NOMINATION SIGNATURE PAGE
2023 Virginia Outstanding Faculty Awards

Nominations must include this as the cover page of the nomination package PDF submission

Name of Applicant:	Alessandra Luchini
Institution:	George Mason University
Category (choose only one): • Baccalaureate Institution • Masters/Comprehensive Institution • Research/Doctoral Institution • Rising Star	Research/Doctoral Institution
Signature of President or Chief Academic Officer:	
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Excerpts from George Mason University's Mission Statement

A public, comprehensive research university established by the Commonwealth of Virginia in the National Capital Region, we are an innovative and inclusive academic community committed to creating a more just, free, and prosperous world.

The Mason IDEA: our core institutional characteristics

- Innovative = We do not cling to old ways just because they have worked in the past. We honor time-tested academic principles, while we strive to create new forms of education that serve our students better and new paths of research that can help us discover solutions to the world's greatest challenges.
- Diverse = We bring together a multitude of people and ideas in everything that we do. Our culture of inclusion, our multidisciplinary approach, and our global perspective make us more effective educators and scholars.
- Entrepreneurial = We take ideas into action. We educate students to become agents of positive change; to do or create jobs; to create value through government or business, public or private organizations, academia or the arts. We pursue discoveries that can make a difference in the world. We help our community thrive culturally, socially, and economically.
- Accessible = We are an open and welcoming community. We partner with public and private organizations in our region and around the world. We proactively engage with our community. We define our success by how many talented students with potential we serve, not how many we leave out.

SUMMARY OF ACCOMPLISHMENTS

Dr. Alessandra Luchini is a world-recognized scientist, educator, and innovator. Dr. Luchini's discoveries have led to novel concepts in disease diagnosis and drug discovery. She has developed and applied technologies to detect the faintest molecular hints of disease in the human body and has translated this new knowledge into better diagnostic tests and therapies for infectious diseases, cancer, and inflammatory diseases. Her research and entrepreneurial work have not only led to a stellar record of publications, presentations, and awards, but has also led to numerous patents and two new biotechnology start-up companies. She has achieved all of this while engaging, mentoring, and inspiring hundreds of students. A professor in the School of Systems Biology, Dr. Luchini has contributed through numerous leadership roles and currently serves as Director of the Biosciences PhD Program.

TEACHING

Dr. Luchini is a dedicated teacher committed to conveying the complexities of life, the advancements and benefits of biomedical technology, and the mechanisms and rewards of the creative process to students across all levels of their academic careers. She has mentored more than 120 students from diverse backgrounds and nationalities, and served on the dissertation committee of more than 60 students. Her mentees range from high school interns to post-doctoral fellows. One former student, Temple Douglas, was 16 and attending Thomas Jefferson High School for Science and Technology when she was accepted as a summer intern in Dr. Luchini's laboratory. Her family was trying to cope with Lyme disease; her mother and sister were showing severe symptoms that compromised their cognitive abilities and they were struggling to pinpoint the precise cause of their debilitating condition. Temple learned about nanotechnology developed by Dr. Luchini to identify early signs of cancer and applied it to the unanswered problem of Lyme disease diagnosis. She developed an assay that showed how urine could be used to identify the presence of Lyme disease in patients (including dogs), thus laying the foundation for an evidence-based treatment. As a high schooler under the guidance of Dr. Luchini, Temple was first author in a peer-reviewed scientific publication, a patent application, and was recognized and applauded in a Resolution by the Fairfax County Board of Supervisors for "her breakthrough efforts in producing a better test for Lyme disease." Temple discovered a strong passion for research: she graduated from Princeton, then Virginia Tech, and is now scientific team lead in a top national research laboratory in Portugal. The work was continued by other exceptional students, including Teresa Kaza, whose family of nine siblings was similarly and tragically hit by Lyme disease. Teresa developed a refined version of the assay, was coauthor on a second scientific publication, and was later awarded an NSF Graduate Research Fellowships Program scholarship.

Beyond the laboratory, Dr. Luchini has taught 17 courses. Specifically, she has taught numerous sessions of upper-level undergraduate classes in "infectious diseases and society," with a format consisting of interactive lectures interspersed with newspaper article discussions, debates, and hackathon-like competitions. The interactive format has been very successful, with student comments such as "*Engaging topics, interesting activities (Hackathon, movie assignment), great instructor (loved her accent), exams were challenging but a learning opportunity. One of the best classes I've taken at Mason. Thank you!*" and "*I liked how interactive the class was. The teacher was very passionate and engaged the class*." For multiple years the class, part of the general education program, received an outstanding performance with student evaluation ratings above 4.75/5 in "My overall rating of the teaching."

Dr. Luchini similarly maintains an interactive model of teaching for her graduate classes. For example, in the curriculum that she developed for a class titled "Creativity and Innovation," students explore the origin, mechanism, and value of creativity and learn examples of successful (and unsuccessful) disruptive ideas. Students receive a complete tutorial on patents

and intellectual property and exercise their creative abilities to solve real-world timely scientific problems posed in class. Students have embraced this opportunity to engage creatively, offering comments such as "*I really enjoyed humor and creative methods taught. Group work really created good idea environments,*" "*I appreciate this course! Beam of fresh air!,*" and "*Creative challenges were fun and helpful*."

Dr. Luchini also partnered with foreign universities to offer a study abroad course, "Bench to Bedside: Translational Molecular Research," in Italy and Ireland. The intensive, one-week class featured lectures by more than 20 internationally recognized experts in translational medicine in the fields of oncology, hematology and infectious diseases. In this immersive experience, morning lectures are complemented by hands-on technical workshops that illustrate issues related to implementation of new platforms and assays, including gene editing and cutting edge molecular and cellular technologies. This opportunity has deeply resonated with students, as evidenced in the following feedback. "*This fast-paced, intensive course challenged me as both a student and aspiring physician. It was exciting and very inspiring to hear about cutting-edge research being conducted by highly esteemed clinicians and scientists in their respective fields*!" "I *would recommend this program to everyone I know as it was such an eye-opening learning experience that I would never have had through GMUs normal classes*." "*The experience was invaluable both academically and culturally. The American and Italian faculty were both fantastic, and the program solidified my passion for medical research*."

DISCOVERY

Since joining George Mason University in 2005, Dr. Luchini established a productive research program that encompasses material sciences, clinical diagnostics, structural biology, drug discovery, cellular and molecular biology. Dr. Luchini's research produced 65 peer reviewed publications in high impact journals including *Nature Communication*, *Immunology*, and *Science Translational Medicine*. Dr. Luchini joined George Mason University on a grant from the Italian equivalent of the NIH to develop ways to detect molecular signs of cancer at the early stages. Diseases, early on, release almost imperceptible hints of their presence in bodily fluids. These molecular signs of cancer, or biomarkers, are low abundance and ephemeral because enzymes chop them up quickly; they are also masked by a very high background signal. As a result, they are undetectable in most laboratory assays. Dr. Luchini developed a chemical catcher technology, hydrogel nanoparticles, that can chemically attract, catch, and stabilize the biomarkers. The technology was widely published and patented, and Dr. Luchini co-founded a biotechnology company – Ceres Nanosciences – to exploit the commercial potential of the Nanotraps. This discovery also led to her recognition in Popular Science's Brilliant 10 (2011), their annual publishing of the ten most brilliant scientists in the United States each year.

The work on urine biomarker analysis that Dr. Luchini completed, leveraging the work of then high schooler Temple, has dramatically impacted our understanding of diseases, such as Lyme disease. As Professor Giusto Trevisan, Eminent Scholar of Dermatology and Venereology at the University of Trieste, Italy, observed, "*I have been in the Lyme disease field for more than 40 years and I believe that Dr. Luchini's innovative urine biomarker analysis is key to unravel the mysteries of Lyme disease, to understand its complex behavior, and to answer to the most relevant question: what is the cause of long-lasting severe symptoms that patients continue to present many years after a tick bite?"* With funds from the NIH, Luchini conducted a study on US and European patients suspected of harboring a tick-borne illness and identified hundreds of bacterial proteins providing hints on how Borrelia, the Lyme disease bacterium, behaves in the human body. "We can see enzymes that Borrelia uses to obtain energy from glucose, to build and remodel its cell wall, to escape host response" says Dr. Ruben Magni a collaborator and now scientist at NovaVax. The assay correctly predicted positive Lyme disease patients and it is currently offered to all citizens of Virginia and of the nation under a clinical study.

"*Diagnosing a lung disease like tuberculosis with a urine test may seem illogical, but a group of American researchers is now a step closer to that goal*," is the opening of a New York Times article in 2018, describing one of Luchini's projects. The nanosphere technology was used to develop a sensitive and accurate assay to detect a disease as old as humankind that still kills more than 1 million people a year and infects one third of the human population: tuberculosis. Traditionally, sputum (lung mucus) is commonly used to diagnose tuberculosis, together with chest X-rays. Using urine can revolutionize tuberculosis diagnosis, enabling prompt identification, more efficacious therapy and improved patient management. Importantly, urine is easy to obtain, whereas producing lung sputum is often a very painful process. (Some clinics have "cough rooms" where coughing fits are induced by blowing salt mist deep into the lungs.) Thanks to the nanotraps, Dr. Luchini and her collaborators conducted a successful clinical study that detected the presence of a sugar coating the bacterium that causes tuberculosis in the urine of sick patients. Their results were then confirmed by larger worldwide studies funded by the Bill and Melinda Gates Foundation and other groups.

Dr. Luchini expanded the reach of her biochemical investigations to decipher the protein puzzle and to identify the contact points where proteins interlock. There are areas of protein interfaces named "hot spots" that account for most of the energy that keeps the proteins in close contact: if these tiny areas are obstructed or modified, the whole protein complex is prevented from assembling. Having a precise understanding of the hot spots of interactions enables better drug design for any disease, including cancer and inflammatory diseases. Dyes, similar to chemicals used in textiles and copying machines, are mixed with proteins and paint the proteins everywhere except where the proteins are connected to one another. The exact sequence of the blank spot of interaction is identified in the laboratory. Dr. Luchini used Protein Painting to discover new drug targets for osteoarthritis, designed new biologics and successfully tested them in cell lines and animal models. For the past 10 years Dr. Luchini's research has been continuously funded by The National Institutes of Health (NIH), Department of Defense (DOD), the Gates Foundation, the Virginia Biosciences Health Research Corporation (VBHRC), and commercial licensees of her Mason assigned technology for a total of over $5M in research expenditures, with $2M administered as principal investigator.

KNOWLEDGE INTEGRATION

The impact of Dr. Luchini's research transcends academic boundaries. Her work on hydrogel nanoparticles led to the co-founding of Ceres Nanosciences to exploit the commercial potential of the Nanotraps. Ceres Nanosciences received NIH, VBHRC, and private investor funds to commercialize the technology developed by Dr. Luchini. Based in Manassas, Virginia, Ceres now has 30 employees, illustrating how scientific discoveries and economic development are intwined. "Ceres receives NIH contract to improve COVID-19 surveillance," Insidenova reported in 2022. During the COVID pandemic, Ceres successfully competed for the NIH Rapid Acceleration of Diagnostics initiative and received a contract to scale-up nanotrap production and then establish 16 centers of excellence for wastewater monitoring for COVID, setting the technology standard for viral disease monitoring in the future.

Dr. Luchini's Protein Painting technology and the new drug technologies are covered by patents and led to the creation of yet another new company – Monet Pharmaceuticals – to further invest in a drug and technology development program. Monet Pharmaceuticals received VBHRC support to develop immunotherapy biosimilars for cancer treatment.

Dr. Luchini's teaching, mentoring, and research are highly interrelated, as is evident in the ways that her mentoring has fostered new scientific discoveries and led new young scientists to find their pathways. This integration of teaching and research is also evident in her commitment to making herself available as a frequent lecturer to diverse audiences, including clinical microbiologists (the "Ellen Jo Baron Lectureship in Clinical Microbiology" at Stanford University,

International Lyme and Associated Diseases Society annual meeting, International Symposium on Tick-Borne Pathogens and Disease); cancer researchers (multiple instances of the American Association of Cancer Research annual meeting); infectious disease, structural biology and drug discovery specialists (Higher Order Structure of Protein Therapeutics, Center for Biologics Evaluation and Research, US Food and Drugs Administration); personalized medicine experts (Society for Personalized Nanomedicine annual meeting); and international non-profit organization for the advancement of an equitable society (Aspen Institute Italy).

Moreover, Dr. Luchini's work has been made available to the general public, having been featured in many media outlets including *The New York Times*, *The Scientist and New Scientist*, *The Independent*, *The Guardian*, *The Washington Post*, *USA Today*, Facebook science conversation (25K views), ABC News, WUSA9, the Italian *La Stampa*, *Corriere della Sera*, and *Messaggero Veneto*. Her life story was part of a book published by Mariangela Sullivan (Editor) and a documentary produced by Rai Cinema, the Italian national public broadcasting company, both entitled "Far from US." Far from US exposes a culturally updated version of the American Dream as it traces the journeys of six Italians who chose to live, work, and put down their roots in the United States. Dr. Luchini was chosen as an exemplary scientist to discuss success, opportunities, sacrifices, and expectations in modern-day America.

SERVICE

Dr. Luchini serves as the Program Director of the Biosciences PhD program, which has 74 active PhD students as of summer 2022. In this role, Dr. Luchini performs student recruitment at fairs and scientific meetings, candidate interviews, application review and admission decisions, and student pairing with scientific supervisors. In this role, Dr. Luchini introduced an individual development plan (IDP) covering core competencies depending on the trainees' interests and research topics. The use of an IDP has been associated with greater trainees' satisfaction, greater productivity, fewer conflicts with mentors, and greater career success. Dr. Luchini established external collaborations with the NIH, Food and Drug Administration (FDA), Walter Reed Army Institute of Research (WRAIR), and local biotechnology companies to allow students to perform their dissertation research in external laboratories. Currently, as a result of Dr. Luchini's innovative approach and leadership, there are 15 students working in internationally recognized laboratories conducting cancer, diabetes, infectious disease research, with projects on drug and vaccine development and radiation biomedicine.

Dr. Luchini serves as a member of many George Mason University committees including the Provost Office's Graduate Inclusion and Access (GIA) Scholarship Selection Committee and the School of Systems Biology's Curriculum, Award, and Website Committees.

Beyond Mason, Dr. Luchini is an international member of the PhD program in Molecular and Regenerative Medicine (MRM) at the University of Modena and Reggio Emilia, Italy. She serves as an associate Editor for *Bioinformatics and Artificial Intelligence for Molecular Medicine*, of the Frontier publishing group, and as scientific reviewer for dozens of reputable scientific journals. Dr. Luchini has also served on 20 study sections for the NIH, the DOD, and the NSF, with a diverse range of topics including infectious diseases, cancer nanotechnology, medical field studies, small business innovation research, wound healing, and biochemical engineering. She was scientific reviewer for the France Agence Nationale De La Recherche.

PERSONAL STATEMENT

On September 10th, 1946, my grandpa returned home to a small rural town in Northeast Italy from his two-year internment in the Wietzendorf Nazi concentration camp. Under the appalled eyes of his 5-year-old son, my dad, a yellowish ghost-like figure of less than 90 pounds for his 6'2" frame, grabbed a stick to keep his beloved family members at a distance for fear of communicating infectious diseases and parasites. My dad then saw the worn-out clothes fly out of the bathroom window, including the once awe-inspiring Alps Mountain Army hat. In a redeeming and purifying act, the pitiful garments were put on fire and reduced to ashes.

Having been identified as number 40075 for two years, my grandpa held long animated discussions on what personal identity means, and ultimately, what is the most defining element of life. I was fortunate that he lived to be 96, and he and I had many such discussions that always ended up highlighting the importance of creativity, which manifests itself in the highest products of the human spirit. He shared that what most helped him to survive the de-humanizing physical and mental conditions during his internment were his creative efforts, in the form of poetry and architectural sketches. One of the latter became his retirement house and his poems were published and enjoyed by friends and family (and brought many tears). To honor my grandpa's legacy, I have always felt passionate about creativity and seek to apply creativity in all aspects of my research and teaching, including aiming to inspire my students and trainees to be more creative.

Teaching. I view teaching as an intellectual and emotional interaction to help curious and talented minds to reach high achievements in scientific knowledge, methods, and professional conduct. Interacting with students at all levels, from one-on-one mentoring (I have mentored more than 150 students), to in person and online classes, is an incredibly enriching experience, where the constant exchange of ideas fosters mutual growth. I have witnessed how successfully completing a scientific project can be empowering for students, strengthening their self-identity, and conferring a sense of belonging to the scientific community, which often defines a person's professional and personal path for years to come. I strive to empower each student by exposing them to responsibilities and chances to mature, both scientifically and professionally. Students are guided to explore their own scientific interests, to design their projects and experiments, and are supported to become mentors early on during their graduate careers.

Importantly, students' educational offers are diversified based on each of their career interests, whether they seek to remain in academia or work in an industry setting. The program of study is therefore optimized to provide students with internship opportunities and skills that maximize a seamless transition to their industry of choice, being it government or private companies. I feel passionate about helping students develop critical skills that will guide them in their professional and human experience. With the ever-growing presence of technology in our lives, we cannot underestimate the importance of investing in people's education to ensure intelligent and optimal use of technology for human benefit.

Discovery. "*Considerate la vostra semenza: fatti non foste a viver come bruti, ma per seguir virtute e canoscenza;"* "*Consider your origin: you were not made to live as brutes, but to follow virtue and knowledge*" says Dante Alighieri in the 26th chapter of Hell in his masterpiece *The Divine Comedy*. These words, which I learned in high school, profoundly resounded with me and, in those impressionable years, I made a personal vow that I would indeed follow the words of the Poet. Many years later, I am still driven to push knowledge boundaries and walk down paths that have remained previously unexplored. I am driven to solve real world problems, such as infectious disease and cancer diagnosis, and discover novel therapies to improve people's well-being. I value the opportunities that the George Mason University environment offers to

pursue knowledge, train students and translate discoveries into real world products, which are intimately connected and potentiate each other.

Integration of knowledge. Cross fertilization of ideas is at the basis of creativity and innovation in all fields. Physicist James Maxwell used the mathematical system developed by Augustin-Louis Cauchy in continuum mechanics to create his Dynamic Theory of the Electromagnetic Field (1865). Mathematician and philosopher Gottfried Leibniz developed a binary numbering system in the XVIII century, which will become the primary language for computing systems, after he was introduced to the ancient Chinese divination text I Ching and its Yin and Yang hexagram figures. Twentieth century Austrian painter Kustav Klimt was inspired by deeply different figurative styles, including Impressionism, Art Nouveau, and Byzantine mosaics. In my research, I apply materials and chemicals used for very different, and sometimes opposite, purposes to the problems of disease diagnosis and treatment. The nanotrap particles, for example, were inspired by similar constructs that have been extensively used for drug delivery. In my research, I have used particles for the opposite purpose of capturing and preserving disease biomarkers. I have repurposed synthetic dyes, otherwise used in textiles and printers, to investigate the secrets of protein interactions and to discover novel drugs.

Service. I have served on more than 60 graduate committees. Quite frankly, the variety of students' interests and the depths of discussions never cease to impress me. For the last six years I have reviewed more than 100 applications for the Biosciences PhD program annually and I have participated in many interviews and recruitment initiatives. It is very important to set forth the greatest effort to build our graduate student community and continue to strengthen it over the years. I am very committed to scientific outreach and I have lectured for many initiatives, such as the Galileo Science café, organized by George Mason University to engage the community in science discussions, as well as forums organized by Virginia legislative representatives, such as the "Lyme and other Tick-Borne Diseases Forum," and Young Women's Leadership Program. I have participated in many high school and middle school seminars and career days (e.g., Oakton high school, Irvin Middle School) on biomedicine and nanotechnology. I have mentored 25 high school students during summers and academic years. I am genuinely inspired by the enthusiasm, the scientific knowledge, and the originality of ideas that these teenage students bring to every project.

Summary. My goals are to train students in the creative process, to help students become mature scientists, and to contribute new ideas to the community that hopefully have an academic and societal impact. I have strived to constantly improve my effectiveness as a teacher and a mentor. My professional activities are mainly devoted to contributing scholarly work of the highest rigor, to recruiting and training diverse groups of students, and to obtaining external funding to support my research. I acknowledge that my accomplishments would not have been possible without the strong support of many colleagues in the Center for Applied Proteomics and Molecular Medicine, the School of Systems Biology, George Mason University at large, and in many universities across the world, and the decisive contributions and hard work of excellent students who have been strenuously dedicated to the achievement of our laboratory goals and advancing science. My scientific and creative work are how I continue to honor my grandpa's legacy.

CURRICULUM VITAE: Alessandra Luchini

Education

Postgraduate training, Proteomics-Nanotechnology, George Mason University 2007
PhD, Bioengineering, University of Padova, Italy 2005
BS, Chemical Engineering (magna cum laude), University of Padova, Italy 2001

Work Experience

Jun 2021-present:	George Mason University, VA, Professor, School of Systems Biology.
Jan 2019-present:	George Mason University, Graduate Program Director, PhD Biosciences, School of Systems Biology (SSB).
Jun 2015-2021:	George Mason University, VA, Associate Professor, SSB.
July 2010-Jun 2015:	George Mason University, VA, Assistant Professor, SSB.
Oct 2007-July 2010:	George Mason University, VA, Research Assistant Professor, Center for Applied Proteomics and Molecular Medicine (CAPMM).
Oct 2005-Oct 2007;	George Mason University (VA): Research fellow at the Center for Applied Proteomics and Molecular Medicine (CAPMM).
Feb-May 2004:	University of Milano-Bicocca, Milan, Italy: Teaching Assistant, Master in Molecular Immunopathology, course Functional Genomics.
May-Dec 2002:	University of Milano-Bicocca, Milan Italy: Research fellow in the Department of Biotechnology and Bioscience.

Personal Statement

I create supportive mentoring systems and networks through mentoring PhD students to be effective mentors for undergraduate, high school and middle school students in their efforts to conduct biomedical research. Mentoring younger scientists is an important opportunity for graduate students to develop leadership, professional and operational skills, which are integral to the curriculum of a biomedical scientist. My research interests lie in the use of proteomics and affinity probes to study cancer and infectious disease biomarkers, and protein-protein interactions. Specifically, I have developed new technologies for biomarker discovery and measurement, and for rapid identification of druggable hot spots of interaction in protein complexes. I have applied these technologies to study lung field cancerization and early-stage breast cancer, infectious diseases pathogenesis and inflammation.

Honors and Awards

2015: Segno Donna Award for biomedical research
2013: Mason Emerging/Researcher/Scholar/Creator Award
2011: Popular Science 2011 Brilliant Ten, made the list of Top 10 young geniuses contributing to scientific discovery for my work in nanoparticles.
2009: The European Women Inventors and Innovators (EUWIIN) Gold Innovation in Science Award for my Hydrogel Nanoparticles work that enables early disease detection.
2009: Premio Award, Honoring the Top Italian Female Scientist in North America
2007: AACR-OSI Pharmaceuticals Scholar-in-Training Award
2003: StartCup Award for Technology Innovation
2002: StartCup Award for Technology Innovation

Contributions to Science

1) The field of biomarker discovery and measurement has been hampered by lack of sensitivity of current technologies and by physiological roadblocks including biomarker low abundance, lability and masking by high abundance resident proteins. I contributed to inventing and developing the Nanotrap particle technology that in one step can address all the aforementioned roadblocks. The Nanotrap particles have been used to discover new biomarkers for early cancer, infectious and neurodegenerative disease detection. As a

sample pre-processing method, the Nanotrap particles can increase effective sensitivity and precision of all diagnostic instruments, and can be incorporated in point of care devices for the collection and detection of health disorders in the field.

- Castro-Sesquen YE, Gilman RH, Galdos-Cardenas G, Ferrufino L, Sánchez G, Liotta LA, Bern C, **Luchini A**. Use of a Novel Chagas Urine Nanoparticle Test (Chunap) for Diagnosis of Congenital Chagas Disease, PLOS Neglected Tropical Diseases, 8(10): e3211 DOI:10.1371/journal.pntd.0003211

2) Protein-protein interactions (PPI) are the basis of all biological processes and are considered key drug targets. Unfortunately, PPI are thought to be undruggable because they are flat, featureless, and generally don't contain catalytic sites. Although the binding partners of approximately 10% of all estimated possible PPI are known, very little information is available on the precise sequence of the PPI interface. Thanks to my expertise in dye protein interactions, I contributed to the invention and implementation of a novel technology, protein painting, that uses surface binding small molecules and mass spectrometry in order to provide the exact sequence of PPI interacting regions. Protein painting outperformed existing competing technologies and has the potential to provide key information for 1) the development of drugs targeting PPIs, 2) the identification of antibody epitopes for vaccine development, and 3) elucidation of the effect of post translational modifications on protein PPI complexes. The inhibitors that were developed can be applied to the therapy of inflammatory disease and cancer.

- **Luchini A**, Espina V, Liotta LA, Protein painting reveals solvent-excluded drug targets hidden within native protein–protein interfaces, Nature Communications, 2014, 5:4413, doi:10.1038/ncomms5413

Examples of Published Work (65 papers)

Hetrick B, Chilin LD, He S, Dabbagh D, Alem F, Narayanan A, **Luchini A**, Li T, Liu X, Copeland J, Pak A, Cunningham T, Liotta L, Petricoin EF, Andalibi A, Wu Y. Development of a hybrid alphavirus-SARS-CoV-2 pseudovirion for rapid quantification of neutralization antibodies and antiviral drugs. Cell Rep Methods. 2022 Mar 28;2(3):100181.

R Magni, … **Luchini, A**. Evaluation of pathogen specific urinary peptides in tick-borne illnesses. Scientific Reports. 10, 19340 (2020).

A Dailing, … **Luchini**, **A.** Characterization and Validation of Arg286 residue of IL-1RAcP as a Potential Drug Target for Osteoarthritis. Frontiers in Chemistry, 2021 Feb 3;8:601477. doi: 10.3389/fchem.2020.601477. eCollection 2020.

Kim B, Araujo R, Howard M, Magni R, Liotta LA, **Luchini A**. Affinity enrichment for mass spectrometry: improving the yield of low abundance biomarkers. Expert Rev Proteomics. 2018 Apr;15(4):353-366.

R Magni, … **Luchini, A.** Lipoarabinomannan antigenic epitope differences in tuberculosis disease subtypes. Sci Rep 10, 13944 (2020).

Conti A, Fredolini C, Tamburro D, Magagnoli G, Zhou W, Liotta LA, Picci P, **Luchini A**, Benassi MS. Identification of novel candidate circulating biomarkers for malignant soft tissue sarcomas: Correlation with metastatic progression. Proteomics. 2016 Feb;16(4):689-97.

Patents (17 granted patents)

Entrepreneurial Activities: Co-founder, Ceres Nanosciences and Monet Pharmaceuticals.

Current External Support/ Funding ($2,098,214): (site PI) R01AI087776, $1,085,234, (6/18/18 - 6/17/23); (PI) 1R21AI138135-01A1, $502,980 (2/15/19 – 2/14/23); (PI) 1R21AI154295-01, $435,000 (9/1/20 - 8/31/22); (Faculty) Cellex $75,000 (9/1/20 - 8/31/23)

LETTERS OF SUPPORT: Alessandra Luchini

“Dr. Luchini complements her innovative research by being a role model and a source of inspiration for students. Dr. Luchini is a gifted educator who is loved by her students. Her undergraduate and graduate students frequently send her heart-felt thank you letters and celebrate her with flowers at the end of her classes. Recently she was appointed to be Program Director of the Biosciences PhD program (n=74 active PhD students as of Summer 2022). Under her watch, the SSB graduate program has thrived, expanding the quality number and diversity of enrolled students. Dr. Luchini is an outstanding research scientist, and role-model, who continues to use her innovative technology make an ever-increasing series of recognized discoveries and innovations in biomedical disease topics that are of high international impact such as tuberculosis, Chagas disease, osteoarthritis, and tick-borne diseases (e.g. Lyme). Her work has been continuously funded by competitive NIH and DOD and Gates Foundation grants, in addition to industry-funded research based on her patents.” **~ Lance Liotta**, MD PhD, Medical Director, Co-Director, Center for Applied Proteomics and Molecular Medicine, GMU University Professor.

“Dr. Luchini has invented and created a series of technologies such as protein painting to discover drug targets, core shell nanoparticle nanotechnology for bioanalysis and therapy, and affinity networks for diagnostics. Her successful collaboration with the George Mason University Office of Technology Transfer has led to the creation of two biotechnology spin-offs, one of which was recently awarded a large NIH RADx Tech award for operation scale-up and wastewater testing for pathogenic viruses... Moreover, the potential impact of using a non-invasive biofluid such as urine for molecular analysis and personalized interventions in the field of infectious diseases is enormous and I am impressed by the simplicity of Dr. Luchini’s method. If successfully scaled up, this diagnostic approach could help thousands of patients in a short time. Dr. Luchini also serves as an active mentor for our students and postdocs. She is a highly sought-after collaborator in several of the college’s transdisciplinary partnerships; her work embodies Mason’s values of access to excellence through providing access to treatment and diagnostics for underrepresented groups.” **~ Fernando R. Miralles-Wilhelm**, PhD, College of Science Dean, George Mason University.

“Dr. Luchini has gathered international recognition over the years. She is part of Italian Aspen Institute “Talents living abroad”, a small group of industry leaders, government bureaucrats, and university professors who were born in Italy and currently occupy leadership positions around the world. The group convenes once a year under the guide of Pres. Mario Tremonti, former Treasure Minister of the Italian Government. Pres. Tremonti collects insights from the community that materialize in initiatives aimed to strengthen the Italian economy, health care, and higher education system. Dr. Luchini emerges as an inspirational role model for young female scientists who aspire to establish a career in science, and as a natural communicator who can engage different audiences.” **~ Ruggero De Maria**, MD, Director of the Institute of General Pathology at the Catholic University of Rome and President of the Italian Institute for Genomic Medicine.

“I believe the approach Dr. Luchini has pioneered and her model of nanoparticles in urine as a direct diagnostic method have great value for infectious disease detection and surveillance, and for monitoring therapy success. Urine is an easily collected, non-invasive body fluid and the nanoparticle technology can be embedded in point of care solutions for timely detection at the bed side. This is important for testing deployment in underserved settings and in situations that require prompt diagnosis, such as in people living with HIV, for whom reactivation of tuberculosis, Chagas disease or toxoplasmosis could be fatal without timely detection. Jointly,

we have demonstrated the approach ability to detect antigen in Congenital Chagas disease, bChagas disease / HIV co-infection, tuberculosis of different types, toxoplasmosis and, in particular, toxoplasmic encephalitis. Dr. Luchini is an exceptional mentor and has trained 5 of our international and US students with very prolific output of high impact publications. I believe the capability Dr. Luchini's work has demonstrated to detect previously invisible urinary markers derived from different pathogens and her proposed rapid and accurate testing devices are very elegant and transformative and they will revolutionize the way we operate in the field. Because of the significance and impact of her research projects, Dr. Luchini's activities have increased GMU's recognition in the international public health scientific community." **~ Robert Gilman**, PhD, Professor, Johns Hopkins Bloomberg School of Public Health.

"I can attest for Dr. Luchini's accomplishments during her scientific career at George Mason University which include, among others: (i) community-wide recognition in the proteomics field, (ii) strong record of publications in peer-reviewed journals, (iii) ability to maintain a funded research program, (iv) participation in study sections, (v) student and post-doc mentorship, and (vi) valuable collaborations with researchers in academia and industry." **~ Robert Molestina**, PhD, American Type Culture Collection.

"Alessandra, I am writing to tell you how much you have changed my life. You showed me a glimpse of what people working to change the world look like and that has made so much of a difference in my life. It inspired me to go back to grad school after a brief stint of working in industry. After finishing my undergrad with the MIT Computer Science department, I went to work in finance! My job was easy, well-paid, but utterly meaningless. I am not sure if I would have been able to notice the sheer pointlessness of non-world improving work if I had not interned with you for a summer. Several months into this job, the inspiration struck and I quit for grad school. I chose the weirdest, happiest place that would take me in, the MIT Media Lab. I worked on a problem that is very close to my heart: intelligence augmentation. I tried to build devices for making humans smarter. You have been on my mind a lot recently and I want to thank you again for being so generous with your time to guide me that summer." **~ Cassandra Xia**, Head of Engineering, Evergrow.

"I love having Dr. Luchini as a mentor. I feel respected and understood. I feel stimulated by the intellectual challenges you provide, supported in all aspects of research and yet able to work independently and prove my worth." **~ Rocio Cornero**, Biosciences PhD student, BS in Chemistry, George Mason University.

"I loved the opportunity to work with Dr. Luchini as a Biology student. I would have never imagined that there is so much mathematics and statistics involved in the biological sciences. She guided me through sophisticated concepts with ease and clarity and I now feel more prepared for the challenges of my future jobs. I am impressed of how she is always progressing in her research and she proposes new topics and new software every time." ~ **Raymond Del Vecchio**, BS Computational Biology, Brown University.

"I was suffering from tremendous and unexplained cognitive impairment, weight loss, fatigue, and limited mobility. I had heard of an experimental urine test that could provide molecular information about Lyme and other tick borne diseases. My doctor told me that I could participate in a clinical study at George Mason University, supported by the NIH and the Virginia government, and I just had to provide a urine sample. It turned out there were molecules of Borrelia, the causative agent of Lyme disease, in my urine. After my doctor conducted targeted clinical and laboratory assessments, I received an antibiotic treatment, which dramatically improved my health." **~ Timothy McCarty**, Lyme disease patient.