

Caroline N. Smith

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EDUCATION AND TRAINING

- 2017 - present Doctor of Philosophy (Biochemistry), University of Kentucky, Lexington, KY
Research Advisor: Jessica S. Blackburn, Ph.D.
GPA: 4.0
- 2013 - 2017 B.Sc. (Biology) Minor (Biochemistry), Bellarmine University, Louisville, KY
Research Advisor: Mary O. Huff, Ph.D.
GPA: 3.95
- 2009 - 2013 Madison Central High School, Richmond, KY
GPA: 4.261

RESEARCH EXPERIENCE

- 2017 - present Graduate Research Assistant, College of Medicine, Molecular and Cellular Biochemistry Department, University of Kentucky, Lexington, KY
Research Advisor: Jessica S. Blackburn, Ph.D.
Aim: I study the oncogenic phosphatase PRL-3 and its role in regulating the beta-catenin/c-Myc interface in T-cell acute lymphoblastic leukemia (T-ALL). I hypothesize that anti-PRL-3 nanobodies can inactivate PRL-3 to indirectly target and decrease c-Myc expression in T-ALL.
- 2016 - 2017 Honors Undergraduate Research Student, Department of Biology, Bellarmine University, Louisville, KY
Research Advisor: Mary O. Huff, Ph.D.
Aim: Designed a project to determine specific flavonoids that protect HEK293 cells from toxins in low-dose cadmium exposure.
- May - Jul 2016 NSF Research Experience for Undergraduates, College of Medicine, Molecular and Cellular Biochemistry Department, University of Kentucky, Lexington, KY
Research Advisor: Yvonne Fondufe-Mittendorf, Ph.D.
Aim: Designed a project to measure methylation and gene expression in epithelial lung cells treated with inorganic arsenic.

PUBLICATIONS
(# Denotes Co-authorship)

1. Rivas, D.R.#, Dela Cerna, M.V.C.#, **Smith, C.N.**, Patty, B., Lee, D., Blackburn, J.S. (2020). A screen of FDA-approved drugs identifies inhibitors of Phosphatase of Regenerating Liver-3 (PRL-3). In Submission to *Sci Rep*.
2. **Smith, C.N.** (2017). Determining the protective effects of quercetin against cadmium toxicity in human embryonic kidney cells. *ScholarWorks@Bellarmine. Undergraduate Theses.21*. (ScholarWorks Link: https://scholarworks.bellarmino.edu/ugrad_theses/21/)
3. Rea, M., Eckstein, M., Eleazer, R., **Smith, C.**, Fondufe-Mittendorf, Y.N. (2017). Genome-wide DNA methylation reprogramming in response to inorganic arsenic links inhibition of CTCF binding, DNMT expression and cellular transformation. *Sci Rep.*, 7, 41474. DOI: 10.1038/srep41474

HONORS AND AWARDS

GRADUATE

- 2019 Women's Club Endowed Fellowship (University of Kentucky)
- 2019 - present AACR Associate Member Council (American Association for Cancer Research)
- 2019 ASBMB 2019 Annual Meeting Graduate Student and Postdoctoral Researcher Travel Award Recipient (American Society for Biochemistry and Molecular Biology)
- 2019 - 2020 Student Invited Speaker Host (University of Kentucky, Molecular and Cellular Biochemistry Department)
- 2019 Women in Medicine and Science Rising Star Award Finalist
- 2017 - 2019 Dean's List (University of Kentucky)

UNDERGRADUATE

- 2017 Summa Cum Laude Graduate (GPA above 3.85) (Bellarmine University)
- 2017 Msgr. Raymond J. Treece Senior Merit Award – College of Arts and Sciences, presented to a graduating senior from each of the five schools who has made the best use of his/her abilities and opportunities in accordance with the purpose of the college/school in which he/she is enrolled. The faculty members within each school nominate and select the recipients (Bellarmine University)
- 2017 Sister Mary Casilda Science Award, for one graduating senior who demonstrates outstanding research in science (Bellarmine University)
- 2017 Fred J. Karem Scholastic Achievement Award, established in 1972 to recognize student-athletes who excelled in the classroom, earning a 3.95 GPA or higher for the past two semesters (Bellarmine University)
- 2017 Letterman Club Award, student-athletes and athletic support groups who have completed their eligibility (Bellarmine University)
- 2017 Bellarmine University Women's Swimming Coach's Award, outstanding Swimmer, teammate and leader chosen by team's coaching staff (Bellarmine University)

- 2015 - 2017 Chi Alpha Sigma College Athlete Honor Society Inductee, student athletes who have maintained a 3.4 cumulative or higher GPA following their sophomore year (Bellarmine University)
- 2015 - 2017 Women's Council Scholar (Bellarmine University)
- 2014 - 2017 Bellarmine University Women's Swim Team Captain (Bellarmine University)
- 2013 - 2017 Dean's List (Bellarmine University)
- 2013 - 2017 Academic - All Great Lakes Valley Conference Swimmer (Great Lakes Valley College Athletics Conference)
- 2013 - 2017 Monsignor Horrigan Scholarship (Bellarmine University)
- 2013 - 2017 Bellarmine Trustee Scholar (Bellarmine University)
- 2013 - 2017 Kentucky GSP Scholarship (Bellarmine University)
- 2013 - 2017 Women's Swimming Scholarship (Bellarmine University)
- 2013 - 2017 Kentucky Educational Excellence Scholarship (Kentucky Higher Education Assistance Authority)
- 2016 Undergraduate Research Grant (Bellarmine University)

HIGH SCHOOL

- 2013 AP Statistics Female Student of the Year (Madison Central High School)
- 2013 Top 10 of Graduating Class (3rd Overall) (Madison Central High School)
- 2013 Lions Club Scholarship Recipient (Richmond Lion's Club)
- 2013 Richmond Exchange Club Scholarship Recipient (Richmond Exchange Club)
- 2012 Kentucky Governor's Scholar (Governor's Scholar Program)
- 2012 All-Region 5 Swimming Team (Kentucky High School Athletic Association)
- 2009 - 2012 Swimming Team Record Holder (Madison Central High School)

ACADEMIC INVOLVEMENT

GRADUATE

- 2019 - present Women in Medicine and Science Professional Development Certificate
- 2019 - present Biomedical Graduate Student Organization Buddies Mentorship Program
- 2019 - present Markey Cancer Center Trainee Advisory Council
- 2019 - present Markey Cancer Center Career Enhancement Club Member
- 2019 Appalachian Career Training in Oncology (ACTION) High School Program (Special Topics and Cancer Workshop Instructor)
- 2019 - present Biomedical Graduate Student Organization Board Member (Director of IT)
- 2018 - 2019 Biomedical Graduate Student Organization Board Member (Director of Fundraising)
- 2018 NSF Research Experience for Undergraduates, University of Kentucky (Graduate Student Program Liaison)
- 2017 - present Biomedical Graduate Student Organization Social Committee Member
- 2017 - present Biomedical Graduate Student Organization Outreach Committee Member
- 2017 - present Office of Biomedical Education, Integrated Biomedical Science Ph.D. Student Recruitment

UNDERGRADUATE

2016 – 2017	Colleges Against Cancer President, Bellarmine University
2015 – 2017	Student Athlete Activities Council, Bellarmine University
2014 – 2017	NCAA Division II Women’s Swimming Team Captain, Bellarmine University
2013 – 2017	Honors Program, Bellarmine University
2013 – 2017	NCAA Division II Women’s Swimming Team Member, Bellarmine University
2013 – 2017	Biology Club Member, Bellarmine University
2015 – 2016	Colleges Against Cancer Vice President, Bellarmine University
2015	CCSA Study Abroad Student, Kings College, London, England, UK
2014 – 2015	Colleges Against Cancer Fundraising Chair, Bellarmine University
2014	Freshman Orientation Team Member, Bellarmine University
2013 – 2014	Colleges Against Cancer Faculty Relations Chair, Bellarmine University

HIGH SCHOOL

2012 - 2013	Swimming Team Captain, Madison Central High School
2012 - 2013	Senior Class Secretary, Madison Central High School
2010 - 2013	Spanish Honors Society, Madison Central High School
2010 - 2013	National Honors Society, Madison Central High School
2009 - 2013	Spanish Club Member, Madison Central High School
2012	Youth Salute of Madison County, Madison County Schools Board of Education
2011 - 2012	Junior Class Secretary, Madison Central High School
2011 - 2012	Madison County Youth Leadership Council, Madison County Schools Board of Education
2010 - 2011	Sophomore Class Reporter, Madison Central High School
2010 - 2011	Parent Newsletter Editor-In-Chief, Madison Central High School

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

- American Association for Cancer Research (AACR)
- American Society for Biochemistry and Molecular Biology (ASBMB)
- American Association for the Advancement of Science (AAAS)

MEETINGS ATTENDED

- WIMS 5th Annual Visiting Professor Program – Dr. Laura Schweitzer (Lexington, KY, October 3, 2019)
- Midwest Zebrafish Conference 2019 (Lexington, KY, June 7 - 9, 2019)
- 12th Annual NIH Career Symposium (Bethesda, MD, May 10, 2019)
- Markey Cancer Center Research Day (Lexington, KY, May 7, 2019)
- ASBMB Annual Meeting (Orlando, FL, April 5 - 9, 2019)
- AACR Annual Meeting (Atlanta, GA, March 29 - April 3, 2019)

- FASEB: Protein Phosphatases Annual Meeting (Snowmass Village, CO, July 15 - 20, 2018)
- Markey Cancer Center Research Day (Lexington, KY, May 9, 2018)
- AACR Annual Meeting (Chicago, IL, April 14 - 18, 2018)

WORKSHOPS ATTENDED

1. Personality Differences with Rob Hayes (University of Kentucky, Training and Development Specialist, Lexington, KY, February 20, 2020)
2. Mentor - Mentee Relationships with Chelsea Barrett (University of Kentucky, Lexington, KY, November 4, 2019)
3. Discrimination, Harassment, and Sexual Misconduct: What You Need to Know (University of Kentucky, Office of Institutional Equity and Equal Opportunity, Lexington, KY, October 31, 2019)
4. Conflict Resolution with Dr. Anika Hartz (University of Kentucky, Office of Biomedical Education, Lexington, KY, October 17, 2019)
5. Responsible Conduct of Research (RCR) for College of Medicine Research Trainees with Dr. Helene Lake-Bullock (University of Kentucky, Office of Biomedical Education and Markey Cancer Center Office of Education and Training, Lexington, KY, October 1, 2019)
6. *Next Gen PhD: A Guide to Career Paths in Science* by Melanie Sinche, Book Club (University of Kentucky, September 26, 2019 - present)
7. Personal & Social Competence: Emotional Intelligence for Success with Michelle Jones (University of Kentucky, Women in Medicine and Science, Lexington, KY, June 10, 2019)
8. 12th Annual NIH Career Symposium (NIH Natcher Conference Center, Office of Intramural Training and Education, Bethesda, MD, May 10, 2019)
9. SciPhD Workshop - Practical Aspects of Getting Your First Nonacademic Job with Dr. Randall Ribaud (University of Kentucky, Office of Biomedical Education, Lexington, KY, March 21, 2019)
10. Grant Writing Workshop for Trainees: Preparing an NIH F-Series Fellowship Application (University of Kentucky, Markey Cancer Center, Lexington, KY, October 22, 2018 - April 8, 2019)
11. Science Communication Workshop with Jorge Cham (PhD Comics) (University of Kentucky, Lexington, KY, September 6, 2018)
12. New England Biolabs RNAseq Workshop (University of Kentucky, Lexington, KY, June 5 - 6, 2018)
13. Staying on Top of the Scientific Literature (University of Kentucky, Lexington, KY, February 22, 2018)
14. Office of Biomedical Education Workshop: Teaching & Research at a Small Liberal Arts College: Reflections of a SLACer (University of Kentucky, Lexington, KY, January 8, 2018)
15. Infectious Diseases Research Day (University of Kentucky, Lexington, KY, October 24, 2017)
16. Office of Biomedical Education Workshop: A Career in Science Policy (University of Kentucky, Lexington, KY, October 13, 2017)

17. ASBMB Workshop: Preparing Science Professionals (University of Kentucky, Lexington, KY, September 29 - 30, 2017)

PERSONNEL MENTORED

UNDERGRADUATE STUDENTS:

NAME:	DATES:	UNIVERSITY:	CURRENT POSITION:
Henry Moore	2018 - 2019	Univ. of Kentucky	Laboratory Technician
Ashley Estrada	Summer 2018	Northern Virginia C.C.	Completing Bachelors
Elizabeth Dugan	2016 - 2017	Bellarmino Univ.	Medical Student

HIGH SCHOOL STUDENTS

NAME:	DATES:	HIGH SCHOOL:
Isabella Spielmann	2018 - present	Paul Laurence Dunbar High School, Lexington, KY

TALKS/PRESENTATIONS (NAME OF PRESENTER BOLDED)

1. **Smith, C.N.**, Bellarmine University, Undergraduate Honors Program, Louisville, KY, February 2, 2017. *Why Bellarmine is the Place for You!*
2. **Smith, C.N.**, Bellarmine University, Undergraduate Honors Program Thesis Presentation, Louisville, KY, April 23, 2017. *Protective Effects of Quercetin Against Cadmium Toxicity in HEK-293 Cells.*
3. **Smith, C.N.**, University of Kentucky, Department of Molecular and Cellular Biochemistry Department, Lexington, KY, July 28, 2016. *Differential Methylation and Gene Expression in BEAS-2B Cells Treated with Inorganic Arsenic.*

POSTER PRESENTATIONS (NAME OF PRESENTER BOLDED)

1. **Smith, C.N.**, Spielmann, I.M., Haney, M.G., Blackburn, J.S. The PRLs and other phosphatases as novel drug targets in pediatric leukemia. Markey Cancer Center Research Day, University of Kentucky, Lexington, KY, May 7, 2019.
2. **Smith, C.N.**, Spielmann, I.M., Haney, M.G., Blackburn, J.S. The PRL family and other phosphatases as novel drug targets in pediatric cancer. ASBMB Annual Meeting, Orlando, FL, April 8, 2019.
3. **Smith, C.N.**, Blackburn, J.S. Oncogenic phosphatases as drug targets in pediatric cancers. FASEB: Protein Phosphatases Annual Meeting, Snowmass Village, CO, July 17, 2018.
4. **Smith, C.N.**, Huff, M.O. Determining the protective effects of quercetin against cadmium toxicity in human embryonic kidney cells. Annual Undergraduate Research Symposium, Bellarmine University, Louisville, KY, April 18, 2017.

DNA SEQUENCES DEPOSITED IN NCBI GENBANK

1. **Smith, C.N.**, Agadzhanov, G.E., Lau, J.M., Robinson, D.L. (2017). Genomic DNA sequence for the 'Persian Shield' plant. *Strobilanthes dyeriana* bio-material BUG-16-SD-

- 1, glyceraldehyde-3-phosphate dehydrogenase (GAPC-1) gene, partial cds. 1157 bp. NCBI GenBank Accession: KX422757.
2. **Smith, C.** (2015). Ragweed (*Ambrosia trifida*) male flower and pollen cDNA library clone BU-R-1423. AmbT-1423; similar to putative 40S ribosomal protein S7-like, mRNA sequence. The Ambrosia Project, J.M. Lau and D.L. Robinson, Bellarmine University, Louisville, KY. NCBI Accession: JZ881104.1
3. **Smith, C.** (2015). Ragweed (*Ambrosia trifida*) male flower and pollen cDNA library clone BU-R-1425. AmbT-1425; similar to putative 60S ribosomal protein L31-like, mRNA sequence. The Ambrosia Project, J.M. Lau and D.L. Robinson, Bellarmine University, Louisville, KY. NCBI Accession: JZ881105.1

SERVICE

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| Nov 7, 2019 | Observer in University of Kentucky Study Section for American Cancer Society Institutional Research Grant, University of Kentucky, Lexington, KY |
| Jul, 2019 | Mock Reviewer for Cell Signaling through PI, Jessica Blackburn |
| Jun 8, 2019 | Midwest Zebrafish Conference 2019 Session Moderator, University of Kentucky, Lexington, KY. |

OUTREACH

- | | |
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| Oct 29, 2019 | Curiosity Fair, University of Kentucky, Lexington, KY. Set up a station with microscopes and fluorescent zebrafish to demonstrate how our lab uses zebrafish to model cancer. |
| Oct 15, 2019 | American Cancer Society Hope Lodge Dinner Planning and Preparation, Lexington, KY. I planned the dinner meal, participants, and schedule for cooking dinner for patients staying at the Hope Lodge. A group and I of fifteen Markey Cancer Center Trainees prepared, served, and visited with patients during the dinner. |
| Oct 1, 2019 | Curiosity Fair Lunch and Learns, “Hook, Line, and Sinker: Using Zebrafish to Find New Cancer Therapies,” Girls, Girls, Girls Burritos, Lexington, KY. Presented to the community how we can use zebrafish and fluorescent proteins as tools to study cancer. |
| Sep 2018 - 2019 | Alex’s Lemonade Stand Foundation’s Million Mile, Team Organizer, raised \$4,182.00 and completed 1,218 miles to raise funds and awareness for pediatric cancer research. |
| Jun 12, 2019 | 4-H Student Laboratory Tours, Biological Biomedical Science Research Building, University of Kentucky, Lexington, KY. Explained to middle and high school aged girls how we use zebrafish as a tool to find new cancer therapeutics in the laboratory. |
| Jun 2013 - 2019 | American Cancer Society’s Relay for Life, Madison County, Richmond, KY, have acted as a participant in the twelve-hour event to raise money for this organization. |
| Feb 2, 2019 | Kentucky American Water – Fayette County Public Schools District Science Fair, Frederick Douglas High School, Lexington, KY, |

acted as a judge for eight projects in the fourth grade Microbiology category.

Jan 8, 2019 Science Fair Judge, Morton Middle School, Lexington, KY.

Nov 2018 - 2019 Weird Science Night, Maxwell Elementary School, Lexington, KY, showed students how zebrafish develop over time with both the naked eye and under a microscope

Jun 20, 2018 Ronald McDonald Charities of the Bluegrass, University of Kentucky, Lexington, KY cooked and served group dinner to all patients living in the house.

Apr 27, 2018 Everything is Science “Mapping the Big C”, University of Kentucky, Lexington, KY College of Pharmacy, acted as a co-presenter at Pazzo’s to introduce zebrafish models in basic research to a non-science audience.

Feb 3, 2018 Kentucky American Water – Fayette County Public Schools District Science Fair, Bryan Station High School, Lexington, KY, acted as a judge for twelve projects in the fourth through sixth grade Physics/Astronomy category.

Apr 2014 – 2018 American Cancer Society’s Relay for Life, Bellarmine University, Louisville, KY, have acted as a participant in the twelve-hour event to raise money for this organization.

Nov 16, 2017 English Conversation Club – Main Library, Louisville, KY, spoke with both adults and children who immigrated from Mexico to help improve their English.

Oct 20, 2017 Beargrass Creek Alliance Storm Drain Marking, Bellarmine University, Louisville, KY, marked all storm drains on campus.

Oct 9, 2016 IRONMAN Louisville Volunteer, Rest Area Coordinator and Worker, Louisville, KY, with the Bellarmine University Swimming Team, I worked to set up rest and food stations for racers.

Jan 2014 – 2016 Soup Kitchen Worker, assist in meal preparation, serving, and clean-up of meals provided to homeless men, women, and children

Jun 2011 – 2014 Madison County KY Special Olympics, Swimming Meet Volunteer, Richmond, KY, I have worked to time swimmers during their races as well as line swimmers up in their correct lanes before races.

Aug 25, 2013 IRONMAN Louisville, Bike-catcher, Louisville, KY, with the Bellarmine University Swimming Team, I worked to receive and place bikes from racers as they transitioned from biking to running

Aug 24, 2013 Bellarmine Day of Service, Louisville, KY, helped to reorganize and provide optimal materials for elementary library.

Jun - Aug 2013 6-year-old & Under Volunteer Swimming Team Coach, Arlington Country Club, Richmond