

ANNA VILGELM

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SUMMARY STATEMENT

I am a cancer biologist with experience in basic and translational studies. My research is focused on pre-clinical development of therapies that stimulate anti-tumor immunity by inducing “hot”, immune-cell enriched, tumor microenvironment. Currently, my group explores senescence-inducing therapies that activate pro-inflammatory pathways in tumor cells resulting in increased secretion of chemokines that promote immune cell homing into the tumor. We utilize mouse models of melanoma and mammary cancer, as well as patient-derived models, such as patient-derived organoids and patient-derived xenografts grown in humanized mice.

EDUCATION AND TRAINING

Vanderbilt University Nashville, TN	PostDoc 2011-2015
Engelhardt Institute of Molecular Biology Moscow, Russia and Vanderbilt University Medical Center Nashville, TN	PhD 2011
Russian National Research Medical University Moscow, Russia	MD 2005

ACADEMIC APPOINTMENTS

Research Assistant Professor Department of Pharmacology Vanderbilt University School of Medicine	2017-present
Research Assistant Professor Department of Cancer Biology Vanderbilt University School of Medicine	2015-2017

RESEARCH EXPERIENCE

Ongoing Independent Research Programs:

Combining senescence-inducing and senolytic agents to improve melanoma therapy	2018-2025 Funder: NCI Role: PI
CDK4/6 inhibition modulates tumor immune microenvironment to enhance response to immunotherapy	2017-2020 Funder: BCRF Role: PI

Ongoing Collaborative Research Programs:

Modeling New Therapeutic Approaches for Malignant Melanoma (PI: Richmond)	2017-2021 Funder: VA, Role: Co-I
Harnessing human brain and liver microphysiological systems for testing therapeutics for metastatic melanoma (PI: Wikswo)	2018-2023 Funder: NCI, Role: Co-I
Vanderbilt University PET Imaging Resource to Enhance Delivery of Individualized Cancer Therapeutics (PI: Manning)	2018-2023 Funder: NCI, Role: Co-I

Completed Research Programs:

Inducing therapeutic senescence via CDKN2A pathway reactivation to combat melanoma progression	2015-2018 Funder: The Harry J. Lloyd Charitable Trust, Role: PI
Identification of therapeutic agents that promote pro-inflammatory phenotype of cancer cells	2018 Funder: VICTR, Role: PI
Investigation of the effectiveness of combination and single-agent targeted therapies in novel and established melanoma patient derived xenograft models (PI: Pietenpol)	2016-2017 Funder: NCI, Role: Co-I
Enhancing breast cancer immunogenicity by inhibiting cell cycle kinases CDK4/6	2017 Funder: VICC, Role: PI

Mentored Research Experience:

Vanderbilt University, Department of Cancer Biology Advisor: Ann Richmond	2011-2015 Role: Postdoctoral Fellow
Vanderbilt Clinical Oncology Research Career Development Program Mentors: Ann Richmond, Jeff Sosman Project: Preclinical evaluation of AURKA inhibitor and its combination with MDM2 antagonist as a systemic melanoma treatment	2011-2014 Funder: NIH K12 Role: Trainee
Vanderbilt University Medical Center, Department of Surgery Mentors: Alex Zaika, Wael El-Rifai Dissertation: Expression and functions of genes of the p53 family in gastrointestinal malignancies	2006-2010 Role: PhD student
Fox Chase Cancer Center, Human Genetics Program Mentor: Antonio DiCristofano Thesis: Akt-mediated activation of ER α as a result of PTEN loss in endometrial cells and its role in the pathogenesis of endometrial cancer	2005-2006 Role: Medical Student
Institute of Nutrition, Russian Academy of Medical Sciences Mentor: Victor A. Tutelian	2003-2005 Role: Student-intern
Moscow Central Hospital №6, Laboratory of Clinical Immunology Mentor: Vladimir Nelubin	2002-2003 Role: Student-intern

GRANTS, AWARDS AND HONORS

NIH R01 converted to an NCI MERIT (R37) award Research grant	2018-2025
VICTR, Pilot award	2018
BCRF Research grant	2017-2020
VICC Pilot award	2017
VICC Postdoctoral Scholar of the Year Award	2015
Harry J Lloyd Charitable trust Career development award	2015-2018
Society for Melanoma Research Travel award	2015
Annual Meharry Medical College/Vanderbilt Ingram Cancer Center/TSU Retreat Top poster presentation award, 3-rd place	2015
Vanderbilt Ingram Cancer Center Annual Retreat 2-nd place award in recognition of excellence in cancer research	2015
Annual Meharry/Vanderbilt /Tennessee State University Retreat Best Poster Presentation Overall Award	2014
Annual Host-Tumor Interactions Program & Department of Cancer Biology Retreat 1-st place award for top poster presentation	2013
Vanderbilt Ingram Cancer Center Retreat 1-st place award, excellence in cancer research and an outstanding poster	2012
Annual Host-Tumor Interactions Program & Department of Cancer Biology Retreat 1-st place award for top poster presentation	2011
Training grant supporting salary and research supplies, Vanderbilt Clinical Oncology Research Career Development Program	2011-2014
Russian State Medical University “Best graduation thesis of 2005” award	2005
Fox Chase Cancer Center/Russian National Research Medical University sister institutes student exchange program Travel and stipend award	2004

TEACHING EXPERIENCE

Course teaching:

Introduction to Cancer Biology. Tumor Suppressors and apoptosis	September 2018
Cancer Immunotherapy. Making cold tumors hot II: Mobilizing the immune system	March 2019

Research Supervision/Mentoring:

Kenya Collins, Vanderbilt University master student	2018
Stacey Mont, Postdoctoral Fellow	2017
Lauren Slesur, VUMC medical student	2016
Kelsie Riemenschnider, VUMC medical student	2015
Kiran Malikayil, Meharry Medical College student	2015
Carla Gibbs, Meharry Medical College student	2013
Jessica Smith, Meharry Medical College student	2012
Poojitha Sitaram, VUMC graduate student	2009

PROFESSIONAL ORGANIZATIONS

Elliot Newman Society	2013-Present
Society for Leukocyte Biology	2013-Present
Society for Melanoma Research	2012-Present
American Association for Cancer Research	2012-Present

PROFESSIONAL ACTIVITIES/SERVICE

Study section/grant review:

NIH NCI
Mechanisms of Cancer Therapeutics – 2

October 2018

METAvivor

September 2018

Manuscripts peer review:

Clinical Cancer Research, PLOS One, Molecular Cancer Therapeutics, Oncotarget, Expert Opinion On Therapeutic Patents, Cancer Letters.

Leadership/ service:

Poster Judge, Meharry Medical College/Vanderbilt
Ingram Cancer center/TSU Retreat

January 2018

Student Group Leader, Russian National Research
Medical University

1998-2004

PUBLICATIONS

1. **Vilgelm AE**, Richmond A. “Chemokines Modulate Immune Surveillance in Tumorigenesis, Metastasis and Response to Immunotherapy”. *Frontiers in Immunology*, February 2019.
2. **Vilgelm AE***, Saleh N, Riemenschneider K, Slesur L, Chen S, Johnson C, Yang J, Shattuck-Brandt R, Yan C, Johnson D, Al-Rohil R, Halilovic E, Kauffmann R, Kelley M, Ayers G, Richmond A. "Intrinsic Resistance to CDK4/6 Inhibition Driven by Compensatory Activation of CDK1/2 Is Overcome by MDM2 Antagonists". In press, *Science Translational Medicine*. * - **corresponding author**
3. Yang J, Kumar A, **Vilgelm AE**, Chen SC, Ayers GD, Novitskiy SV, Joyce S, Richmond A. “Loss of CXCR4 in Myeloid Cells Enhances Antitumor Immunity and Reduces Melanoma Growth through NK Cell and FASL Mechanisms.” *Cancer Immunol Res.*, August 14, 2018.
4. **Vilgelm AE***, Cobb P, Malikayil K, Flaherty D, Johnson CA, Raman D, Saleh N, Higgins B, Vara BA, Johnston JN, Johnsonh DB, Kelley MC, Chen SC, AyersGD, Richmond A. “MDM2 Antagonists Counteract Drug-Induced DNA Damage.” *EBioMedicine*, October 24, 2017. * - **corresponding author**
5. Sai J, Owens P, Novitskiy SV, Hawkins OE, **Vilgelm AE**, Yang J, Sobolik T, Lavender N, Johnson AC, McClain C, Ayers GD, Kelley MC, Sanders M, Mayer IA, Moses HL, Boothby M, Richmond A. “PI3K Inhibition Reduces Mammary Tumor Growth and Facilitates Antitumor Immunity and Anti-PD1 Responses.” *Clin Cancer Res.*, Dec 21, 2016.
6. **Vilgelm, A. E.***, Johnson, D. B., Richmond, A. “Combinatorial approach to cancer immunotherapy: strength in numbers.” *J Leukoc Biol.*, Jun 2, 2016. * - **corresponding author**
7. **Vilgelm, A. E.** and Richmond, A. “Using avatars to win the fight over BRAF inhibitor resistance.” *Pigment Cell Melanoma Res.*, May 17, 2016.
8. Johnson DB, Estrada MV, Salgado R, Sanchez V, Doxie DB, Opalenik SR, **Vilgelm AE**, Feld E, Johnson AS, Greenplate AR, Sanders ME, Lovly CM, Frederick DT, Kelley MC, Richmond A, Irish JM, Shyr Y, Sullivan RJ, Puzanov I, Sosman JA, Balko JM. “Melanoma-specific MHC-II expression represents a tumor-autonomous phenotype and predicts response to anti-PD-1/PD-L1 therapy”. *Nat Commun.* Jan 29, 2016.
9. **Vilgelm, A. E.***, Johnson, C. A., Prasad, N., Yang, J., Chen, S. C., Ayers, G. D., Pawlikowski, J. S., Raman, D., Sosman, J. A., Kelley, M., Ecsedy, J. A., Shyr, Y., Levy, S. E., Richmond, A. “Connecting the Dots: Therapy-Induced Senescence and a Tumor-Suppressive Immune Microenvironment.” *J Natl Cancer Inst.*, Dec 30, 2016. * - **corresponding author**
10. **Vilgelm A**, Richmond A. “Combined therapies that induce senescence and stabilize p53 block melanoma growth and prompt antitumor immune responses.” *Oncoimmunology*, Mar 19, 2015.
11. Liu Y, Hawkins OE, **Vilgelm AE**, Pawlikowski JS, Ecsedy JA, Sosman JA, Kelley MC, Richmond A. “Combining an Aurora Kinase Inhibitor and a Death Receptor Ligand/Agonist Antibody Triggers Apoptosis in Melanoma Cells and Prevents Tumor Growth in Preclinical Mouse Models”. *Clin Cancer Res.*, Jul 7, 2015.
12. **Vilgelm AE**, Pawlikowski JS, Liu Y, Hawkins OE, Davis TA, Smith J, Weller KP, Horton LW, McClain CM, Ayers GD, Turner DC, Essaka DC, Stewart SF, Sosman JA, Kelley MC, Ecsedy JA, Johnston JN and Richmond A. “Mdm2 and Aurora A inhibitors synergize to block melanoma growth by driving apoptosis and immune clearance of tumor cells”. *Cancer Res.*, Jan 1 2015.

13. Hockemeyer, K, Janetopoulos C, Terekhor A, **Vilgelm AE**, Hofmeister W, Wikswow J, Richmond A. "Engineered three-dimensional microfluidic device for interrogating cell-cell interactions in the tumor microenvironment." *Biomicrofluidics*, Jul 15, 2014.
14. Davis TA, **Vilgelm AE**, Richmond A, Johnston JN. "A Practical Preparation of (-)-Nutlin-3 at Gram-Scale" *J Org Chem.*, Nov 1, 2013.
15. Liu Y, Hawkins OE, Su Y, **Vilgelm AE**, Sobolik T, Thu YM, Kantrow S, Splittgerber RC, Short S, Amiri KI, Ecsedy JA, Sosman JA, Kelley MC, Richmond A. "Targeting Aurora Kinases Limits Tumor Growth through DNA Damage Mediated Senescence and Blockade of NF- κ B Impairs Senescence." *EMBO Mol Med.*, Jan 5, 2013.
16. Su Y, **Vilgelm AE**, Kelley MC, Hawkins OE, Liu Y, Boyd KL, Kantrow S, Splittgerber RC, Short SP, Sobolik T, Zaja-Milatovic S, Dahlman KB, Amiri KI, Jiang A, Lu P, Shyr Y, Stuart DD, Levy S, Sosman JA, Richmond A. "RAF265 inhibits the growth of advanced human melanoma tumors". *Clin Cancer Res.*, Apr 15, 2012.
17. **Vilgelm AE**, Hong SM, Washington MK, Wei J, Chen H, El-Rifai W, Zaika A. "Characterization of Δ Np73 expression and regulation in gastric and esophageal tumors." *Oncogene.*, Oct 28, 2010.
18. **Vilgelm AE**, Zaika AI, Prassolov VS. "The coordinated interaction of multifunctional members of the p53 family determines many key processes in multicellular organisms." *Mol Biol (Mosk)*. Jan-Feb 2011. Review.
19. **Vilgelm AE**, Washington MK, Wei J, Chen H, Prassolov VS, Zaika AI. "Interactions of the p53 protein family in cellular stress response in gastrointestinal tumors." *Mol Cancer Ther.*, Mar 9, 2010.
20. Wei J, Nagy TA, **Vilgelm A**, Zaika E, Ogden SR, Romero-Gallo J, Piazuelo MB, Correa P, Washington MK, El-Rifai W, Peek RM, Zaika A. "Regulation of p53 tumor suppressor by Helicobacter pylori in gastric epithelial cells." *Gastroenterology*. Oct 28, 2010.
21. **Vilgelm A**, El-Rifai W, Zaika A. "Therapeutic prospects for p73 and p63: rising from the shadow of p53." *Drug Resist Updat.*, Aug-Oct 2008. Review.
22. Spirin PV, **Vil'gelm AE**, Prassolov VS. "Lentiviral vectors". *Mol Biol (Mosk)*. Sep-Oct 2008. Review.
23. Wei J, O'Brien D, **Vilgelm A**, Piazuelo MB, Correa P, Washington MK, El-Rifai W, Peek RM, Zaika A. "Interaction of Helicobacter pylori with gastric epithelial cells is mediated by the p53 protein family." *Gastroenterology*. May 2008.
24. **Vilgelm A**, Wei JX, Piazuelo MB, Washington MK, Prassolov V, El-Rifai W, Zaika A. "DeltaNp73alpha regulates MDR1 expression by inhibiting p53 function." *Oncogene*. Apr 3, 2008.
25. **Vil'gel'm AE**, Chumakov SP, Prassolov VS. "RNA interference: biology and perspectives of application in biomedicine and biotechnology". *Mol Biol (Mosk)*., May-Jun 2006. Review.
26. Tomkova K, El-Rifai W, **Vilgelm A**, Kelly MC, Wang TC, Zaika AI. "The gastrin gene promoter is regulated by p73 isoforms in tumor cells." *Oncogene*, Sep 28, 2006.
27. **Vilgelm A**, Lian Z, Wang H, Beauparlant SL, Klein-Szanto A, Ellenson LH, Di Cristofano A. "Akt-mediated phosphorylation and activation of estrogen receptor alpha is required for endometrial neoplastic transformation in Pten \pm mice." *Cancer Res.*, Apr 1, 2006.

PRESENTATIONS AT SCIENTIFIC MEETINGS

1. “Drug-induced senescence promotes anti-tumor immunity via the induction of CCL5”, Gordon Research Seminar (GRS) on Chemotactic Cytokines, June 2-3, 2018, Sunday River, Maine. **Oral presentation.**
2. “MDM2 antagonism overcomes resistance to CDK4/6 inhibition in melanoma”, AACR Annual Meeting, April 14-18, 2018, Chicago, Illinois. **Oral presentation.**
3. “Drug-induced senescence modulates tumor immune microenvironment to enhance immunotherapy response in melanoma”, Cell Symposia: Cancer, Inflammation, and Immunity, 11-13 June 2017, San Diego, CA. Poster presentation.
4. “The link between polyploidy and replication stress in melanoma”, AACR, 1-5 April 2017, Washington, DC. Poster presentation.
5. “Mechanisms of resistance to therapy-induced senescence in melanoma”, Vanderbilt Ingram Cancer Center Annual Retreat “The New Age of Tumor Immunology in Precision Medicine”, Nashville, TN, April 30, 2015. Oral presentation.
6. “Synergistic Anticancer Activity of Aurora A kinase and MDM2 Antagonists in Melanoma” AACR conference “Advances in Melanoma: From Biology to Therapy”, Philadelphia, PA, Sept. 20-23, 2014. Poster presentation.
7. “MDM2 and Aurora kinase A inhibitors synergize to block melanoma growth by inducing tumor cell apoptosis and immune clearance”. 13th Annual Meharry Medical College/Vanderbilt Ingram Cancer center/Tennessee State University Retreat, Nashville, Tennessee, January 2014. Received Best Poster Presentation Overall award in recognition of exemplary efforts in cancer research.
8. “Inhibition of mitotic kinase sensitizes genetically diverse melanoma tumors to non-genotoxic p53 activation.” 7th International MDM2 Workshop, Cambridge, UK, August 2013. Poster presentation.
9. “Genoprotective restoration of p53 improves response to anti-mitotic therapy in melanoma. VICC Retreat, Nashville, Tennessee, 2012. Received 1-st place award in recognition of excellence in cancer research and an outstanding poster presentation.
10. “Acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma is associated with inhibition of tumor immune surveillance.” Meharry Medical College/Vanderbilt Ingram Cancer Center/ Tennessee State University, Cancer Partnership, 12th Annual Cancer Retreat, Nashville, Tennessee, 2012. Poster presentation.
11. “Acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma is associated with inhibition of tumor immune surveillance.” Society for Melanoma Research Congress. Hollywood, California, 2012. Poster presentation.
12. “Acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma is associated with inhibition of tumor immune surveillance.” Host-Tumor Interactions Program & Department of Cancer Biology, 12th Annual Joint Retreat, Nashville, Tennessee, 2012. Poster presentation.
13. “Acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma is associated with inhibition of tumor immune surveillance.” VICC Retreat, Nashville, Tennessee, 2012. Poster presentation.
14. “Molecular mechanism underlying acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma. 103rd AACR Annual Meeting, Chicago, Illinois, 2012. Poster presentation.

15. "Molecular mechanism underlying acquired resistance to Aurora A kinase inhibitor, Alisertib, in melanoma." MVT U54 Cancer Partnership 11TH Annual Cancer Retreat, Nashville, Tennessee, 2011. Poster presentation.
16. "Resistance to Aurora Kinase A Inhibitors in Melanoma and How to Overcome it." 11-th Annual Host-Tumor Interactions Program & Department of Cancer Biology Retreat, Nashville, Tennessee, November 2011. Received 1-st place award for top poster presentation.
17. "Role of p73 and Mechanisms of Its Regulation in Gastrointestinal Tumors." Digestive Disease Week (DDW), New Orleans, Louisiana, 2010.
18. "Interactions Within the p53 Protein Family Play Critical Role in Cancer Chemotherapeutic Treatment: New Insights into Chemotherapeutic Drug Response in Gastrointestinal Tumors." Digestive Disease Week (DDW), Chicago, Illinois, 2009.
19. "Complex interactions within the p53 protein family in response to chemotherapy." Growth, Proliferation and Apoptosis (GPA) seminar, Vanderbilt University, Nashville, Tennessee, 2008. Oral presentation.
20. "Overexpression of DeltaNp73alpha induces drug resistance in human gastric carcinoma cells through up-regulation of the MDR1 gene." American Association for Cancer Research (AACR) Meeting, Los Angeles, California, 2007.
21. "Overexpression of DeltaNp73alpha induces drug resistance in human gastric carcinoma cells through up-regulation of the MDR1 gene." Annual student conference, Engelhardt Institute of Molecular Biology of Russian Academy of Sciences, Moscow, Russia, 2007. Oral presentation.
22. "The gastrin gene promoter is regulated by p73 isoforms in tumor cells." Vanderbilt Ingram Cancer center, Cancer Biology Retreat, 2006. Poster presentation.
23. "Akt-mediated phosphorylation and activation of estrogen receptor alpha is required for endometrial neoplastic transformation in Pten+/- mice." Annual Postdoctoral Research Conference, Fox Chase Cancer Center, Philadelphia, Pennsylvania, 2004. Poster presentation.

INVITED TALKS:

1. Vilgelm. "Reprogramming tumor secretome to enhance anti-tumor immunity", University of Alabama Birmingham, April 29 2019, Invited talk.
2. Vilgelm. "Utilizing senescence-inducing therapy to promote "hot" tumor immune micro-environment", Mayo Clinic, Scottsdale Arizona, April 22 2019, invited talk.
3. Vilgelm. "Leveraging cellular senescence to improve cancer therapy", Georgetown University and Georgetown Lombardy Comprehensive Cancer Center, February 20, 2019, invited talk.
4. "Utilizing cellular senescence to improve cancer therapy", Ohio State University, January 2019, Columbus, Ohio.
5. "Senescence induced by CDK4/6 inhibition promotes anti-tumor T cell responses", VICC Breast Cancer Research Program Retreat, January 7, 2019, Nashville, TN.
6. "The yin-yang of cancer therapy-induced senescence", Tennessee State University, November 2017, Nashville, TN.