committee to Review Appointments and Promotions to Associate Professor
2010-present Postbaccalaureate Research Education Program (PREP) Advisory Committee
2013 Department of Microbiology and Immunology Manire Award Selection Committee
2010-2013 School of Medicine Office of Research – Faculty at Large
2012 Program in Molecular Biology and Biotechnology (PMBB) Director Search Committee
2012-2013 Internal Review Panel for Howard Hughes Medical Institute International Student Research Fellowships
2011-2012 School of Medicine Strategic Planning Committee: Task Force 1
2008-2011 Biological and Biomedical Sciences Program (BBSP)
First Year Faculty Mentor
2010-2011 Liason Committee on Medical Education (LCME)

2007-2011 Organizer of UNC Bacteriology Research in Progress
2006-2011 Institutional Biosafety Committee
2008-2009 Department of Microbiology & Immunology Faculty Search Committee
2005-2009 Department of Microbiology & Immunology and BBSP Admissions Committee
2006-2008 Center For Aids Research (CFAR) Faculty Search Committee
2004-2006 Genetics Curriculum First Year Student Advisor
2004-2006 Department of Microbiology & Immunology Rotation Report Committee
2004-2006 Undergraduate Research Committee for the Quality Enhancement Plan at UNC/Southern Association of Colleges and Schools (SACS) Reaccreditation
2005 Cell and Molecular Biology Collaborative Research Grant Review
2005 Department of Microbiology & Immunology Retreat Organizing Committee
2002-2003 Department of Microbiology & Immunology Seminar Committee
2002-2003 Department of Microbiology & Immunology Faculty Search Committee
2002-2003 Interdisciplinary Program in Biomedical Science (IBMS) First Year Student Advisor
2002-present Founder and Organizer of Tuberculosis Duke UNC (TB-DUNC) Group
2001-present Center for Aids Research - Tuberculosis Working Group

Consultant:

Becton Dickinson and Company, NJ –

To provide guidance relating to procedures for handling *Mycobacterium tuberculosis*

Professional Societies:

American Association for the Advancement of Science

American Society for Microbiology

American Society for Biochemistry and Molecular Biology