Frederick S. Varn

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EDUCATION AND TRAINING

Postdoctoral Fellow   2018-present
The Jackson Laboratory for Genomic Medicine; Farmington, CT
Supervised by Roel Verhaak, PhD

PhD, Molecular and Systems Biology   2013-2018
Dartmouth College; Hanover, NH
Supervised by Chao Cheng, PhD
Dissertation title: *Systematic pan-cancer analyses of the tumor immune response*

MS, Quantitative Biomedical Sciences   2014-2018
Dartmouth College; Hanover, NH

BS, Biology (Highest Honors)   2009-2013
University of Florida; Gainesville, FL
Honors thesis: *The role of HMGA-1 in the recruitment of RNA polymerase II to the beta-globin gene locus*

HONORS AND AWARDS

Albert J. Ryan Fellowship Award   2017
Norris Cotton Cancer Center Travel Award   2016
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

GRANT SUPPORT

Jane Coffin Childs Memorial Fund for Medical Research   07/01/2019-06/30/2022
Glioma evolution in the presence of local immune activity
Role: Principal Investigator

T32 GM008704 Compton (PI)   07/01/2015-06/30/2017
NIH-NIGMS
Molecular and Cellular Biology at Dartmouth Training Grant
Role: Appointee

RESEARCH EXPERIENCE

Postdoctoral Associate; The Jackson Laboratory for Genomic Medicine   2018-present
- Established immunogenomic techniques to investigate the glioma immune response
- Drafted independent funding proposals
- Experience programming in R, Python, SQL

Graduate Research Assistant; Dartmouth   2013-2018
- Developed 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 PI in writing funding proposals
- Presented work in laboratory meetings, program-wide seminars, and national conferences
- Mentored undergraduate and rotation students in computational biology
- Experience programming in R, Python, and MatLab

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; 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

PROFESSIONAL AND COMMUNITY ACTIVITIES

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

SCHOLARSHIP

Original Research Publications (most recent first)

First author
1.   **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:e1513440. PMID: 30546953.
2.   **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. PMID: 30254145.
3.   **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. PMID: 29872556.
4.   **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. PMID: 28126714.
5.   **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. PMID: 26725977.

6. **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. PMID: 26598031.
7. **Varn FS**, Ung MH, Lou SK, Cheng C. Integrative analysis of survival-associated gene sets in breast cancer. *BMC Med Genomics*. 2015;8:11. PMID: 25881247.

Collaborative work

8. 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, Ngan CY, Chapman M, Koehler JW, Miller AD, Miller CR, Porter BF, Rissi DR, Mazcko C, LeBlanc AK, Dickinson PJ, Packer R, Taylor AR, Rossmeisl JH, Heimberger A, Levine JM, Verhaak RGW. Comparative molecular life history of spontaneous canine and human gliomas. *bioRxiv*. 2019:673822.
9. 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. PMID: 31151460.
10. 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. PMID: 31088847.
11. 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. PMID: 30161001.
12. 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. PMID: 29436393.
13. 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. PMID: 29141854.
14. 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. PMID: 28464832.
15. 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. PMID: 27589846.
16. 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. PMID: 26856934.
17. 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. PMID: 26032289.
18. 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. PMID: 26312165.
19. 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. PMID: 25996148.

Reviews (most recent first)

20. 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. PMID: 28258694.

21. **Varn FS**, Mullins DW, Arias-Pulido H, Fiering S, Cheng C. Adaptive immunity programmes in breast cancer. *Immunology*. 2016. PMID: 27564847.
22. 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. PMID: 27689915.

Book Chapters

23. 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.

Abstracts Presented (most recent first)

1. **Varn FS**, Li D, Cheng C. Genomic analysis of the virus-induced tumor microenvironment in six cancer types. Poster, Tumor Immunology and Immunotherapy. Boston, MA. October 2017.
2. **Varn FS**, Cheng C. Application of somatic mutation-based expression profiles for high-throughput phenotyping in cancer. Poster, American Association for Cancer Research. Washington, DC. April 2017.
3. **Varn FS**, Cheng C. Systematic pan-cancer analysis of CD8+ memory T cell activity. Poster, Biology of Genomes. Cold Spring Harbor, NY. May 2016.