ACS FELLOW NAME, DEGREE (working toward or received):
Lavonte Saunders, BA Biochemistry and Mathematics, Vanderbilt University

Certificate in Cancer Studies, Case Western Reserve University, expected May 2026

NAME OF SPONSORING INSTITUTION: Case Western Reserve University

FELLOWS MENTOR(S): Jacob Scott, MD, DPhil, Staff, Genomic Sciences and Systems Biology, Cleveland Clinic Research, Radiation Oncology, Cleveland Clinic
Associate Professor, School of Medicine, Case Western Reserve University
Associate Director for Data Science, Case Comprehensive Cancer Center
Adjunct Associate Professor, Department of Physics, Case Western Reserve University
Member, Developmental Therapeutics Program, Case Comprehensive Cancer Center

DESCRIPTION OF THE FELLOWS' RESEARCH PROJECT AND PROGRESS: My research project focused on investigating the role the environment plays in modulating interactions between genomically disparate lung cancer cells and how that influences the trajectory of cancer evolution. Using a mixture of computational and experimental methods I found that highly stressful conditions (low nutrients, high drug) tend to make mutants expand at the expense of their ancestor, contributing to mutant takeover in the population. This project is significant because it establishes a foundation for understanding how each cell type influences the others and determining if it's best to inhibit or enhance those interactions. This requires elucidating the mechanism(s) of ecology and will suggest combination therapies for clinical use or inform clinician decisions about cancer evolution to sustain therapeutic efficacy. In addition, this project moves towards personalized therapies where patients can receive the right treatment at the right cadence.

My project currently is investigating the pairwise interactions of different mutational profiles in non-small cell lung cancer (BRAF, KRAS, BRAF-KRAS) with their non-mutant ancestor and one another. Future studies will focus on collecting conditioned media for mass spectrometry analyses to determine if secreted factors are responsible for ecological interactions that are observed *in vitro*. Lastly, I aim to apply ecology principles to evolutionary seascapes (tracking cancer evolution over different genotypes and drug doses). This approach will treat the cells' growth as dependent on the number and genotype of cells around them, giving another view of cancer evolution.

CAREER DEVELOPMENT ACTIVITIES (E.G., INDIVIDUALIZED COURSEWORK OR WORKSHOPS ATTENDED): My IDP was developed by both my mentor and me. We checked every few months to ensure I was reaching the goals I set for myself. When I wanted an opportunity to do a collaborative research project, my mentor suggested attendance at the Moffitt Cancer Center Integrated Mathematical Oncology workshop. I worked with scientists whom I never met before across different disciplines and generated a novel research proposal. The experience reinforced my drive to pursue the physician-scientist track because of the exciting work done by all the teams in addressing the workshop's theme of revolutionizing cancer therapy. My IDP continued to be a tool that showed me areas where I could grow and learn to become a self-directed researcher and synthesize ideas from different disciplines as well as increase my skills in bioinformatics.

- Course Work (16 credit hours): I took the following courses: cell biology, molecular biology, hallmarks of cancer, ethics of research, metabolism dysregulation and disease, grant writing, special topics in pharmacology. These gave me foundational knowledge in cancer biology from which to begin formulating research questions and developing methodologies to answer them.

- Jackson Lab Short Course: I spent a week at The Jackson Laboratory learning about the use of *in vivo* mouse models in research. I learned how to inject mice in multiple body cavities, identified and extracted different internal organs, and transplanted tumors on vascular organs. I went from having no mouse research experience to becoming more comfortable with handling them and how they are used in cancer research.

- Integrated Mathematical Oncology workshop: I spent a week in Tampa with a group of scientists across different fields such as ecology, immunology, and mathematics. We worked together to draft a research proposal and provide preliminary data to support the concept. My role was to complete a bioinformatics analysis of Moffitt Cancer Center patient data in collaboration with a few other members on my team. We drafted a specific aims page and gave a final presentation to a set of judges. We earned first place and were awarded $50K in pilot grant funding to start the project.

- Conferences: I have had multiple opportunities to present my research and have productive discussions with various individuals in different stages of their career. I've attended ABRCMS, Integrated Mathematical Oncology, Case Comprehensive Cancer Center retreats and conferences, Cleveland Clinic Research Day, and the American Cancer Society annual meeting.

- MCAT prep (4 months): I enrolled in a Kaplan prep course with zoom classes, modules, practice questions and tests. The course provided a timeline for organizing my learning process and a lot of feedback when answering questions. As a result of the material, I scored a 521 (98^{th} percentile) on the actual test. This was a huge increase from my previous score of 507 (71^{st} percentile).

- Physician Shadowing (25 hours): I shadowed multiple individuals who are certified in oncology subspecialties including radiation, pediatrics, ob/gyn, neurology, and orthopedics. This was highly valuable for me to reflect on my own career path and become more familiar with the challenging aspects of medicine such as poor prognoses. The clinicians I shadowed were also researchers, so I gained more insight about the physician-scientist pathway such as translating clinical observations to the lab and *vice versa*.

- Mock Interviews: I completed mock interviews with faculty in the Case CCC who are standard interviewers of MSTP candidates and practiced talking about my research in Post-Bacc monthly meetings to the Program Director, steering committee members, and near-peer mentors.

- Networking: I have met with and networked with researchers from different institutions during lunches with seminar speakers and met with individuals who lead various programs such as Dr. Alex Huang, the Director of Case's MSTP.

- Mentor Training: I am currently mentoring an undergraduate student in the lab where I am helping him develop as a scientist and become an independent thinker through conducting research. In addition, as the lab has new individuals join the lab, I assist with teaching them cell culture and giving a general overview of the evolutionary game theory as it pertains to lung cancer.

PUBS/MANUSCRIPTS CO-AUTHORED: (See instructions for more information):

I have been researching lung cancer evolution, examining interacting mutants under various environmental conditions such as drug and nutrient availability. I co-culture the mutant cells, analyze the data to infer their growth rates and interaction parameters, and investigate potential mechanisms of the interactions. Much of the analysis involves coding and applying mathematical principles to the data. This work is performed in conjunction with my day-to-day mentor, Eshan King, and my mentee, Henry Lee. Eshan's previous work demonstrated that dose and dose scheduling influence the evolutionary trajectory of lung cancer cells. My contributions are to use ecology/game theory to explain the interactions and to assess the role of nutrient availability in these evolutionary trajectories. The laboratory plans to publish these studies, and I will be a co-author on the planned paper.

CONFERENCE PRESENTATIONS: (See instructions for more information):

American Cancer Society Annual Meeting, 9/24/25-9/25/25, Atlanta, GA; poster
Case Comprehensive Cancer Center Retreat, 8/28/25-8/29/25, Cleveland, OH; poster
Moffitt Cancer Center Integrated Mathematical Oncology Workshop, 11/2/25-11/8/25, Tampa, FL; poster
Cleveland Clinic Research Day, 11/12/25, Cleveland, OH; poster
ABRCMS, 11/18/25, San Antonio, TX; poster

HONORS, AWARDS, FELLOWSHIPS, AND ANY OTHER SUPPORT RECEIVED DURING THE PERIOD OF TRAINING:

- Funding to attend Jackson Lab short course for mouse models in cancer research.
- Travel award for attending Integrated Mathematical Oncology workshop by Moffitt Cancer Center.
- My team won 1st place for Integrated Mathematical Oncology workshop and received $50K in pilot grant funding for team research proposal.
- Selected for spotlight in American Cancer Society impact report.
- Invited to speak as the sole post-baccalaureate fellow during the American Cancer Society Medal of Honor ceremony honoring Dr. Tyler Jacks. I received a standing ovation for my presentation and met four current and former directors of the NCI as well as Mr. Shane Jacobson, the CEO of the ACS.