

Frederick S. Varn, PhD

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EDUCATION AND TRAINING

Postdoctoral Associate	2018-present
The Jackson Laboratory for Genomic Medicine; Farmington, CT	
Supervised by Roel Verhaak, PhD	
Research focus: Dissecting the role of the microenvironment in glioma evolution	
PhD, Molecular and Systems Biology	2013-2018
Dartmouth College, School of Graduate and Advanced Studies; Hanover, NH	
Supervised by Chao Cheng, PhD	
Dissertation title: <i>Systematic pan-cancer analyses of the tumor immune response</i>	
MS, Quantitative Biomedical Sciences	2014-2018
Dartmouth College, School of Graduate and Advanced Studies; Hanover, NH	
BS, Biology (Highest Honors)	2009-2013
University of Florida; Gainesville, FL	
Honors thesis: <i>The role of HMGA-1 in the recruitment of RNA polymerase II to the beta-globin gene locus</i>	

GRANT SUPPORT

Jane Coffin Childs Memorial Fund for Medical Research Glioma evolution in the presence of local immune activity Role: Principal Investigator	07/01/2019-06/30/2022
T32 GM008704 Compton (PI) NIH-NIGMS Molecular and Cellular Biology at Dartmouth Training Grant Role: Appointee	07/01/2015-06/30/2017

HONORS AND AWARDS

AACR-ABTA Scholar-in-Training Award	2022
Society for Neuro-Oncology Abstract Award for Excellence in Pathology	2021
Memorial Sloan Kettering Emerging Leader in Computational Oncology	2021
AACR-Bristol Myers Squibb Scholar-in-Training Award	2021
JAX Scholar Award	2019-2021
Merck & Co. Fellow of The Jane Coffin Childs Memorial Fund for Medical Research	2019-present
Albert J. Ryan Fellowship Award	2017
Molecular and Cellular Biology at Dartmouth Fellowship Award	2013
Florida Rural Rehabilitation Corporation Scholarship	2012
University of Florida University Scholar	2012
Science for Life Howard Hughes Medical Institute Intramural Award	2011

RESEARCH EXPERIENCE

Postdoctoral Associate; The Jackson Laboratory for Genomic Medicine 2018-present

- Investigated the role of the glioma microenvironment in mediating treatment resistance
- Led the initial projects of the Glioma Longitudinal Analysis (GLASS) Consortium
- Applied genomic and microscopy-based approaches to test hypotheses on the effects of glioma-neuron and glioma-myeloid cell interactions in mediating treatment resistance
- Developed an integrated longitudinal data resource combining genomic, transcriptomic, and histopathological data from pre- and post-treatment glioma samples (synapse.org/glass)
- Coordinated a team of neuropathologists in standardized evaluation of the histopathological changes gliomas undergo following treatment
- Designed antibody panels for multiplex immunofluorescence imaging of the microenvironment
- Established data processing pipelines for the analysis of sequencing and microscopy data
- Mentored interns and early-stage postdoctoral associates in longitudinal genomic analysis
- Presented in national conferences, institutional seminars, and educational workshops
- Programming: Advanced proficiency in R and SQL, Intermediate proficiency in Python

Graduate Research Assistant; Dartmouth College 2013-2018

- Developed a novel method to infer immune infiltration from tumor gene expression data
- Applied computational tools to genomic data to characterize the tumor microenvironment
- Designed bioinformatics software pipelines for analyzing raw tumor sequencing data
- Fostered collaborative partnerships with multiple cancer laboratories at Dartmouth
- Wrote and assisted mentor in writing funding proposals
- Presented work in national conferences and program-wide seminars
- Mentored undergraduate and rotation students in computational biology and genetics

Undergraduate Research Assistant; University of Florida 2011-2013

- Characterized transcription factor recruitment to enhancer regions in a cell line model
- Cell biology techniques: Plasmid transformations, viral transfections
- Molecular biology techniques: Western blotting and qPCR

TEACHING EXPERIENCE

Teaching Assistant- Genetics (Biology 13); Dartmouth College 2015

- Led undergraduate practical laboratory sessions to class sizes of 20-30 students
- Assisted students in applying classical and molecular biology-based genetic techniques
- Held office hours to assist undergraduates and graded exams/assignments

Volunteer Tutor; University of Florida 2012-2013

- Tutored students in their studies of physics and biology
- Aided tutees in both group and private settings

Course Lectures

Cancer Genomics: A Virtual Short Course for Undergraduates; JAX 2022

Mentored Students

Gordon Ye (Undergraduate summer researcher; JAX Summer Student Program)	2021
Taylor Wade (Postbaccalaureate Intern; JAX)	2020-2022
Evelien Schaafsma (Rotating PhD student; Dartmouth)	2018
Aleksey Molodstov (Rotating PhD student; Dartmouth)	2016
Dillon Popovich (Rotating PhD student; Dartmouth)	2016

PROFESSIONAL ACTIVITIES

The Society for Neuro-Oncology- Member	2019-Present
American Association for Cancer Research- Associate Member	2017-Present
Molecular and Cellular Biology Graduate Committee (Dartmouth)- Student Representative	2016-2017

Ad-Hoc Reviewer for: Genome Medicine, Cell Reports, Oncogene, Acta Neuropathologica Communications, Neuro-Oncology Advances, Briefings in Bioinformatics, Cancer Communications, Scientific Data, Scientific Reports, Cancers, Frontiers in Oncology

SCHOLARSHIP

Original Research Publications (most recent first)*First author*

1. **Varn FS**, Johnson KC, Martinek J, Huse JT, Nasrallah MP, Wesseling P, Cooper LAD, Malta TM, Wade TE, Sabedot TS, Brat D, Gould PV, Woehrer A, Aldape K, Ismail A, Sivajothi SK, Barthel FP, Kim H, Kocakavuk E, Ahmed N, White K, Datta I, Moon HE, Pollock S, Goldfarb C, Lee GH, Garofano L, Anderson KJ, Nehar-Belaid D, Barnholtz-Sloan JS, Bakas S, Byrne AT, D'Angelo F, Gan HK, Khasraw M, Migliozi S, Ormond DR, Paek SH, Van Meir EG, Walenkamp AME, Watts C, Weiss T, Weller M, Palucka K, Stead LF, Poisson LM, Noushmehr H, Iavarone A, Verhaak RGW, Consortium G. Glioma progression is shaped by genetic evolution and microenvironment interactions. *Cell*. 2022;185(12):2184-99 e16. Epub 20220531. doi: 10.1016/j.cell.2022.04.038. PubMed PMID: 35649412; PMCID: PMC9189056.
2. **Varn FS**, Wang Y, Cheng C. A B cell-derived gene expression signature associates with an immunologically active tumor microenvironment and response to immune checkpoint blockade therapy. *Oncoimmunology*. 2019;8(1):e1513440. Epub 2018/12/14. doi: 10.1080/2162402X.2018.1513440. PubMed PMID: 30546953; PMCID: PMC6287894.
3. **Varn FS**, Schaafsma E, Wang Y, Cheng C. Genomic Characterization of Six Virus-Associated Cancers Identifies Changes in the Tumor Immune Microenvironment and Altered Genetic Programs. *Cancer Res*. 2018;78(22):6413-23. Epub 2018/09/27. doi: 10.1158/0008-5472.CAN-18-1342. PubMed PMID: 30254145; PMCID: PMC6239894.
4. **Varn FS**, Tafe LJ, Amos CI, Cheng C. Computational immune profiling in lung adenocarcinoma reveals reproducible prognostic associations with implications for immunotherapy. *Oncoimmunology*. 2018;7(6):e1431084. Epub 2018/06/07. doi: 10.1080/2162402X.2018.1431084. PubMed PMID: 29872556; PMCID: PMC5980421.
5. **Varn FS**, Wang Y, Mullins DW, Fiering S, Cheng C. Systematic Pan-Cancer Analysis Reveals Immune Cell Interactions in the Tumor Microenvironment. *Cancer Res*. 2017;77(6):1271-82. doi: 10.1158/0008-5472.CAN-16-2490. PubMed PMID: 28126714.
6. **Varn FS**, Andrews EH, Mullins DW, Cheng C. Integrative analysis of breast cancer reveals prognostic haematopoietic activity and patient-specific immune response profiles. *Nat Commun*. 2016;7:10248. doi: 10.1038/ncomms10248. PubMed PMID: 26725977; PMCID: PMC4725766.
7. **Varn FS**, Andrews EH, Cheng C. Systematic analysis of hematopoietic gene expression profiles for prognostic prediction in acute myeloid leukemia. *Sci Rep*. 2015;5:16987. doi: 10.1038/srep16987. PubMed PMID: 26598031; PMCID: PMC4657053.

8. **Varn FS**, Ung MH, Lou SK, Cheng C. Integrative analysis of survival-associated gene sets in breast cancer. *BMC Med Genomics*. 2015;8:11. doi: 10.1186/s12920-015-0086-0. PubMed PMID: 25881247; PMCID: PMC4359519.

Co-authorship

9. Najem H, Ott M, Kassab C, Rao A, Rao G, Marisetty A, Sonabend AM, Horbinski C, Verhaak R, Shankar A, Krishnan SN, **Varn FS**, Arrieta VA, Gupta P, Ferguson SD, Huse JT, Fuller GN, Long JP, Winkowski DE, Freiberg BA, James CD, Plataniias LC, Lesniak MS, Burks JK, Heimberger AB. Central nervous system immune interactome is a function of cancer lineage, tumor microenvironment, and STAT3 expression. *JCI Insight*. 2022;7(9). Epub 20220509. doi: 10.1172/jci.insight.157612. PubMed PMID: 35316217; PMCID: PMC9090258.
10. Johnson KC, Anderson KJ, Courtois ET, Gujar AD, Barthel FP, **Varn FS**, Luo D, Seignon M, Yi E, Kim H, Estecio MRH, Zhao D, Tang M, Navin NE, Maurya R, Ngan CY, Verburg N, de Witt Hamer PC, Bulsara K, Samuels ML, Das S, Robson P, Verhaak RGW. Single-cell multimodal glioma analyses identify epigenetic regulators of cellular plasticity and environmental stress response. *Nat Genet*. 2021;53(10):1456-68. Epub 2021/10/02. doi: 10.1038/s41588-021-00926-8. PubMed PMID: 34594038; PMCID: PMC8570135.
11. Kocakavuk E, Anderson KJ, **Varn FS**, Johnson KC, Amin SB, Sulman EP, Lolkema MP, Barthel FP, Verhaak RGW. Radiotherapy is associated with a deletion signature that contributes to poor outcomes in patients with cancer. *Nat Genet*. 2021;53(7):1088-96. Epub 2021/05/29. doi: 10.1038/s41588-021-00874-3. PubMed PMID: 34045764.
12. Gromeier M, Brown MC, Zhang G, Lin X, Chen Y, Wei Z, Beaubier N, Yan H, He Y, Desjardins A, Herndon JE, 2nd, **Varn FS**, Verhaak RG, Zhao J, Bolognesi DP, Friedman AH, Friedman HS, McSherry F, Muscat AM, Lipp ES, Nair SK, Khasraw M, Peters KB, Randazzo D, Sampson JH, McLendon RE, Bigner DD, Ashley DM. Very low mutation burden is a feature of inflamed recurrent glioblastomas responsive to cancer immunotherapy. *Nat Commun*. 2021;12(1):352. Epub 2021/01/15. doi: 10.1038/s41467-020-20469-6. PubMed PMID: 33441554; PMCID: PMC7806846.
13. Schaafsma E, Zhao Y, Wang Y, **Varn FS**, Zhu K, Yang H, Cheng C. Whole transcriptome signature for prognostic prediction (WTSP): application of whole transcriptome signature for prognostic prediction in cancer. *Lab Invest*. 2020. Epub 2020/03/08. doi: 10.1038/s41374-020-0413-8. PubMed PMID: 32144347.
14. Amin SB, Anderson KJ, Boudreau CE, Martinez-Ledesma E, Kocakavuk E, Johnson KC, Barthel FP, **Varn FS**, Kassab C, Ling X, Kim H, Barter M, Lau CC, Ngan CY, Chapman M, Koehler JW, Long JP, Miller AD, Miller CR, Porter BF, Rissi DR, Mazcko C, LeBlanc AK, Dickinson PJ, Packer RA, Taylor AR, Rossmeisl JH, Jr., Woolard KD, Heimberger AB, Levine JM, Verhaak RGW. Comparative Molecular Life History of Spontaneous Canine and Human Gliomas. *Cancer Cell*. 2020;37(2):243-57 e7. Epub 2020/02/13. doi: 10.1016/j.ccell.2020.01.004. PubMed PMID: 32049048; PMCID: PMC7132629.
15. Xie F, Zhang J, Wang J, Reuben A, Xu W, Yi X, **Varn FS**, Ye Y, Cheng J, Yu M, Wang Y, Liu Y, Xie M, Du P, Ma K, Ma X, Zhou P, Yang S, Chen Y, Wang G, Xia X, Liao Z, Heymach JV, Wistuba II, Futreal PA, Ye K, Cheng C, Xia T. Multifactorial Deep Learning Reveals Pan-Cancer Genomic Tumor Clusters with Distinct Immunogenomic Landscape and Response to Immunotherapy. *Clin Cancer Res*. 2020;26(12):2908-20. Epub 2020/01/09. doi: 10.1158/1078-0432.CCR-19-1744. PubMed PMID: 31911545; PMCID: PMC7299824.
16. Barthel FP, Johnson KC, **Varn FS**, Moskalik AD, Tanner G, Kocakavuk E, Anderson KJ, Abiola O, Aldape K, Alfaro KD, Alpar D, Amin SB, Ashley DM, Bandopadhyay P, Barnholtz-Sloan JS, Beroukhim R, Bock C, Brastianos PK, Brat DJ, Brodbelt AR, Bruns AF, Bulsara KR, Chakrabarty

- A, Chakravarti A, Chuang JH, Claus EB, Cochran EJ, Connelly J, Costello JF, Finocchiaro G, Fletcher MN, French PJ, Gan HK, Gilbert MR, Gould PV, Grimmer MR, Iavarone A, Ismail A, Jenkinson MD, Khasraw M, Kim H, Kouwenhoven MCM, LaViolette PS, Li M, Lichter P, Ligon KL, Lowman AK, Malta TM, Mazor T, McDonald KL, Molinaro AM, Nam DH, Nayyar N, Ng HK, Ngan CY, Niclou SP, Niers JM, Noushmehr H, Noorbakhsh J, Ormond DR, Park CK, Poisson LM, Rabadan R, Radlwimmer B, Rao G, Reifenberger G, Sa JK, Schuster M, Shaw BL, Short SC, Smitt PAS, Sloan AE, Smits M, Suzuki H, Tabatabai G, Van Meir EG, Watts C, Weller M, Wesseling P, Westerman BA, Widhalm G, Woehrer A, Yung WKA, Zadeh G, Huse JT, De Groot JF, Stead LF, Verhaak RGW, Consortium G. Longitudinal molecular trajectories of diffuse glioma in adults. *Nature*. 2019;576(7785):112-20. Epub 20191120. doi: 10.1038/s41586-019-1775-1. PubMed PMID: 31748746; PMCID: PMC6897368.
17. Zhao Y, Carter R, Natarajan S, **Varn FS**, Compton DA, Gawad C, Cheng C, Godek KM. Single-cell RNA sequencing reveals the impact of chromosomal instability on glioblastoma cancer stem cells. *BMC Med Genomics*. 2019;12(1):79. Epub 2019/06/04. doi: 10.1186/s12920-019-0532-5. PubMed PMID: 31151460; PMCID: PMC6545015.
 18. Deng J, Li J, Sarde A, Lines JL, Lee YC, Qian DC, Pechenick DA, Manivanh R, Le Mercier I, Lowrey CH, **Varn FS**, Cheng C, Leib DA, Noelle RJ, Mabaera R. Hypoxia-Induced VISTA Promotes the Suppressive Function of Myeloid-Derived Suppressor Cells in the Tumor Microenvironment. *Cancer Immunol Res*. 2019;7(7):1079-90. Epub 2019/05/16. doi: 10.1158/2326-6066.CIR-18-0507. PubMed PMID: 31088847; PMCID: PMC6606337.
 19. Shee K, Jiang A, **Varn FS**, Liu S, Traphagen NA, Owens P, Ma CX, Hoog J, Cheng C, Golub TR, Straussman R, Miller TW. Cytokine sensitivity screening highlights BMP4 pathway signaling as a therapeutic opportunity in ER(+) breast cancer. *FASEB J*. 2019;33(2):1644-57. Epub 2018/08/31. doi: 10.1096/fj.201801241R. PubMed PMID: 30161001; PMCID: PMC6338642.
 20. Shee K, Yang W, Hinds JW, Hampsch RA, **Varn FS**, Traphagen NA, Patel K, Cheng C, Jenkins NP, Kettenbach AN, Demidenko E, Owens P, Faber AC, Golub TR, Straussman R, Miller TW. Therapeutically targeting tumor microenvironment-mediated drug resistance in estrogen receptor-positive breast cancer. *J Exp Med*. 2018;215(3):895-910. doi: 10.1084/jem.20171818. PubMed PMID: 29436393; PMCID: PMC5839765.
 21. Zhao Y, **Varn FS**, Cai G, Xiao F, Amos CI, Cheng C. A P53-Deficiency Gene Signature Predicts Recurrence Risk of Patients with Early-Stage Lung Adenocarcinoma. *Cancer Epidemiol Biomarkers Prev*. 2018;27(1):86-95. doi: 10.1158/1055-9965.EPI-17-0478. PubMed PMID: 29141854; PMCID: PMC5839302.
 22. Mark KMK, **Varn FS**, Ung MH, Qian F, Cheng C. The E2F4 prognostic signature predicts pathological response to neoadjuvant chemotherapy in breast cancer patients. *BMC Cancer*. 2017;17(1):306. doi: 10.1186/s12885-017-3297-2. PubMed PMID: 28464832; PMCID: PMC5414335.
 23. Ung MH, Wang GL, **Varn FS**, Cheng C. Application of pharmacologically induced transcriptomic profiles to interrogate PI3K-Akt-mTOR pathway activity associated with cancer patient prognosis. *Oncotarget*. 2016. doi: 10.18632/oncotarget.11776. PubMed PMID: 27589846.
 24. Cheng C, Lou S, Andrews EH, Ung MH, **Varn FS**. Integrative Genomic Analyses Yield Cell-Cycle Regulatory Programs with Prognostic Value. *Mol Cancer Res*. 2016;14(4):332-43. doi: 10.1158/1541-7786.MCR-15-0368. PubMed PMID: 26856934; PMCID: PMC5033644.
 25. Ung MH, **Varn FS**, Cheng C. IDEA: Integrated Drug Expression Analysis-Integration of Gene Expression and Clinical Data for the Identification of Therapeutic Candidates. *CPT Pharmacometrics Syst Pharmacol*. 2015;4(7):415-25. doi: 10.1002/psp4.51. PubMed PMID: 26312165; PMCID: PMC4544055.

26. Cheng C, **Varn FS**, Marsit CJ. E2F4 Program Is Predictive of Progression and Intravesical Immunotherapy Efficacy in Bladder Cancer. *Mol Cancer Res*. 2015;13(9):1316-24. doi: 10.1158/1541-7786.MCR-15-0120. PubMed PMID: 26032289; PMCID: PMC4734892.
27. Ung MH, **Varn FS**, Lou S, Cheng C. Regulators associated with clinical outcomes revealed by DNA methylation data in breast cancer. *PLoS Comput Biol*. 2015;11(5):e1004269. doi: 10.1371/journal.pcbi.1004269. PubMed PMID: 25996148; PMCID: PMC4440643.

Reviews (most recent first)

28. Kim Y, **Varn FS**, Park SH, Yoon BW, Park HR, Lee C, Verhaak RGW, Paek SH. Perspective of mesenchymal transformation in glioblastoma. *Acta Neuropathol Commun*. 2021;9(1):50. Epub 2021/03/26. doi: 10.1186/s40478-021-01151-4. PubMed PMID: 33762019; PMCID: PMC7992784.
29. Nowak EC, Lines JL, **Varn FS**, Deng J, Sarde A, Mabaera R, Kuta A, Le Mercier I, Cheng C, Noelle RJ. Immunoregulatory functions of VISTA. *Immunol Rev*. 2017;276(1):66-79. doi: 10.1111/imr.12525. PubMed PMID: 28258694.
30. Ung MH, **Varn FS**, Cheng C. In silico frameworks for systematic pre-clinical screening of potential anti-leukemia therapeutics. *Expert Opin Drug Discov*. 2016:1-10. doi: 10.1080/17460441.2016.1243524. PubMed PMID: 27689915.
31. **Varn FS**, Mullins DW, Arias-Pulido H, Fiering S, Cheng C. Adaptive immunity programmes in breast cancer. *Immunology*. 2017;150(1):25-34. Epub 2016/08/27. doi: 10.1111/imm.12664. PubMed PMID: 27564847; PMCID: PMC5341497.

Book Chapters

1. Ung M, Lou S, **Varn FS**, and Cheng C. Integrative analysis identifies transcription factor-DNA methylation relationships and introduces new avenues for translating cancer epigenetics into the clinic. Book: *Next Generation Sequencing in Cancer Research (Volume 2)*. Springer, 2014. Edited by Wei Wu and Hani Choudhry.

Conference Presentations (most recent first)

1. **Varn FS**, Ye GY, Ghospurkar P, Wade T, Lipp E, Khasraw M, Hermes B, Elliott C, Costello J, Hong C, Vallentgoed W, French PJ, Padovan M, Ng HK, Li K, Westcott K, Vaubel R, McCortney K, Horbinski C, Moon H, Paek SH, Lowman A, LaViolette P, Barnholtz-Sloan JS, Wesseling P, Verhaak RGW. The longitudinal evolutionary trajectory of oligodendroglioma is driven by treatment-associated genetic alterations. **Oral presentation**, Society for Neuro-Oncology Annual Scientific Meeting. Tampa, FL. November 2022. **Selected for plenary session**.
2. **Varn FS**, Johnson KC, Martinek J, Huse JT, Nasrallah MP, Wesseling P, Cooper LAD, Malta TM, Wade TE, Sabedot TS, Brat DJ, Gould PV, Wöehrer A, Aldape K, Ismail A, Barthel FP, Kim H, Kocakavuk E, Ahmed N, White K, Sivajothi S, Datta I, Barnholtz-Sloan JS, Bakas S, D'Angelo F, Gan HK, Garofano L, Khasraw M, Migliozi S, Ormond DR, Paek SH, Van Meir EG, Walenkamp AME, Watts C, Weller M, Weiss T, Palucka K, Stead LF, Poisson LM, Noushmehr H, Iavarone A, Verhaak RGW, The GLASS Consortium. Longitudinal analysis of diffuse glioma reveals cell state dynamics at recurrence associated with changes in genetics and the microenvironment. **Oral presentation**, American Association for Cancer Research Annual Meeting. New Orleans, LA. April 2022. **Selected for AACR-ABTA Scholar-in-Training Award**.
3. **Varn FS**, Johnson KC, Wade TE, Malta TM, Sabdeot TS, Barthel FP, Kim H, Ahmed N, Datta I, Barnholtz-Sloan JS, Bakas S, D'Angelo F, Gan H, Garofano L, Huse JT, Khasraw M, Kocakavuk E,

Migliozzi S, Ormond DR, Paek SH, Van Meir EG, Walenkamp AME, Watts C, Weller M, Weiss T, Wesseling P, Stead LF, Poisson LM, Noushmehr H, Iavarone A, Verhaak RGW, The GLASS Consortium. Longitudinal analysis of diffuse glioma reveals cell state dynamics at recurrence associated with changes in genetics and the microenvironment. **Oral presentation**, Society for Neuro-Oncology Annual Scientific Meeting. Boston, MA. November 2021. **Selected for SNO Abstract Award for Excellence in Pathology.**

4. **Varn FS**, Johnson KC, Barthel FP, Kim H, Wade T, Malta T, Sabdeot T, Lodha D, Ajaib S, Ahmed N, Garofano L, D'Angelo F, Stead L, Poisson L, Noushmehr H, Iavarone A, Verhaak R, The GLASS Consortium. Longitudinal analysis of diffuse glioma reveals cell state dynamics at recurrence associated with changes in genetics and the microenvironment. **Oral presentation**, Society for Neuro-Oncology Basic and Translational Omics of Brain Tumors and their Microenvironment. Virtual. July 2021.
5. **Varn FS**, Integration of multi-omics data: Teaching old data new tricks. **Invited oral presentation**, Society for Neuro-Oncology Basic and Translational Omics of Brain Tumors and their Microenvironment. Virtual. July 2021.
6. **Varn FS**, Johnson KC, Barthel FP, Kim H, Wade T, Lodha D, Ajaib S, Ahmed N, Garofano L, D'Angelo F, Stead L, Noushmehr H, Iavarone A, Verhaak R, The GLASS Consortium. Tumor-myeloid cell interactions are dynamic and influence the evolutionary trajectory of adult diffuse glioma. **Poster**, American Association for Cancer Research Annual Meeting. Virtual. April 2021. **Selected for AACR-Bristol Myers Squibb Scholar-in-Training Award.**
7. **Varn FS**, Barthel FP, Johnson KC, Kocakavuk E, Moskalik A, Kim H, Verhaak R, The GLASS Consortium. Longitudinal analyses of glioma evolution reveal altered gene expression and immune response dynamics following therapy. **Poster**, Keystone Symposium: Cancer Evolution and Combinatorial Cancer Therapies: Concepts and Challenges. Banff, AB, Canada. January 2020.
8. **Varn FS**, Li D, Cheng C. Genomic analysis of the virus-induced tumor microenvironment in six cancer types. **Poster**, AACR: Tumor Immunology and Immunotherapy. Boston, MA. October 2017.
9. **Varn FS**, Cheng C. Application of somatic mutation-based expression profiles for high-throughput phenotyping in cancer. **Poster**, American Association for Cancer Research Annual Meeting. Washington, DC. April 2017.
10. **Varn FS**, Cheng C. Systematic pan-cancer analysis of CD8⁺ memory T cell activity. **Poster**, Biology of Genomes. Cold Spring Harbor, NY. May 2016.