Brian Muchmore

Resident Physician

Resident in the combined Pediatrics-Medical Genetics program at the University of Michigan, Ann Arbor.

Skills

- 10,000+ hours of laboratory bench work experience.
- 10,000+ hours of data science experience with working proficiency in R, Bash, and Python.
- Professional proficiency using Docker, Traefik and Guacamole.

Education

08/2017-05/2021 **M.D.**, *Robert Larner, M.D., College of Medicine at the University of Vermont*, Burlington, Vermont.

09/2009-09/2012 **B.S. in Pre-medicine**, *University of Maryland*, College Park, Maryland.

08/2002-06/2006 **B.A. in Russian Studies**, *Bates College*, Lewiston, Maine.

Lapses in Training

05/24/2021-06/20/2021 **Period between medical school graduation and the beginning of residency**.

Awards

05/2020 **Jerold and Ingela Lucey Early Career Investigator Prize for Innovations in Infant or Child Health**.

Certification/Licensure

10/2018 **Basic Life Support**.

11/2021 **Advanced Cardiovascular Life Support**.

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Volunteer Experience

08/2012-08/2016 **Camp Fantastic**, *Volunteer at a sleep-away camp for children with cancer, which is sponsored by the NIH and run by the organization Special Love*, Front Royal, Virginia.

Work Experience

01/2016-01/2021 **CodoniX**, *Real-time reporting and data mining of Codonix's terabyte-plus of patient data*, Potomac, Maryland.

Research Experience

01/2015-01/2019 **Research Fellow at GENyO in the laboratory of Dr. Marta Alarcón-Riquelme**, *Lead bioinformatician for the PRECISESADS Flow Cytometry Study Group, which was a subgroup of a multi-national andmulti-institutional project to find clinically useful biomarkers for systemic autoimmune diseases. Also, lead bioinformatician andco-laboratory leader of Spain's first CyTOF/Helios core facility*, Granada, Spain.

05/2018-05/2018 **CyTOF/CODEX Course Attendee**, *Was a participant in the 2018 CyTOF/CODEX mini-course held by the Nolan laboratory at Stanford University in order to help set-up Spain's first CyTOF/Helios core facility. Airfare, accommodation and training fees were provided by the PRECISESADS project*, Palo Alto, California.

01/2013-01/2014 **Research Fellow at Chulalongkorn University in the laboratory of Dr. Yong Poovorawan**, *Evolutionary analysis of SNPs and INDELs using ancient genomes and 1000 genomes data*, Bangkok, Thailand.

09/2009-09/2012 **Cancer Research Training Award Fellow at the National Institutes of Health in the laboratory of Dr. Ludmila Prokunina-Olsson**, *Functional investigation of GWAS cancer signals associated with HCV-related traits and bladder cancer*, Bethesda, Maryland.

05/2009-09/2009 **Research Internship at the National Institutes of Health in the laboratory of Dr. Alasdair Steven**, *Cloned mutants of the fungal prion protein Het-s for analysis of structural motifs with electron microscopy*, Bethesda, Maryland.

Publications

1. Muchmore, B., Muchmore, P., Lee, C. W., Alarcon-Riquelme, M. E., & Muchmore, A. (2020). Tracking potential COVID-19 outbreaks with influenzalike symptoms urgent care visits. *Pediatrics*, *146*(4). https://doi.org/10.1542/peds.2020-1798

2. Onabajo, O. O., Muchmore, B., & Prokunina-Olsson, L. (2019). The IFN-L4 conundrum: When a good interferon goes bad. *Journal of Interferon & Cytokine Research*, *39*(10), 636–641. https://doi.org/10.1089/jir.2019.0044
3. Muchmore, B., & Alarcon-Riquelme, M. E. (2017). CymeR: Cytometry analysis using KNIME, docker and r. *Bioinformatics*, *33*(5), 776–778. https://doi.org/10.1093/bioinformatics/btw707
4. Fu, Y.-P., Kohaar, I., Moore, L. E., Lenz, P., Figueroa, J. D., Tang, W., Porter-Gill, P., Chatterjee, N., Scott-Johnson, A., Garcia-Closas, M., Muchmore, B., Baris, D., Paquin, A., Ylaya, K., Schwenn, M., Apolo, A. B., Karagas, M. R., Tarway, M., Johnson, A., … Prokunina-Olsson, L. (2014). The 19q12 bladder cancer GWAS signal: Association with cyclin e function and aggressive disease. *Cancer Research*, *74*(20), 5808–5818. https://doi.org/10.1158/0008-5472.CAN-14-1531
5. Prokunina-Olsson, L., Muchmore, B., Tang, W., Pfeiffer, R. M., Park, H., Dickensheets, H., Hergott, D., Porter-Gill, P., Mumy, A., Kohaar, I., Chen, S., Brand, N., Tarway, M., Liu, L., Sheikh, F., Astemborski, J., Bonkovsky, H. L., Edlin, B. R., Howell, C. D., … O-Brien, T. R. (2013). A variant upstream of IFNL3 (IL28B) creating a new interferon gene IFNL4 is associated with impaired clearance of hepatitis c virus. *Nature Genetics*, *45*(2), 164–171. https://doi.org/10.1038/ng.2521
6. Park, H., Serti, E., Eke, O., Muchmore, B., Prokunina-Olsson, L., Capone, S., Folgori, A., & Rehermann, B. (2012). IL-29 is the dominant type III interferon produced by hepatocytes during acute hepatitis c virus infection. *Hepatology*, *56*(6), 2060–2070. https://doi.org/10.1002/hep.25897
7. Fu, Y.-P., Kohaar, I., Rothman, N., Earl, J., Figueroa, J. D., Ye, Y., Malats, N., Tang, W., Liu, L., Garcia-Closas, M., Muchmore, B., Chatterjee, N., Tarway, M., Kogevinas, M., Porter-Gill, P., Baris, D., Mumy, A., Albanes, D., Purdue, M. P., … Prokunina-Olsson, L. (2012). Common genetic variants in the PSCA gene influence gene expression and bladder cancer risk. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(13), 4974–4979. https://doi.org/10.1073/pnas.1202189109
8. Shebl, F. M., Pfeiffer, R. M., Buckett, D., Muchmore, B., Chen, S., Dotrang, M., Prokunina-Olsson, L., Edlin, B. R., & O-Brien, T. R. (2011). IL28B rs12979860 genotype and spontaneous clearance of hepatitis c virus in a multi-ethnic cohort of injection drug users: Evidence for a supra-additive association. *The Journal of Infectious Diseases*, *204*(12), 1843–1847. https://doi.org/10.1093/infdis/jir647
9. Musunuru, K., Strong, A., Frank-Kamenetsky, M., Lee, N. E., Ahfeldt, T., Sachs, K. V., Li, X., Li, H., Kuperwasser, N., Ruda, V. M., Pirruccello, J. P., Muchmore, B., Prokunina-Olsson, L., Hall, J. L., Schadt, E. E., Morales, C. R., Lund-Katz, S., Phillips, M. C., Wong, J., … Rader, D. J. (2010). From noncoding variant to phenotype via SORT1 at the 1p13 cholesterol locus. *Nature*, *466*(7307), 714–719. https://doi.org/10.1038/nature09266

PRECISESADS Flow Cytometry Study Group Collaborations

1. Simon, Q., Grasseau, A., Boudigou, M., Le Pottier, L., Bettachioli, E., Cornec, D., Rouviere, B., Jamin, C., Le Lann, L., Borghi, M. O., Aguilar-Quesada, R., Renaudineau, Y., Alarcon-Riquelme, M. E., Pers, J.-O., & Hillion, S. (2021). A cytokine network profile delineates a common Th1/Be1 pro-inflammatory group of patients in four systemic autoimmune diseases. *Arthritis & Rheumatology*. https://doi.org/10.1002/art.41697

2. Bossini-Castillo, L., Villanueva-Martin, G., Kerick, M., Acosta-Herrera, M., Lopez-Isac, E., Simeon, C. P., Ortego-Centeno, N., Assassi, S., Hunzelmann, N., Gabrielli, A., de Vries-Bouwstra, J. K., Allanore, Y., Fonseca, C., Denton, C. P., Radstake, T. R., Alarcon-Riquelme, M. E., Beretta, L., Mayes, M. D., & Martin, J. (2021). Genomic risk score impact on susceptibility to systemic sclerosis. *Annals of the Rheumatic Diseases*, *80*(1), 118–127. https://doi.org/10.1136/annrheumdis-2020-218558
3. Beretta, L., Barturen, G., Vigone, B., Bellocchi, C., Hunzelmann, N., De Langhe, E., Cervera, R., Gerosa, M., Kovacs, L., Castro, R. O., Almeida, I., Cornec, D., Chizzolini, C., Pers, J.-O., Makowska, Z., Lesche, R., Kerick, M., Alarcon-Riquelme, M. E., & Martin, J. (2020). Genome-wide whole blood transcriptome profiling in a large european cohort of systemic sclerosis patients. *Annals of the Rheumatic Diseases*, *79*(9), 1218–1226. https://doi.org/10.1136/annrheumdis-2020-217116
4. Le Lann, L., Jouve, P.-E., Alarcon-Riquelme, M., Jamin, C., & Pers, J.-O. (2020). Standardization procedure for flow cytometry data harmonization in prospective multicenter studies. *Scientific Reports*, *10*(1), 11567. https://doi.org/10.1038/s41598-020-68468-3
5. Ruiz-Limon, P., Ortega-Castro, R., Barbarroja, N., Perez-Sanchez, C., Jamin, C., Patino-Trives, A. M., Luque-Tevar, M., Ibanez-Costa, A., Perez-Sanchez, L., de la Rosa, I. A., Abalos-Aguilera, M., Jimenez-Gomez, Y., Calvo-Gutierrez, J., Font, P., Escudero-Contreras, A., Alarcon-Riquelme, M. E., Collantes-Estevez, E., & Lopez-Pedrera, C. (2019). Molecular characterization of monocyte subsets reveals specific and distinctive molecular signatures associated with cardiovascular disease in rheumatoid arthritis. *Frontiers in Immunology*, *10*, 1111. https://doi.org/10.3389/fimmu.2019.01111

Poster Presentations

03/2017 Annals of the Rheumatic Diseases — **Muchmore, B., Le Lann, L., Jamin, C., consortium PRECISESADS, Marañon, C., Pers, J.O., & Alarcon-Riquelme, M.E.**, *02.16 Machine learning of flow cytometry data encompassing seven systemic autoimmune diseases and controls.*, Athens, Greece.

09/2013 International Cytokine and Interferon Society — **Muchmore, B., Tang, W., Porter-Gill, P., Kohaar, I., Liu, L., Brand, N., Park, H., Dickensheets, H., Sheikh, F., Rehermann, B.,Donnelly, RP., O'Brien, T.R., & Prokunina-Olsson L.**, *182 : Identification and characterization of interferon-lambda-4 (IFN-lambda-4), a novel class-2 cytokine which impairs clearance of hepatitis C virus*, San Francisco, California.

04/2011 AACR 102nd Annual Meeting — **Muchmore, B., Park, H., Dickensheets, H., O'Brien, T. R., Rehermann, B., Donnelly, R., & Prokunina-Olsson L.**, *Abstract 3751: Expression analysis of the IL28A, IL28B, IL29 and IL28L genes in primary human peripheral blood mononuclear cells and hepatocytes: Effects of activation mode, time-course and genotypes*, Orlando, Florida.

Oral Presentations

05/2020 **University of Vermont Pediatric Grand Rounds**, *Real-time monitoring of influenza and COVID-19 in urgent cares across the United States*, Burlington, Vermont.

03/2017 **PRECISESADS General Assembly**, *Real-time machine learning of OMICS data*, Suresnes, Spain.

03/2016 **Conference of Complex Diseases**, *CymeR: Cytometry analysis using KNIME, Docker and R.*, Granada, Spain.

02/2016 **KNIME Spring Summit**, *Dockerizing KNIME - Recipes for a KNIME cocktail*, Berlin, Germany.

Hobbies & Interests

Woodworking, aquaponics, soccer and the R programming language..

Language Fluency

Native English. I converse easily and accurately in all types of situations.

Basic Russian. I speak the language imperfectly and only to a limited degree and in limited situations.

Basic Spanish. I speak the language imperfectly and only to a limited degree and in limited situations.

Basic Thai. I speak the language imperfectly and only to a limited degree and in limited situations.

Other Awards/Accomplishments

01/2020 **Patent**, *NOVEL INTERFERON-(lambda)-4 (IFNL-4) PROTEIN, RELATED NUCLEIC ACID MOLECULES, AND USESTHEREOF.*, Ref: E-217-2011-1. U.S. Pat: 10,545,147.