

Robin Varghese, Ph.D. | Curriculum Vitae

Genomics & Molecular Biologist

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Profile

- Expert in biomarker discovery using computational and molecular tools.
- Expert in human cell culture, DNA/RNA/protein quantitative/qualitative assays, and molecular and cell biology.
- Proficiency in technical optimization, development and data analysis.
- Experience in teaching and management.

Education

Ph.D. in Genetics Bioinformatics and Computational Biology – Virginia Polytechnic Institute and State University, Blacksburg, VA	2011-2016
B.S. in Biology – Texas A&M University, Corpus Christi, TX	2003-2006

Experience

Assistant Professor - VCOM- Biomedical Division <ul style="list-style-type: none">➤ Course Director of Genetics. Research focus: utilizing an interdisciplinary approach in discovering clinically relevant biomarkers for complex diseases such as cancer and cardiovascular disease.	2018- Present
Adjunct Assistant Professor - Virginia-Maryland College of Veterinary Medicine <ul style="list-style-type: none">➤ Researcher in the Department of Biomedical Sciences and Pathobiology	2020- Present
Adjunct Professor - Bluefield College <ul style="list-style-type: none">➤ Genetics Course Director in the Master of Arts in Biomedical Sciences Program	2018- Present
Post-Doctoral Fellow - VCOM- Garner Lab <ul style="list-style-type: none">➤ Computational and experimental analysis of clinical pathologies through next generation DNA sequencing and genomics	2016-2018
Graduate Research Assistant and Post-Doctoral Fellow - Virginia Tech Carilion Research Institute - Sheng Lab	2014-2016

- Discovered novel prognostic biomarkers and therapeutic targets for glioblastoma using computational and molecular tools.
- Graduate Research Assistant** – Virginia Bioinformatics Institute- *Mittelman Lab* 2011-2014
- Applied genome-editing tools to manipulate and analyze tandem DNA repeats for biomarker discovery in microsatellite loci.
- Research Assistant/Team Leader** –Baylor College of Medicine- *Human Genome Sequencing Center* 2007-2011
- Managed medical resequencing validation team, supervised and trained employees, developed robotic scripts for optimization of protocols and worked closely with upper management on large federal projects.
- Certified Pharmacy Technician** – Walgreens Pharmacy 1999-2007
- Trained, managed, and supervised pharmacy personnel.
- Tissue Recovery Technician** –Baylor College of Medicine- *Lions Eye Bank* 2007
- Decedent physical/ocular examination followed by whole globe enucleation, corneal excision, and cadaveric blood draw for tissue transplantation.
- Instructor** – Houston Allied Health Services 2002
- Prepared students for Texas pharmacy technician state board examination by teaching clinical and retail pharmacy science and practices.

Skills

Cell Biology

Primary human/mouse cell culture and cancer stem cell and cancer cell culture. RNA interference, lentivirus production and transduction, transient and stable transfection, cell differentiation and self-renewal assays, MTS viability assays, flow cytometry, live and fixed cell microscopy.

Molecular Biology

DNA/RNA/protein isolation from tissue and cells, electrophoresis, DNA cloning, Sanger DNA sequencing, PCR, real-time quantitative PCR, western blotting, gene reporter assays, TALEN design.

Software Utilized

Sequencing analysis utilizing Linux/Unix and Python.
Statistical analysis utilizing JMP, Graphpad, and R.

Awards

NSF S STEM, Virginia Polytechnic Institute and State University

2013

Patents

International Patent Application Filed -VCOM, Blacksburg, VA

Title: Cancer Signatures, Methods of Generating Cancer Signatures, and Uses Thereof

Filed: Dec 20, 2020 us PCT/US20/66282

Provisional Patent Filed -VCOM, Blacksburg, VA

Cancer Signatures, Methods of Generating Cancer Signatures, and Uses Thereof

Patent date filed Dec 20, 2019 Patent issuer and number US 62/951,084

Provisional Patent Filed – Virginia Tech Carilion Research Institute, Roanoke, VA

VTIP 15 - 082- Methods for Personalized Medicine: GBM Diagnosis and Treatment United States Letters Patent Serial No. 62/144,387

Selected Publications

- 1) Pridham KJ, Shah F, Hutchings KR, Sheng KL, Guo S, Liu M, Kanabur P, Lamouille S, Lewis G, Morales M, Jourdan J, Grek CL, Ghatnekar GG, **Varghese R**, Kelly DF, Gourdie RG, Sheng Z. Connexin 43 confers chemoresistance through activating PI3K. *Oncogenesis*. 2022 Jan 12;11(1):2. doi: 10.1038/s41389-022-00378-7. PMID: 35022385; PMCID: PMC8755794.
- 2) Sheng K.L, Kang L, Pridham K.J, Dunkenberger L.E, Sheng Z, **Varghese RT**. An integrated approach to biomarker discovery reveals gene signatures highly predictive of cancer progression. *Scientific Reports*. December 4, 2020
- 3) Anandakrishnan R, Carpenetti TL, Samuel P, Wasko B, Johnson C, Smith C, Kim J, Michalak P, Kang L, Kinney N, Santo A, Anstrom J, Garner HR, **Varghese RT**. DNA sequencing of anatomy lab cadavers to provide hands-on precision medicine introduction to medical students. *BMC Med Educ*. 2020 Nov 16.

- 4) Nick Kinney, Lin Kang, Laurel Eckstrand, Arichanah Pulenthiran, Peter Samuel, Ramu Anandakrishnan, **Robin T. Varghese**, P. Michalak, Harold R. Garner. Abundance of ethnically biased microsatellites in human gene regions. *PLoS ONE*. Dec 12, 2019
- 5) Anandakrishnan R, **Varghese RT**, Kinney NA, Garner HR. Estimating the number of genetic mutations (hits) required for carcinogenesis based on the distribution of somatic mutations. *PLOS Computational Biology*. Mar 7, 2019
- 6) Dash S, Kinney NA, **Varghese RT**, Garner HR, Feng WC, Anandakrishnan R. Differentiating between cancer and normal tissue samples using multi-hit combinations of genetic mutations. *Scientific reports*. Jan 30, 2019
- 7) Sheng KL, Pridham KJ, Sheng Z, Lamouille S, **Varghese RT*** Functional Blockade of Small GTPase RAN Inhibits Glioblastoma Cell Viability. *Frontiers in Oncology*. 8 January 2019
- 8) Kinney N, Titus-Glover K, Wren JD, **Varghese RT**, et al CAGm: a repository of germline microsatellite variations in the 1000 genomes project. *Nucleic Acids Research*. 17 October 2018
- 9) **Varghese RT***, Young S*, Pham L*, Liang Y*, Pridham KJ , Guo S , Murphy SF , Kelly DF, Sheng Z. Casein Kinase 1 Epsilon Regulates Glioblastoma Cell Survival. *Scientific Reports*. 11 September 2018
- 10) Kinney N, Larsen T, **Varghese RT**, Poelzing S, Garner HR & AlMahameed ST. Whole Exome Sequencing Reveals Response Signature in Atrial Fibrillation Patients Undergoing Initiation of Dofetilide Therapy, A Pilot Study. *Clinical Cardiology*. 2018 April 19 PMID:29671888
- 11) Pridham KJ, **Varghese RT**, Sheng Z. The Role of Class IA PI3K Catalytic Subunits in Glioblastoma. *Frontiers in Oncology*. 2017 Dec 15.
- 12) Kinney N*, **Varghese RT***, Anandakrishnan R, Garner HR. ZDHHC3 as a Risk and Mortality Marker for Breast Cancer in African American Women. *Cancer Informatics*. Vol 16, 2017 Dec 13.
- 13) Pridham, KJ*, Le L*, Guo S*, **Varghese RT***, et al. PIK3CB/p110B is a Selective Survival Factor for Glioblastoma. *Neuro-Oncology*. 2017 Sep 16. Nox181
- 14) Velmurugan KR, **Varghese RT**, Fonville N, Garner HR. High-depth, high accuracy microsatellite genotyping enables precision lung cancer risk classification. *Oncogene*. 2017 Nov 16;36(46):6383-6390.

- 15) **Varghese RT***, Liang Y, Guan T, Franck CT, Kelly DF, et al. Survival kinase genes present prognostic significance in glioblastoma. *Oncotarget*. 2016 Mar 4; PubMed PMID: 26956052.
- 16) Murphy SF, **Varghese RT**, Lamouille S, Guo S, Pridham KJ, et al. Connexin 43 Inhibition Sensitizes Chemoresistant Glioblastoma Cells to Temozolomide. *Cancer Research*. 2016 Jan 1; 76(1):139-49. PubMed PMID: 26542214.
- 17) Schaaf CP, Sabo A, Sakai Y, Crosby J, **Varghese R**, et al. Oligogenic heterozygosity in individuals with high-functioning autism spectrum disorders. *Human Molecular Genetics*. 2011 Sep 1;20(17):3366-75. PubMed PMID: 21624971; PubMed Central PMCID: PMC3153303.
- 18) Coventry A, Bull-Otterson LM, Liu X, **Varghese RT**, Maxwell TJ, et al. Deep resequencing reveals excess rare recent variants consistent with explosive population growth. *Nature Communications*. 2010 Nov 30; 1:131. PubMed PMID: 21119644; PubMed Central PMCID: PMC3060603.

Complete List of Published Work in My Bibliography:

<https://scholar.google.com/citations?user=yga0ZE8AAAAJ&hl=en&oi=ao>

Invited Talks

Varghese, RT. “Bringing Precision Medicine to the Anatomy Lab” Virginia Tech, 02/05/2020

Varghese, RT. "Genomics in Medicine" VCOM 4th Annual Research Retreat 2017. Asheville, NC

Varghese, RT. "Novel prognostic markers for glioblastoma" Annual VTCRI Meeting, November 2015. Roanoke, VA

Varghese, RT “Survival kinases identified by a kinome RNA interference screen are prognosis markers for glioblastoma" GBCB Virginia Tech Seminar Series, Nov 2015. Blacksburg, VA

Varghese, RT "The Role of Casein Kinase 1 Epsilon in Glioblastoma" GBCB Virginia Tech Seminar Series, March 2015. Blacksburg, VA

Other Experience and Professional Memberships (current)

Member, American Association for Cancer Research	2015-present
Review Editor, Frontiers of Pharmacology	2017-present
Review Editor, Frontiers of Oncology	2017-present

Research Support

Current Research Support

1. VCOM Research Eureka Accelerator Program (REAP)
07/01/20 - 06/30/21

Title: Linking the gut microbiome, female reproduction and obesity: Identifying protective molecular mechanisms of the bacterial metabolite, Indole-3-propionic acid, in ovarian and placental cells against obesity-induced cellular stress

Goal: The overall goal of this proposal is to begin identifying the functional relevance of IPA in ovarian and placental cells in the context of a normal and obesogenic environment in vitro. *Role:* Co-PI (Co-PI: M. Lipsmeyer)

2. VCOM Research Eureka Accelerator Program (REAP)
07/01/20 - 06/30/21

Title: Investigating the effect of a rare mutation in Fetuin-B on the progression of Acute Myeloid Leukemia

Goal: The goal of this project is to identify cellular pathways affected by the T292Nfs* variant in Fetuin-B, to determine if the variant may contribute to the progression of AML.

Role: Investigator (PI: R. Anandakrishnan)

3. VCOM Research Eureka Accelerator Program (REAP)
07/01/19 - 10/31/20

Title: OR2T7: A prognostic marker and a potential therapeutic target for glioblastoma

Goal: The goal of the proposed work is to investigate the role of OR2T7 in tumor progression.

Role: Co-PI (PI: R. Anandakrishnan)

4. VCOM Research Eureka Accelerator Program (REAP)

07/01/19 - 12/31/20

Title: Chelation therapy salvages the DNA damaging effects of lead and cadmium on endothelial cells

Goal: The goal of this study is to discover genomic risk markers of patients who experience post-operative atrial fibrillation following cardiothoracic surgery by analyzing variations in microsatellite genomic regions, SNPS, and INDELS. *Role:* PI

Recently Completed Research Support

1. Orbit Genomics

05/01/19 - 04/30/20

Title: Development of a Pancreatic Cancer Risk Assay (Phases I and II)

Goal: Develop a proprietary microsatellite-based risk classifier for Pancreatic Cancer Risk Diagnostic based on Orbit Genomics microsatellite biomarker discovery process.

Role: Investigator (PI: H. Garner)

2. Orbit Genomics

02/12/20 - 04/30/20

Title: Lung Cancer Panel Validation Study

Goal: The goal of the program is to validate the Lung Cancer Risk genomic diagnostic with independent, de-identified blinded samples. *Role:* Investigator (PI: H. Garner)

3. Health and Human Services, 1 ORIIR180040-01-00

06/01/18 - 05/31/19

Identifying and quantifying the level of questionable abstract publications at scientific meetings

Goal: Develop and demonstrate high-throughput techniques to evaluate the biomedical scientific corpus for possible violations of ethical publishing standards (e.g. etblast.org). *Role:* Investigator (PI: H. Garner)

4. VCOM Research Eureka Accelerator Program (REAP)

07/01/18 - 06/30/2019.

Title: Bringing Precision Medicine to Anatomy Lab

Goal: The goal of this study is to implement precision medicine in the anatomy lab medical school curriculum utilizing cadaveric DNA and DNA sequencing technology.

Role: PI