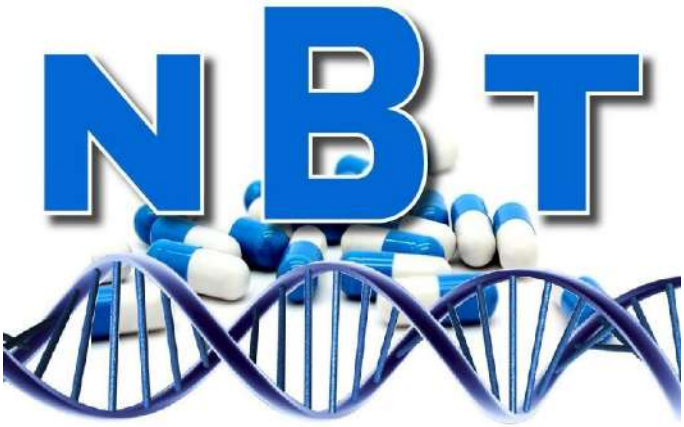

"Our corporate mission is to deliver impactful and affordable medicines that transform health outcomes for patients in emerging countries and to concomitantly reinvest locally to promote medical, science and technology education."

Curriculum Vitae

Alexzander A. A. Asea, PhD, MBA

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Last updated on June 1, 2021

CURRICULUM VITAE

Part I: General Information

Contact Information:

Name: Alexzander Andrew A. Asea, PhD, MBA

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8 The Green, Suite A
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Website: https://www.nampeva.com
Website: https://www.linkedin.com/in/alexzander-asea-phd-mba-18834a7/

Education:

1985 B.Sc., (Honors), Biochemistry and Chemistry, Makerere University, Kampala, Uganda
1995 Ph.D., Medical Microbiology and Immunology, University of Gothenburg, Gothenburg, Sweden
2019 M.B.A., Executive Management, University of Toledo, Toledo, USA

Postdoctoral Training:

1995-1996 Postdoctoral Research Fellow, Pulmonary and Critical Care Medicine, University of Miami School of Medicine, Miami, Florida, USA
1996-1998 Postdoctoral Research Assistant, Pulmonary and Critical Care Medicine, Brigham & Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA
1996-1998 Postdoctoral Research Assistant, Schepen's Eye Research Institute, Harvard Medical School, Boston, Massachusetts, USA
1998-1999 Postdoctoral Research Associate, Radiation Oncology, Dana-Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts, USA

Academic Appointments:

1999-2002 Instructor in Radiation Oncology, Department of Adult Oncology, Dana-Farber Cancer Institute and Joint Center for Radiation Therapy, Harvard Medical School, Boston, Massachusetts, USA

2002-2005 Assistant Professor of Medicine, Department of Medicine, Boston University School of Medicine and Boston University Medical Center, Boston, Massachusetts, USA

2005-2012 Associate Professor of Pathology and Laboratory Medicine (Tenured), Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2008-2012 Adjunct Professor of Molecular Biology and Laboratory Medicine, Temple College, Temple, Texas, USA

2012-2014 Professor of Microbiology, Biochemistry & Immunology (Tenured), Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Professor of Pathology & Anatomy, Morehouse School of Medicine (Tenured), Atlanta, Georgia, USA

2014-2016 Professor of Neurology, King Fahd University Hospital, Dammam, Saudi Arabia

2016-2018 Visiting Professor of Radiation Oncology, Center for Radiation Oncology Research, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2018-2021 Professor of Medicine, the University of Toledo College of Medicine & Life Sciences, Toledo, Ohio, USA

Administrative Appointments:

2005-2012 Effie and Wofford Cain Centennial Chair in Clinical Pathology, Scott & White Memorial Hospital and Clinic, Temple, Texas, USA

2005-2012 Chief, Division of Investigative Pathology, Department of Pathology & Laboratory Medicine, Scott & White Hospital, Temple, Texas, USA

2012-2014 Chairman, Department of Microbiology, Biochemistry & Immunology, Atlanta, Georgia, USA

2012-2016 Consultant Tumor Immunologist, Center for Radiation Oncology Research, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2013-2016 Head, Section of Translational Medicine, Department of Cutting-Edge Medicine and Neuroscience, The Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy

2014-2016 Vice President for Research and Director, Sponsored Programs, Research Integrity & Compliance, University of Dammam, Dammam, Saudi Arabia

2014-2016 Chairman, Department of Neuroscience, Institute for Research & Consultancies (IRMC), University of Dammam, Dammam, Saudi Arabia

2016-2018 Consultant in Tumor Immunology, Center for Radiation Oncology Research, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2018-2021 Director, Precision Therapeutics Proteogenomics Diagnostics Center, Eleanor N. Dana Cancer Center, Department of Medicine, Division of Hematology & Oncology, The University of Toledo College of Medicine, Toledo, Ohio, USA

2020-present President & CEO, NampEVA BioTherapeutics, LLC, Dover, Delaware USA

Part II: Departmental & Committee Responsibilities

Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

1999-2002 Member, Radiation Oncology Fellowship Program, Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

Boston University School of Medicine & Boston Medical Center, Boston, MA, USA

2002-2005 Deputy Chief, Center for Molecular Stress Response, Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2003 Co-Organizer, First Annual Frontiers in Molecular Medicine symposium for the Section of Molecular Medicine, Department of Medicine, Boston University School of Medicine and Boston Medical Center entitled "*Emerging Role of Toll-Like Receptors in Biology and Medicine*" October 3, 2003, Boston, Massachusetts, USA

2003 Session Chairman, "*Emerging Role of Toll-Like Receptors in Biology and Medicine*" October 3, 2003, Boston, Massachusetts, USA

2003-2005 Committee Member, Section for Molecular Medicine Graduate Admissions Committee, Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2003-2005 Committee Member, Levinsky Pre-Doctoral Fellowship Committee, Section for Molecular Medicine Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2003-2005 Organizer, Toll-Like Receptor (TLR) Interest Group Seminar Series, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Effie and Wofford Cain Centennial Endowed Chair in Clinical Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Chief, Division of Investigative Pathology, Department of Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Director, Proteomics Laboratory, Department of Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Director of Research, Department of Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Core Research Laboratories Committee, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Tissue Bank Subcommittee, Baylor Scott & White Hospital, Temple, Texas, USA

2007-2012 Intellectual Property Committee (IPC), Baylor Scott & White Hospital, Temple, Texas, USA

2009-2012 Institutional Biosafety Committee (IBC), Baylor Scott & White Hospital, Temple, Texas, USA

Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2006-2012 Tenured Associate Professor of Pathology and Laboratory Medicine, Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2007-2012 Member, Graduate School of Biomedical Science (GSBS) Graduate Faculty, Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2011-2012 At-Large Member, Graduate Committee for the COM/SGS, Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

Central Texas Veterans Health Care System, Temple, Texas, USA

2006-2010 Member, Research and Development Committee, Central Texas Veterans Health Care System, Temple, Texas, USA

Temple College, Temple, Texas, USA

2005-2012 Member, Biotechnology Initiative Advisory Council, Temple College, Temple, Texas, USA

Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Executive Faculty Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Academic Policy Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2012-2016 Consultant, Center for Radiation Oncology Research, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy

2013-2016 Head, Section of Translational Medicine, Department of Cutting-Edge Medicine and Neuroscience, The Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy

University of Dammam, Dammam, Saudi Arabia

2014-2016 Vice President for Research and Director, Sponsored Programs, Research Integrity & Compliance, University of Dammam, Dammam, Saudi Arabia

2014-2016 Chairman, Department of Neuroscience, Institute for Research & Consultancies (IRMC), University of Dammam, Dammam, Saudi Arabia

2014-2016 Professor, Department of Neurology, King Fahd University Hospital, Dammam, Saudi Arabia

The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2016-2018 Consultant, Center for Radiation Oncology Research, Department of Experimental Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

The University of Toledo College of Medicine & Life Sciences, Toledo, Ohio, USA

2018-present Director, Precision Therapeutics Protogenomics Diagnostics Center, Eleanor N. Dana Cancer Center, Department of Medicine, Division of Hem/Onc, University of Toledo College of Medicine & Life Sciences, Ohio, USA

2018-present Member, PhD in Clinical Proteomics Biomedical Science Program, Bioinformatics, Proteomics/Genomics (BIPG) Track, The University of Toledo College of Medicine and Life Sciences, Toledo, Ohio USA

2018-present Member, Biomedical Graduate Executive Committee (BGEC), The University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

2018-present Member, Biomedical Graduate Research Committee, The University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

2019-present Director, *Summer Research Program for International Medical Professionals*, in association with Alfaisal University, Riyadh, Kingdom of Saudi Arabia, Department of Medicine, University of Toledo College of Medicine and Life Sciences, Eleanor N. Dana Cancer Center, Toledo, Ohio, USA

2019-present Member, Mentoring Committee, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

Part III: Leadership Roles, Professional Activities, Awards and Honors

Leadership Roles

2002-2005 Deputy Chief, Center for Molecular Stress Response, Boston University Medical Center, Boston, Massachusetts, USA

2002-2005 Member, Accreditation Committee, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2003-2005 Member, Strategic Planning Committee, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2005-2012 Chief, Division of Investigative Pathology, Department of Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Director, Proteomics Laboratory, Department of Pathology, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Core Research Laboratories Committee, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Member, Strategic Planning Committee, Baylor Scott & White Hospital, Temple, Texas, USA

2005-2012 Member, Medical School Accreditation Committee, Texas A&M Health Science Center College of Medicine, Temple, USA

2005-2012 Bioscience Initiative Advisory Council Member, Temple College, Temple, Texas, USA

2012-2014 Chairman, Department of Microbiology, Biochemistry & Immunology, Atlanta, Georgia, USA

2012-2014 Executive Faculty Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Academic Policy Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Member, Strategic Planning Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

2012-2014 Member, Accreditation Committee, Morehouse School of Medicine, Atlanta, Georgia, USA

2013-2016 Head, Section of Translational Medicine, Department of Cutting-Edge Medicine and Neuroscience, The Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy

2014-2016 Vice President for Research, University of Dammam, Dammam, Saudi Arabia

2014-2016 Chairman, Department of Neuroscience, Institute for Research & Consultancies (IRMC), Dammam, Saudi Arabia

2014-2016 Director, Sponsored Programs, Research Integrity & Compliance, University of Dammam, Dammam, Saudi Arabia

2014-2016 Member, Presidents Advisory Council, University of Dammam, Dammam, Saudi Arabia

2014-2016 Member, University Accreditation Committee, University of Dammam, Dammam, Saudi Arabia

2018-2021 Director, Precision Therapeutics Proteogenomics Diagnostics Center, the University of Toledo College of Medicine & Life Sciences, Toledo, Ohio, USA

2019-2021 Mentoring Committee, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

2020-present President & CEO, NampEVA BioTherapeutics, LLC, Dover, Delaware USA

Scientific Advisory Boards

2005-present Multimmune, GmbH, is a biopharmaceutical company focused on the development of innovative therapeutic approaches for the treatment of cancers that express heat shock protein 70 (Hsp70).

2007-present Swedish Herbal Institute is the world leader in natural immune support and adaptogens.

2009-present Heart of Texas Purple Cancer Warriors (Temple, TX). Heart of Texas Purple Cancer Warriors is a non-profit organization dedicated to raising funds for Dr. Alexzander Asea's research.

2012-present Vitruvian BioMedical, Inc., is a biotechnology company that has implemented a unique business strategy based on early, medium and late-stage product development, which increases the goal of success and is implemented with key partners in the biotech and pharmaceutical industries that focuses on the further development and commercialization of breakthrough diagnostic tests and therapeutics for improving individualized and balanced healthcare for significant medical illnesses. The team has focused on acquiring and licensing technologies in key areas of the Central Nervous System, Oncology and Metabolic Diseases.

Professional Society Involvement

1997-present Member, American Association of Immunologists (AAI)

1997-present Member, American Association for the Advancement of Science (AAAS)

1998-present Member, American Association for Cancer Research (AACR)

2000 President, Ist International Symposium on Heat Shock Proteins in Biology and Medicine, November 6-8, 2000, Woods Hole, MA

2001-present Member, North American Hyperthermia Society

2003 President, IInd International Symposium on Heat Shock Proteins in Biology and Medicine to be held on association with the Cell Stress & Chaperone Society and the North American Hyperthermia Society, September 10-14, 2003, Quebec City, Quebec, Canada

2003-present Member, International Society of Exercise and Immunology

2004-present Member, International Society for Oncodevelopmental Biology and Medicine

2004 Session Co-Chairman, "*HSPs and Immune Responses*" 9th International Congress of Hyperthermic Oncology, April 20-24, 2004, St. Louis, Missouri, USA

2006 President, IIIrd International Symposium on Heat Shock Proteins in Biology and Medicine in association with the European Society for Hyperthermia Oncology (ESHO), May 24-27, 2006, Berlin, Germany

2008 President, IVth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 3-6, 2008, Woods Hole, Massachusetts, USA

2010 President, Vth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 7-11, 2010, Woods Hole, Massachusetts, USA

2012 President, VIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 3-7, 2012, Alexandria, Virginia, USA

2014 Co-President, VIIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 10-14 2014, Alexandria, Virginia, USA

2016 President, VIIIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 11-15, 2016, Alexandria, Virginia, USA

2018 President, IXth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 2-6, 2018, Alexandria, Virginia, USA

2019-present Member, The Human Proteome Organization (HUPO)

2019-present Member, Midwest Association for Toxicology and Therapeutic Drug Monitoring (MATT)

2019-present Member, Association of Biomolecular Resource Facilities (ABRF)

Professional Trainings/Workshops

2007 RNAi for Drug Discovery and Therapeutics, World Trade Center, Boston, MA

2008 Q-TOF LC/MS Techniques and Operations, Agilent Technologies, Chicago, Illinois, USA

2008 Short course on interpretation of mass spectra, The American Society for Mass Spectrometry, Denver, Colorado, USA

2008 Grant Writing Workshop, Office of Proposal Development, Scott & White Hospital and Clinics, Temple, Texas, USA

2008 Grant Writing Workshop, Office of Proposal Development, Reynolds Building, College Station, Texas, USA

2009 Grant Writing Workshop, Office of Proposal Development, College Station, Texas, USA

2010 Grant Writers Seminars and Workshops, Medical Research Building TAMU II, Temple, Texas USA
2010 BD FACSAria Operator Course, Temple, Texas USA
2011 ThermoFisher Scientific Liquid Chromatography and Mass Spectrometry 3-Track Workshop, Thompson Conference Center, University of Texas at Austin, Austin, Texas USA
2011 Practical Tips for Using Hydrophilic Interaction Liquid Chromatography (HILIC) in Challenging Applications, Waters Corporation, Bellaire, Texas USA
2011 Dionex Products Separation Science 2011 Fall Seminar Series, San Antonio, Texas USA
2012 Agilent Technologies "*LC-MS User Meeting*," Cedar Creek, Texas USA
2012 Agilent Technologies "*Advancing Discoveries in Cancer Research*," Houston, Texas USA
2013 Health Disparities Research Training Program (HDRTP) "*Bioethics Workshop: Respec*t," Tuskegee University, Tuskegee, Alabama, USA
2013 The Patient-centered Outcomes Research Institute (PCORI) Regional Meeting, "*The Power of Partnership in Research: Improving Healthcare Outcomes in Underserved Communities Engagement Workshop*," Memphis, Tennessee, USA
2013 Health Research Using Secondary Data Sets, "A Hands-on Workshop Using National Health and Nutrition Examination Survey (NHANES) Data," University of Alabama (UAB) - School of Health Professions, Birmingham, Alabama, USA
2013 "*Translational Medical Research Collaboration with Morehouse School of Medicine*," College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Health Disparities Research Training Program (HDRTP) Grant Writing Retreat Workshop, University of Alabama, Birmingham, Alabama, USA
2016 "*Workshop on Research Methodology*" Johns Hopkins Aramco Healthcare, March 30, 2016, Dammam, Kingdom of Saudi Arabia
2018 MALDI-7090 TOF Mass Spectrometer, Shimadzu Center, June 3-6, 2018, University of Texas, Arlington, Texas USA
2018 Axima Performance MALDI TOF TOF Mass Spectrometer, Shimadzu Center, November 13-15, 2018, University of Texas, Arlington, Texas USA
2018 SYNAPT™ G2-Si HDMS Mass Spectrometer Demonstration, Waters Corporation, December 13-14, 2018, Beverly, Massachusetts, USA
2019 Modernize Your Analytical Measurement - Waters Corporation, February 27, 2019, Columbus, Ohio, USA
2019 Design and Analysis of Quantitative Proteomic Experiments, US Human Proteome Organization (HUPO) 15th Annual Conference, March 3-6, 2019, Rockville, Maryland, USA
2019 Midwest Association for Toxicology and Therapeutic Drug Monitoring (MATT) 25th Annual meeting, April 4-5, 2019, Cleveland, Ohio, USA
2019 Tutorial on Basics of Mass Spectrometry, Advanced Imaging Mass Spectrometry (AIMS), Vanderbilt University, April 8, 2019, Vanderbilt University, Nashville, Tennessee, USA
2019 Tutorial on Basics of Histology and Microscopy, Advanced Imaging Mass Spectrometry (AIMS), Vanderbilt University, April 8, 2019, Vanderbilt University, Nashville, Tennessee, USA
2019 Advanced Imaging Mass Spectrometry (AIMS) course, April 9-12, 2019, Vanderbilt University, Nashville, Tennessee, USA
2019 Short Courses on Mass Spectrometry, 67th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Allied Topics, June 1 - 2, Atlanta, Georgia, USA

2019 67th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Allied Topics, June 2 - 6, Atlanta, Georgia, USA
2019 Lab Testing of Illegal Substances Discussion, September 9, 2019, Columbus, Ohio, USA
2019 Workshop in Sample Preparation: Understanding Sold Phase Extraction Methods - Waters Corporation, October 30, 2019, Ann Arbor, Michigan, USA
2019 Food and Drug Administration (FDA) Clinical Investigator Training Course (CITC), November 12-14, 2019, College Park, Maryland, USA
2019 IMS Great Minds Summit by Waters, Inc. - Waters Corporation, December 2-3, 2019, Indianapolis, Indiana, USA

National Institutes of Health Study Section and Council Membership

2003 Adhoc Member, National Center for Research Resources, Research Centers in Minority Institutions site visit February 2-4, 2003, Tuskegee University, Tuskegee, Alabama, USA
2003 Adhoc Member, National Center for Research Resources, Research Centers in Minority Institutions study section review committee meeting April 2, 2003, NIH Bethesda, Maryland, USA
2003 Adhoc Member, National Center for Research Resources, Research Centers in Minority Institutions site visit June 12-13, 2003, University of Puerto Rico, Rio San Piedras, Puerto Rico
2004 Adhoc Member, National Center for Research Resources, Research Centers in Minority Institutions site visit March 24-25, 2004, Universidad Central del Caribe Biomedical Research Centers, San Juan, Puerto Rico
2004 Adhoc Member, National Center for Research Resources, Research Centers in Minority Institutions site visit May 26-27, 2004, Texas Southern University, Houston, Texas, USA
2009 Peer Reviewer, American Recovery and Reinvestment Act (ARRA) of 2009 Challenge Grants, NIH Bethesda, Maryland, USA
2009 Peer Reviewer, Cancer Research United Kingdom (UK) grant applications, London, United Kingdom
2010 Peer Reviewer, Cancer Research United Kingdom (UK) grant applications, London, United Kingdom2010 Peer Reviewer, National Science Foundation (NSF) grant applications, Arlington, Virginia, USA
2010 Expert Reviewer, Fellowships Applications for the THRiVE Consortium of the University of Cambridge, Cambridge, United Kingdom; comprises of African institutions of higher learning, including Makerere University (Uganda), Kilimanjaro Christian Medical Centre (Uganda), the University of Gulu (Uganda), the Uganda Virus Research Institute (Uganda), the University of Rwanda (Rwanda), the National Institute of Medical Research at Mwanza (Tanzania) and the International Centre of Insect Physiology and Ecology (Kenya)
2010 Peer Reviewer, Health Research Board (HRB). HRB is the lead agency in the Republic of Ireland supporting health research, Dublin, Ireland

Editorial Board Memberships

[1] Editor-in-Chief and Series Editor, Heat Shock Proteins: Initiators of Inflammation and Immunity (Springer Nature Publishers) is Volume 1 in the Heat Shock Proteins series and provides the most up-to-date review on new mechanisms and provides exciting insights into how heat shock proteins modulates the host's immune response.

[2] Series Editor, Heat Shock Proteins in Cancer (Springer Nature Publisher) is Volume 2 in the Heat Shock Proteins series and looks at heat shock proteins emerging as important molecules in the development of cancer and as key targets in cancer therapy.

[3] Editor-in-Chief and Series Editor, Heat Shock Proteins and the Brain: Implications for Neurodegenerative Diseases and Neuroprotection (Springer Nature Publishers) is Volume 3 in the Heat Shock Proteins series and reviews current progress on neural heat shock proteins (HSP) in relation to neurodegenerative diseases, neuroprotection, extracellular HSP and aging and control of life span.

[4] Series Editor, Prokaryotic and Eukaryotic Heat Shock Proteins in Infectious Disease (Springer Nature Publisher) is Volume 4 in the Heat Shock Proteins series and provides the most current review of the literature relating to the role and influence of heat shock (stress) proteins on the establishment, progression and resolution of infectious disease.

[5] Editor-in-Chief and Series Editor, Heat Shock Proteins and Whole Body Physiology (Springer Nature Publishers) is Volume 5 in the Heat Shock Proteins series which provides the most up-to-date review on novel mechanisms insights into the important role played by heat shock proteins in human physiology.

[6] Series Editor, Cellular Trafficking of Cell Stress Proteins in Health and Disease (Springer Nature Publishers) is Volume 6 in the Heat Shock Proteins series brings together experts in the biochemistry, cellular biology, immunology and molecular biology of molecular chaperones and protein-folding catalysts with a focus on the mechanisms of cellular trafficking of these proteins and the role of these variegated trafficking mechanisms in both human and animal health and disease.

[7] Series Editor, Moonlighting Cell Stress Proteins in Microbial Infections (Springer Nature Publishers) is Volume 7 in the Heat Shock Proteins series brings together the world's leading experts in the study of the microbial and human cell stress proteins that are involved in enabling microorganisms to infect humans and cause serious disease.

[8] Series Editor, The Big Book on Small Heat Shock Proteins (Springer Nature Publishers) is Volume 8 in the Heat Shock Proteins series starts with the structure of small heat shock proteins, moving to their functions and finishing with their involvement in diseases.

[9] Editor-in-Chief and Series Editor, Heat Shock Protein-Based Therapies (Springer Nature Publishers) is Volume 9 in the Heat Shock Proteins series which provides the most up-to-date review on new heat shock protein-based mechanisms used in the therapy and treatment of various human disorders and diseases, including cancer, muscular atrophy, neurodegenerative disorders (Alzheimer's Disease, Multiple Sclerosis) and infectious diseases (HIV, periodontal disease).

[10] Editor-in-Chief and Series Editor, Heat Shock Protein & Plants (Springer Nature Publishers) is Volume 10 in the Heat Shock Proteins series which provides the most up-to-date review on the role of heat shock proteins in plant biology and physiology. The books also include chapters on ways in which heat shock protein technology is harnessed to develop plant-based therapies to improve human health.

[11] Series Editor, Prokaryotic Chaperonins Multiple Copies and Multitude Functions (Springer Nature Publishers) is Volume 11 in the Heat Shock Proteins series which discusses recent advances in understanding of the chaperonins and particularly multiple chaperonins.

[12] Editor-in-Chief and Series Editor, Heat Shock Proteins in Veterinary Medicine and Sciences (Springer Nature Publishers) is Volume 12 in the Heat Shock Proteins series which provides the most up-to-date reviews on current advances of the role of HSP in veterinary medicine and research, and is sub divided into sections on HSP in the following aspects of Veterinary Medicine, including, Domestic Animals, Poultry, Aquatic and

Parasites. This book is published under the Sponsorship of the Association for Institutional Research (AIR) and the Association for the Study of Higher Education (ASHE).

[13] Editor-in-Chief and Series Editor, Regulation of Heat Shock Protein Responses (Springer Nature Publishers) is Volume 13 in the Heat Shock Proteins series which provides the most up-to-date review on current advances in our understanding of the regulation of heat shock protein responses, and is sub divided into four sections, including, HSP and Stress Responses; Chaperone Functions of HSP; HSP in Human Diseases; Prognosis & Diagnosis of HSP.

[14] Editor-in-Chief and Series Editor, HSP70 in Human Diseases & Disorders (Springer Nature Publishers) is Volume 14 in the Heat Shock Proteins series which provides the most comprehensive review on contemporary knowledge on the role of HSP70 family - one of the most studied HSP - in human diseases and disorders. Using an integrative approach to expand our current understanding of HSP70 functions, the contributors provide a synopsis of novel mechanisms by which HSP70 is involved in the regulation of human diseases and disorders.

[15] Editor-in-Chief and Series Editor, Heat Shock Proteins and Stress (Springer Nature Publishers) is Volume 15 in the Heat Shock Proteins series the book Heat Shock Proteins and Stress provides the most comprehensive review on contemporary knowledge on the role of HSP in Stress. This is achieved by using an integrative approach to understanding the regulation of HSP responses. This book provide a synopsis of novel mechanisms by which HSP responses are regulated under normal physiological and pathophysiological conditions.

[16] Editor-in-Chief and Series Editor, Chaperokine Activity of Heat Shock Proteins (Springer Nature Publishers) is Volume 16 in the Heat Shock Proteins series, which provides the most up-to-date review on the chaperokine, is a term that describes the unique function of extracellular heat shock protein (eHsp) as both chaperone and cytokine.

[17] Editor-in-Chief and Series Editor, Heat Shock Proteins in Signaling Pathways (Springer Nature Publishers) is Volume 17 in the Heat Shock Proteins series, which provides the most up-to-date review on the signaling pathways of heat shock proteins.

[18] Editor-in-Chief and Series Editor, Heat Shock Protein 60 in Human Diseases and Disorders (Springer Nature Publishers) is Volume 18 in the Heat Shock Proteins series, which provides the most up-to-date review on the role of heat shock protein 60 in human diseases and disorders and provides the most comprehensive review on contemporary knowledge on the role of Hsp60 in human diseases and disorders. This book also includes biomolecular aspects of Hsp60, role of Hsp60 in various diseases including cancer, inflammatory diseases and disorders, cardiovascular diseases and disorders, neurological and neurosciences, skeletal muscle diseases and disorders and role in human health.

[19] Editor-in-Chief and Series Editor, Heat Shock Protein 90 in Human Diseases and Disorders (Springer Nature Publishers) is Volume 19 in the Heat Shock Proteins series. The contributors provide a synopsis of novel mechanisms, previously unknown signal transduction pathways. This book covers various topics including current progress on our understanding on oncogenic aspects of Hsp90, bimolecular aspects of Hsp90, role of Hsp90 in natural products development and reviews on clinical aspects of Hsp90.

[20] Editor-in-Chief and Series Editor, Heat Shock Proteins in Neuroscience (Springer Nature Publishers) is Volume 20 in the Heat Shock Proteins series, provides the most comprehensive review on contemporary knowledge on the role of HSP in signaling pathways relevant to a number of diseases. This book covers the current progress on our understanding of neurological aspects of HSP, role of HSP in neurodegenerative diseases

and disorders, importance of HSP in Multiple Sclerosis, role of HSP in Alzheimer's disease and update on the development of HSP-based therapies for neurological disorders.

[21] Editor-in-Chief and Series Editor, Heat Shock Proteins-Based Cancer Therapies (Springer Nature Publishers) is Volume 21 in the Heat Shock Proteins series. The contributors provide a synopsis of the most current updates on the state of HSP in cancer therapeutics. Contributors provide the most up-to-date data about the direct connections between heat shock response players and tumor cell survival, validating heat shock response players as novel molecular targets in anticancer treatment. The conclusion is that future advancements in this fast-growing area can potentially lead to the next generation of cancer therapeutics.

[22] Editor-in-Chief and Series Editor, Heat Shock Proteins in Human Diseases and Disorders (Springer Nature Publishers) is Volume 22 in the Heat Shock Proteins series, which provides the most comprehensive review on contemporary knowledge on the role of HSP various types of human diseases including breast cancer, pancreatic ductile adenocarcinoma, renal conditions with kidney disease and renal cell carcinoma, irreversible remodeling of atrial fibrillation (AF), age-related disorders such as Alzheimer's disease, Parkinson's disease, diabetes, rheumatoid arthritis, and atherosclerosis and Kaposi's sarcoma-associated herpesvirus. These diseases have a dismal prognosis, the survival benefit offered by the current standards do not greatly impact the overall survival statistics with the disease and are associated with toxicity.

[23] Editor-in-Chief and Series Editor, Heat Shock Proteins in Inflammatory Diseases and Disorders (Springer Nature Publishers) is Volume 23 in the Heat Shock Proteins series, which provides the most comprehensive review on contemporary knowledge on the role of HSP in Inflammatory Diseases including sepsis, psoriasis, neurodegenerative diseases, cancers, viral infection and autoimmune rheumatic diseases. Cellular homeostasis plays cytoprotective activities under pathological conditions are Hsp, which acts through the initiation of repair mechanism, protein folding, degradation of irreversible proteins and refolding of misfolded proteins. Hsp alters the inflammation modules through inhibition of cytokines, pro-inflammatory factors, by which playing the significant functions in the inflammatory diseases. The therapeutic potential of HSP in inflammatory/autoimmune skin diseases has emerged owing to their ability to induce the regulation of regulatory T-cells, which play critical role in induction and dysregulation of immune response leading to the progression of several inflammatory/autoimmune diseases.

[24] Editor-in-Chief and Series Editor, Heat Shock Protein Factors (Springer Nature Publishers) is Volume 24 in the Heat Shock Proteins series, which provides the most comprehensive review on contemporary knowledge on the role of Heat shock transcriptional factor 1 (HSF1), is the dominant transcriptional factor mediating the synthesis of heat shock proteins (Hsp). HSF1 is mostly characterized for its role in activating the expression of a repertoire of protein-coding genes, including the heat shock protein (HSP) genes, in response to heat stress, as well as other cellular stresses. The post-translational modifications of HSF1 including phosphorylation, SUMOylating and acetylation in the regulatory domain were important for its functional activation. HSF1 decreased in pathological cardiac hypertrophy caused by pressure overload, while increased in pose of regular exercise. Overexpression of HSF1 alleviates myocardial infraction and atherosclerosis, while there are also some discrepancies in HSF1's role in cardiac aging and heart failure, suggesting that HSF1 is closely associated with the progression of cardiovascular diseases, and it is expected to be a new therapeutic target.

[25] Editor-in-Chief and Series Editor, Special Edition of Coronavirus I (Springer Nature Publishers) is Volume 25, which provides the most comprehensive review on

contemporary knowledge on the severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) associated coronavirus pandemic has posed global health emergency. Coronaviruses are a group of enveloped viruses with non-segmented, single-stranded, and positive-sense RNA genomes. Human coronavirus infection causes respiratory diseases with mild to severe outcomes. In the last 15 years, we have witnessed the emergence of two zoonotic, highly pathogenic human coronavirus: severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV).

[26] Editor-in-Chief and Series Editor, Special Edition on Coronavirus II (Springer Nature Publishers) is Volume 26, which provides the most comprehensive review on contemporary knowledge on severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) associated coronavirus pandemic has posed global health emergency. The virus is transmitted by inhalation or contact with infected droplets and the incubation period ranges from 2 to 14 d. The case fatality rate is estimated about 6%. This book focuses on the epidemiology and transmission immunopathology of SARS-CoV-2 infection, based on the available data on SARS-CoV-2 and other coronaviruses.

[27] Editor-in-Chief and Series Editor, Special Edition on Coronavirus III (Springer Nature Publishers) is Volume 27, which provides the most comprehensive review on contemporary knowledge on the role of severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) associated coronavirus pandemic has posed global health emergency. This includes clinical features, diagnostic evaluation, management, infection prevention and safe handling of deceased bodies with suspected and confirmed with COVID-19.

[28] Editor-in-Chief and Series Editor, Special Edition on Coronavirus IV (Springer Nature Publishers) is Volume 28, which provides the most comprehensive review on contemporary knowledge on the role of tremendous adverse effects of COVID-19 observed at social/cultural/ religious/economic level and other sectors of the society albeit its huge progressive. Lockdowns are encouragable as a matter of the reduced infection and death rate is concerned.

[29] Editor-in-Chief and Series Editor, Special Edition on Coronavirus V (Springer Nature Publishers) is Volume 29, which provides the most comprehensive review on contemporary knowledge on the role of understanding the pathogenesis of COVID19. Heat shock proteins are key stabilizing molecules in various pathways in lungs and kidneys have antioxidant, vasodilatory and anti-inflammatory actions.

[30] Editor-in-Chief and Series Editor, Special Edition on Coronavirus VI, 2nd Edition in Prokaryotic and Eukaryotic Heat Shock Proteins in Infectious Diseases (Springer Nature Publishers) is Volume 30 in the Heat Shock Proteins series, which provides the most comprehensive review on contemporary knowledge on the role of heat shock proteins in response to various infectious diseases. HSPs play regulatory roles in the cell and can block cell death pathways that contribute to their functions in heat resistance during the HSR. More recently, HSPs have been shown to exit cells during the HSR and have been shown to play an inflammatory role as damage associated molecular patterns (DAMPs), mediating the release of inflammatory cytokines. HSPs can also play a role in adaptive immunity by ferrying antigenic peptides into antigen presenting cells and mediating the cross priming of antigen presenting cells (APCs) with extracellular antigens. HSPs and the HSR may play a multitude of roles during infection. Intracellular HSPs may be co-opted by infectious particles such as prions and viruses and play a role in their virulence due to molecular

chaperone functions. HSPs are also involved in a variety of responses to cellular pathogens such as bacteria, mycobacteria, and protozoan parasites.

[31] Editorial Advisory Board Member, Recent Patents on Inflammation and Allergy Drug Discovery (Bentham Science Publishers) publishes review and research articles, and guest edited thematic issues on recent patents in the field of inflammation and allergy drug discovery e.g. on novel bioactive compounds, analogs and targets and also covers recent research (where patents have been registered) in fast emerging therapeutic areas/targets & therapeutic agents related to inflammation and allergy drug discovery.

[32] Editorial Advisory Board Member, Geriatrics Medicine (GM) Journal (Bentham Science Publishers) GM is the leading journal concerned with older people's healthcare and plays a pivotal role in helping readers meet the challenge of managing related diseases. GM Journal provides practical clinical articles written by leaders in their field that exemplify best practice in all the therapeutic areas relevant to the care of older people, and the latest news and advance reports, which relay important developments in the care of older people from key international medical meetings.

[33] Editorial Board Member, Cell Stress & Chaperones (Springer Nature Publishers). An integrative journal of stress biology and medicine and the official journal of the cell stress society international.

[34] Managing Editor, Frontiers in Bioscience (Frontiers in Bioscience Publishers). A worldwide journal and virtual library for scientists, physicians and patients. Frontiers in Bioscience publishes manuscripts, books, lectures, databases and other useful information.

[35] Editorial Board Member, The Scientific World Journal (Hindawi Publishing Corporation), a peer-reviewed scientific journal covering fields in the life sciences ranging from biomedicine to environmental sciences and its primary audience are researchers working in these fields.

[36] Editorial Board Member, SOJ Clinical Trials (Symbiosis Publishers), a peer-reviewed scientific journal covering detailed protocols that have been approved by the ethics committee (IRB/IEC), and that have been registered in a trial registry database (clinicaltrials.gov, ICTRP, EU clinical trials register etc.) before commencement of subject enrollment. The design, conduct, reporting editing and publishing of trial reports follow international guidelines (ICMJE, CIOMS).

[37] Editorial Board Member, Journal of Stem Cell and Transplantation Biology (Elyns Publishing Group) is an international online open access peer reviewed journal dedicated to encourage translational research in stem cell biology, and covers stem cell biology, different types of stem cells including embryonic and grownup stem cells, stem cell therapies, transplantations and other applications.

Journal Reviewer (in alphabetical order)

[1] African Journal of Traditional Complimentary and Alternative Medicine
[2] Acta Gastro-Enterologica Belgica
[3] Aging Cell
[4] Acta Pathologica, Microbiologica et Immunologica (AMPIS)
[5] Archives of Microbiology
[6] Biogerontology
[7] Bioscience & Bioengineering
[8] BMC Cell Biology
[9] BMC Immunology

[10] Brain Behavior and Immunity
[11] Brain Research
[12] Cancer Immunology and Immunotherapy
[13] Cancer Research
[14] Cellular Immunology
[15] Cellular & Molecular Medicine
[16] Cell Stress & Chaperones
[17] Circulation Research
[18] Clinical and Developmental Immunology
[19] Clinical and Experimental Immunology
[20] Clinical and Vaccine Immunology
[21] Clinical Cancer Research
[22] Clinical Chemistry and Laboratory Medicine
[23] Current Cancer Drug Targets
[24] Current Zoology
[25] Drugs of the Future
[26] European Journal of Hematology
[27] European Journal of Immunology
[28] Exercise Immunology Review
[29] Experimental Hematology
[30] Expert Review of Anti-Cancer Therapy
[31] Expert Review of Clinical Immunology
[32] Expert Review of Dermatology
[33] Frontiers in Bioscience
[34] Future Drugs Expert Review
[35] Future Medicine
[36] Immunogenetics
[37] Immunology
[38] Immunology and Cell Biology
[39] Infection and Immunity
[40] International Immunology
[41] International Journal of Biochemistry and Cell Biology
[42] International Journal of Cancer
[43] International Journal of Hyperthermia
[44] Journal of Allergy and Clinical Immunology
[45] Journal of Applied Physiology
[46] Journal of Biochemistry and Cell Biology
[47] Journal of Biological Chemistry
[48] Journal of Bioscience and Biotechnology
[49] Journal of Cell Science
[50] Journal of Clinical Immunology
[51] Journal of Immunology
[52] Journal of Immunotherapy
[53] Journal of Leukocyte Biology
[54] Journal of Microbiology, Immunology and Infection
[55] Journal of Stem Cell and Transplantation Biology
[56] Journal of Virology
[57] Lasers in Surgery & Medicine

[58] Molecular Cancer Therapy
[59] Molecular Immunology
[60] Nature
[61] Nature Immunology
[62] PLoS ONE
[63] Proceedings of the National Academy of Science (PNAS)
[64] Radiation Research
[65] SOJ Clinical Trials
[66] The Scientific World Journal

Awards and Honors

Young Investigator Award, Society for Leukocyte Biology, August 25-28, 1996. Verona, Italy

Award Winner, UNCF/Merck Postdoctoral Science Initiative Fellowship Award, 1997. Rahway, New Jersey, USA

Award Winner, Federation of American Societies of Experimental Biology (FASEB) Grant writing seminar (Phase I), January 14-16, 2000, Orlando, Florida, USA

Plenary Lecture, "*Extracellular HSP70: A Chaperokine*" 8th International Congress of Hyperthermic Oncology, April 26-29, 2000, Kyông-Ju, South Korea

Award Winner, Federation of American Societies of Experimental Biology (FASEB) Grant writing seminar (Phase II), May 19-22, 2000, Tucson, Arizona, USA

Chairman, Ist International Symposium on Heat Shock Proteins in Biology and Medicine, November 6-8, 2000, Woods Hole, Massachusetts, USA

Plenary Lecture, "*The Chaperokine Effect of HSP70*" International Symposium on Heat Shock Proteins in Biology and Medicine. November 6, 2000, Woods Hole, Massachusetts, USA

Keynote Speaker, 2nd Conference on "*The Black Plague: Health, Population, Cancer & AIDS in the African Diaspora*" West Virginia State College. May 3-5, 2001, Institute, West Virginia, USA

Distinguished Lecturer, Center of Excellence, College of Pharmacy & Pharmaceutical Sciences, Florida A&M University, November 20, 2002, Tallahassee, Florida, USA

Chairman, IInd International Symposium on Heat Shock Proteins in Biology and Medicine to be held on association with the Cell Stress & Chaperone Society and the North American Hyperthermia Society, September 10-14, 2003, Quebec City, Quebec, Canada

Subject Matter Expert, "*Role of Heat Shock Proteins in Innate Immunity*" Defense Advanced Research Projects Agency (DARPA) Endogenous Defense Workshop, Department of Defense, July 13-15, 2004, Fairfax, Virginia, USA

Subject Matter Expert, Biodefense Conference "*Innate Immunity and its Value to Biodefense*", Department of Defense, National Defense University, November 10, 2004, Washington, District of Colombia (DC)

Subject Matter Expert, "*Molecular and Cell Biology of HSP70*" 2nd Annual Integrative Neural Immune Program (INIP) NIMH/NIH Biodefense Workshop on Neural & Neuroendocrine Host Factors in Shock and Immune Tissue Damage: Implications for Biodefense Treatment Strategies, January 31, 2005, Bethesda, Maryland, USA

Chairman, IIIrd International Symposium on Heat Shock Proteins in Biology and Medicine in association with the European Society for Hyperthermia Oncology (ESHO), May 23-25, 2006, Berlin, Germany

Frederick Hutchinson Award, IIIrd International Symposium on Heat Shock Proteins in Biology and Medicine, May 25, 2006, Berlin, Germany

Subject Matter Expert, "*HSP70: a Chaperokine*" The Novartis Foundation Symposium, June 5-7, 2007, London, United Kingdom

Chairman, IVth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 3-6, 2008, Woods Hole, Massachusetts, USA

Session Co-Chairman "*New Directions in Immunology, Stress Biology and Thermal Therapy*" Society of Thermal Medicine Annual Meeting, April 7, 2009, Tucson, Arizona, USA

Invited Seminar, "*Targeting Hsp27 for Therapeutic Gain: Role in Tumor Recognition*" King's College London, April 16, 2009, London, United Kingdom

Councilor for Biology & Chemistry, Society for Thermal Medicine (STM). 2009-2011.

Keynote Lecture, "*Use of Heat Shock Proteins for Therapeutic Gain*" 25th Annual Meeting of the European Society for Hyperthermia Oncology (ESHO), June 4–6, 2009, Verona, Italy

President, Vth International Symposium on Heat Shock Proteins in Biology and Medicine, November 7-11, 2010, Marine Biological Laboratories (MBL) Woods Hole, Massachusetts, USA

Invited Speaker, "*Designing Heat Shock Protein-Based Drugs*" College of Medicine, Al-Imam University, April 12, 2010, Riyadh, Saudi Arabia

Nature Publishing Group's Nature Reader Advisory Panel, New York, New York, USA. 2010.

Board of Directors, Breast Cancer Initiative East Africa (BCIEA). BCIEA is a non-profit organization dedicated to take the lead in the advancement of breast cancer surveillance and improved survival rates targeted to the most neglected population in the low-income communities of East Africa. BCIEA mission is to empower people through education based on proven methods and resources that are regionalized and culturally acceptable to target audiences. 2010.

Subject Matter Expert, "*Licensing Opportunities and Challenges for Academic Discoveries*" hosted by Florida A&M University, March 28-29, 2011, Tallahassee, Florida, USA

Session Chair, "*Thermally Augmented Immuno-, Chemo- and Radiosensitization*" at the Society for Thermal Medicine Annual Conference, April 29-May 2, 2011, New Orleans, Louisiana, USA

Session Chair, "*Thermal Therapies*" 27th Annual Meeting of European Society for Hyperthermic Oncology (ESHO), May 26-28, 2011, Aarhus, Denmark

Invited Speaker, "*Heat Shock Protein-Based Anti-Breast Cancer Drugs*" at the 2nd Conference Hosted by the Breast Cancer Initiative East Africa Inc., June 15-18, Kigali, Rwanda

"*Humanitarian Award*" the Greater Frisco Chapter of Jack and Jill of America, October 1, 2011, Dallas, Texas, USA

"*Educator of the Year Award*" the Greater Frisco Chapter of Jack and Jill of America, October 8, 2011, Dallas, Texas, USA

"*Hero of Breast Cancer Research Award*" the Blazing Trails International Center, October 15, 2011, Dallas, Texas, USA

"*The Inspiring Hope Award*" Breast Cancer Resources Centers (BCRC) of Texas, October 25, 2011, Georgetown, Texas, USA

Session Chair, "*Control of Inflammation and Immunity by Mediators of Thermal Stress*" Society for Thermal Medicine (STM) Annual Meeting, April 13–16, 2012, Portland, Oregon, USA

Co-President, VIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 17-19, 2012, Woods Hole, Massachusetts, USA

Invited Speaker, "*Opportunities for Translational Medical Research Collaboration with Morehouse School of Medicine*," Guangxi Medical University, March 26, 2013, Nanning, China

Invited Speaker, "*International Summer Research Program for Undergraduate Medical Students at Morehouse School of Medicine*," Guangxi Medical University, March 28, 2013, Nanning, China

Invited Speaker, "*Opportunities for Translational Medical Research Collaboration with Morehouse School of Medicine*," Guangxi University of Chinese Medicine, April 2, 2013, Nanning, China

Invited Speaker, "*International Summer Research Program for Undergraduate Medical Students at Morehouse School of Medicine*," Guangxi University of Chinese Medicine, April 4, 2013, Nanning, China

Session Chair, Immune Mechanisms at the Society for Thermal Medicine (STM) Annual Meeting, April 17–21, 2013, Aruba

Session Chair, Clinical Developments at the 28th Annual Conference of the European Society for Hyperthermia Oncology, June 19–22, 2013, Munich, Germany

Research Excellence Award Recipient, College of Pharmacy & Pharmaceutical Sciences. Florida A&M University, July 15, 2013, Tallahassee, FL USA

Award for Excellence in Teaching and Technical Demonstrations during the "*Summer Research Program*," from the Department of Microbiology, Biochemistry and Immunology, Morehouse School of Medicine, July 10-August 19, 2013, Atlanta, Georgia, USA

Session Chair, Plant Heat Shock Proteins and Plant-Based Therapies at the VIth International Congress on Stress Proteins in Biology and Medicine, August 18–22, 2013, Sheffield, United Kingdom

Head, Section of Translational Medicine, Department of Cutting-Edge Medicine and Neuroscience, The Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy 2013

President, VIIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 10-14, 2014. Alexandria, Virginia, USA

Keynote Speaker, 1st Annual Scientific Research Update 2015, University of Dammam, April 5-7, 2015. Dammam, Saudi Arabia.

Tumor Immunology Refresher Course at the 32nd Annual Meeting of the Society for Thermal Medicine. April 14-17, 2015. Orlando, FL USA

Keynote Speaker, "*Establishing a GMP-Grade Pharmaceutical Manufacturing Hub in East Africa*" East African Chamber Annual Conference, September 29-October 1, 2016. Dallas, Texas USA

President, VIIIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 5-8, 2016. Alexandria, Virginia, USA

Keynote Speaker, "*Establishing a GMP-Grade Pharmaceutical Manufacturing Hub in East Africa*" DVA Consortium, December 2, 2016. Gaithersburg, Maryland USA

Keynote Speaker, "*Development of an Anti-Cancer Drug*" Holland High School, December 2, 2016. Holland, Texas USA

Keynote Speaker, "*Development of an Anti-Cancer Drug*" Salado High School, December 2, 2016. Salado, Texas USA

Keynote Speaker, "*Imaging Proteogenomics for Biomarker Discovery*" 34th Annual Society for Thermal Medicine Conference. May 5-11, 2018. Westin La Paloma Resort, Tucson, Arizona, USA

Keynote Speaker, "*Proteogenomic identification of Hsp27 in Cancer Growth and Metastasis*" 35th Annual Society for Thermal Medicine Conference. May 5-11, 2018 Westin La Paloma Resort, Tucson, Arizona, USA

Session Chair, "*Biology of Heat Shock Proteins*" Society for Thermal Medicine (STM) Annual Meeting, May 5-10, 2018, Tucson, Arizona, USA

President, IXth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 2-6, 2018. Alexandria, Virginia, USA

Keynote Speaker, "*Precision Medicine and the Proteogenomic Platform*" IXth International Symposium on Heat Shock Proteins in Biology and Medicine in association with Cell Stress Society International (CSSI), November 2–6, 2018. Alexandria, Virginia, USA

Award for Excellence in Lectures and Practical's during the "*Summer Research Program*," College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia, Department of Medicine, University of Toledo College of Medicine and Life Sciences, Eleanor N. Dana Cancer Center. August 16, 2019. Toledo, Ohio, USA

Keynote Speaker, "*Target the Target: Precision Medicine*" Ninth International Congress on Stress Responses in Biology and Medicine, November 10-14, 2019, San Diego, California, USA

Part IV: Research, Administration and Teaching

A. Narrative of Research

Overview - My major research interests involve working with basic and clinical research scientists to advance innovative translational research projects from the bed to the bedside utilizing molecular, cellular and proteogenomics-based research for clinical trials and new treatments for cancer patients. We are currently focused on the development of highly potent and effective heat shock protein (HSP)-based therapies to combat disease and improve human health. HSP are highly abundant, stable proteins found in all cellular organisms. For this very reason my research and the results we produce have far wider implications not only for human health, but also relevance in all biological systems including plants, mammals, fish and microbes. HSP possess the special property of binding peptides, small fragments of proteins found inside all cells. This property makes HSP suited as carrier molecules to sample the peptide antigens found inside cancer cells for use in vaccines to stimulate anti-tumor immunity and enhance immune surveillance. This interest has lead me to focus my efforts in understanding the role of HSP in various diseases including cancer, diabetes, aging, exercise, sickle cell disease, cardiovascular diseases, neurodegenerative disorders and respiratory diseases (COVID-19, H1N1, Influenza).

The model system we use is schematically represented below (**Fig 1**). Briefly, stress can either induce cell death by activating the death pathway or activate the cellular stress response, which stimulates synthesis of intracellular Hsp72 known to inhibit cell death. Increased intracellular Hsp72 is expressed on the surface of cells and becomes a target for NK cell cytotoxicity. Intracellular Hsp72 is subsequently released into the extracellular milieu within exosomes and enters the circulation. Circulating extracellular Hsp72 (eHsp72) binds to APC and stimulates the chaperokine effect; cytokine, chemokine and reactive oxygen species release. In addition, peptides chaperoned by eHsp72 are processed and presented in the context of the MHC class I to stimulate specific CTL responses. Psychological stress and exercise induce the release of eHsp72 into the circulation by a hitherto unknown tissue or organ (**Fig 1**).

Our research team was the first to demonstrate that exogenously added Hsp70 possesses potent cytokine activity, with the ability to bind with high affinity to the plasma membrane, elicit a rapid intracellular Ca^{2+} flux, activate NF-κB, and up-regulate the expression of pro-inflammatory cytokines in human monocytes. We reported that Hsp70-induced pro-inflammatory cytokine

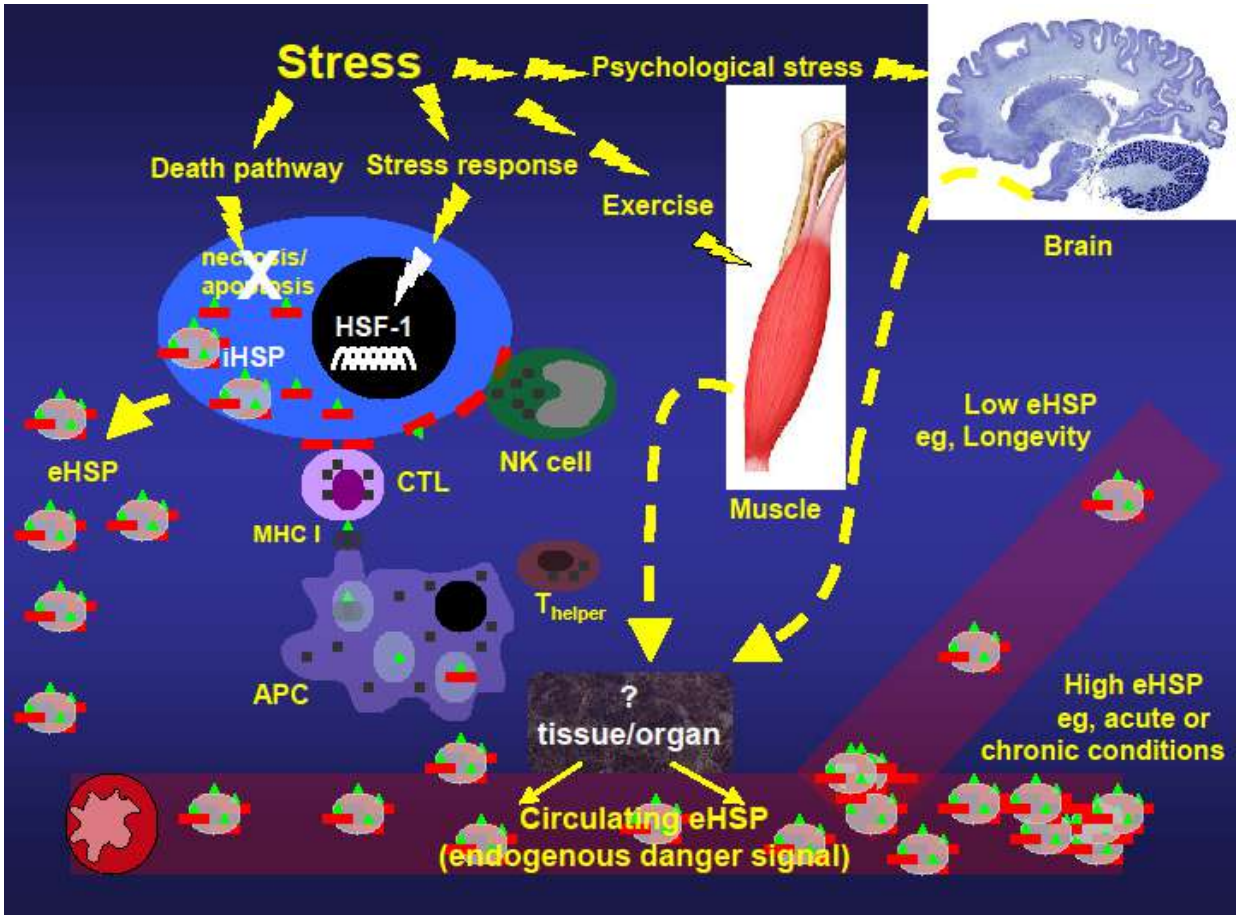

Fig 1. Model for stress-induced release of Hsp72 into the circulation. Stress can either induce cell death by activating the death pathway or activate the cellular stress response, which stimulates synthesis of intracellular Hsp72 known to inhibit cell death. Increased intracellular Hsp72 is expressed on the surface of cells and becomes a target for NK cell cytotoxicity. Intracellular Hsp72 is subsequently released into the extracellular milieu within exosomes and enters the circulation. Circulating extracellular Hsp72 (eHsp72) binds to APC and stimulates the chaperokine effect; cytokine, chemokine and reactive oxygen species release. In addition, peptides chaperoned by eHsp72 are processed and presented in the context of the MHC class I to stimulate specific CTL responses. Psychological stress and exercise induce the release of eHsp72 into the circulation by a hitherto unknown tissue or organ.

Reference: "*Circulating HSP70 in Hyperthermia and Cancer Therapy*" 2RO1 CA091889-06, ASEA, A, (PI) from the National Cancer Institute/National Institutes of Health. The major goal of this project is to investigate the mechanism by which extracellular HSP70 activates the immune response during hyperthermia treatment.

production is mediated *via* the MyD88/IRAK/NF-κB signal transduction pathway and that Hsp70 utilizes both TLR2 (receptor for Gram-positive bacteria) and TLR4 (receptor for Gram-negative bacteria) to transduce its pro-inflammatory signal in a CD14-dependent fashion. These studies now pave the way for the development of highly effective pharmacological or molecular tools that will either up-regulate or suppress Hsp70-induced functions in conditions where Hsp70 effects are desirable (cancer) or disorders where Hsp70 effects are undesirable (arthritis and arteriosclerosis).

Our initial observations studying the effect of heat shock proteins on human monocytes led to a novel paradigm shift in the way in which we view heat shock proteins; that heat shock proteins previously known to be an intracellular molecular chaperone can be found in the extracellular milieu where it has regulatory effects on immunocompetent cells. Our group was the first to describe the chaperokine effect of Hsp70. This is a term coined by us that better describes the dual function of extracellular HSP as a chaperone and cytokine, chaperokine. Chaperokine is now widely used by HSP researchers. This is significant because it has helped focus researchers to study the chaperokine effect of Hsp70 in a number of diseases including cancer, diabetes, aging, infectious diseases, exercise immunophysiology, autoimmune disorders, cardiovascular diseases and neurodegenerative disorders.

My specific research interest is focused on the development of heat shock protein (HSP)-based anti-cancer therapies. We have programs in basic science to understand unique mechanisms by which our drugs function. This is important because it is with this knowledge that we can develop even more potent drugs. In addition, we have preclinical tumor animal models and collaborate with clinician scientists in clinical trials. Below is a list of our current projects.

Cancer Research Program

Cancer is defined as the uncontrollable growth and spread of cells. Cancer can start almost anywhere in the human body. The genetic changes that contribute to cancer tend to affect three main types of genes—proto-oncogenes, tumor suppressor genes, and DNA repair genes. These changes are referred to as "drivers" of cancer. Proto-oncogenes are involved in normal cell growth and division. However, when these genes are altered in certain ways or are more active than normal, they may become cancer-causing genes (or oncogenes), allowing cells to grow and survive when they should not. Tumor suppressor genes are also involved in controlling cell growth and division. Cells with certain alterations in tumor suppressor genes may divide in an uncontrolled manner. DNA repair genes are involved in fixing damaged DNA. Cells with mutations in these genes tend to develop additional mutations in other genes. Together, these mutations may cause the cells to become cancerous.

1. Breast Cancer Project

(i) Triple-Negative Breast Cancer Project: Despite lower incidence and the steady improvement in screening, African-American women are more likely to die of breast cancer than Caucasian women. Studies on surface receptors and gene expression of some breast tumors resulted in the term triple-negative breast cancer (TNBC), because of testing negative for estrogen receptor (ER), progesterone receptor (PgR) and negative testing for the human epidermal growth factor receptor 2 (HER2) gene expression. This creates a phenotype and disease quite distinct from that seen in other subtypes of breast cancer, in that TNBC and is a much more aggressive disease—recurring and metastasizing more often than other kinds of breast cancer, without tumor-specific treatment options and accounts for 15% of all types of breast cancer with higher percentages in

premenopausal African-American women. Studies demonstrated that the degree of African ancestry correlated with increasing frequency of TNBC with Caucasian American < African American < Ghanaian/African backgrounds.

It is now well accepted that women of African ancestry presenting with TNBC are more likely to have late stage, aggressive, rapidly growing, and less hormone-responsive breast tumors compared to TNBC found in a majority of Caucasian women. Unfortunately, the reason for this discrepancy is still unknown. Lack of this knowledge is an important problem, because, without it women of African ancestry with TNBC will not benefit from current chemotherapeutic drugs that have shown great promise for other women with TNBC. Our goal in the TNBC project is to use the data generated in this proposal to explain why chemotherapy treatment differs between women of African ancestry and Caucasian women with TNBC and to accurately predict which patient will respond to treatment.

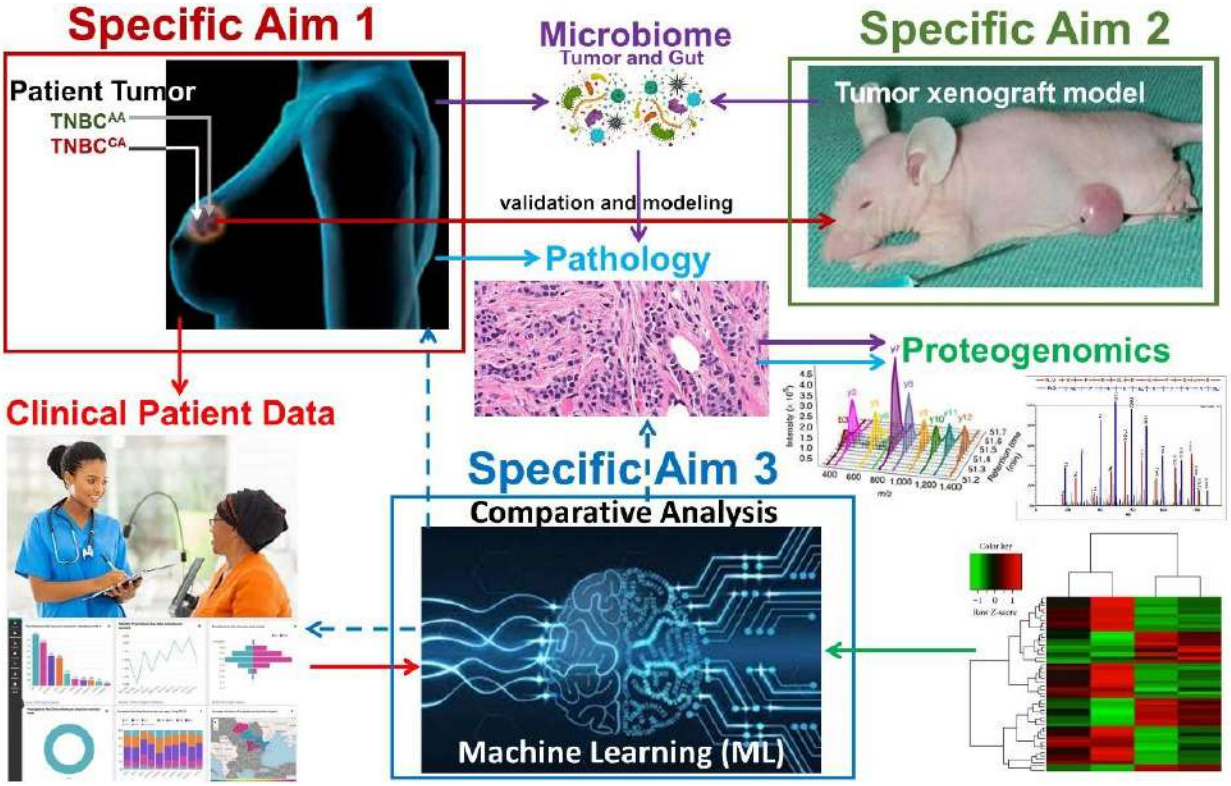

Fig 2. Schematics representation of the intellectual and experimental approaches of the TNBC project.

Our research team will test our central hypothesis using the experimental approach of combining ***multi-omics*** (metabolomics, proteomics, genomics, transcriptomics), ***personalized medicine*** (breast cancer patient's clinical data before and after chemotherapy treatment) and ***machine learning (ML)*** (**Fig 2**).

(ii) Hyperthermia (HT)-Induced Nanotherapy against Cancer Stem Cells: Cancer stem cells (CSC) possess the ability to give rise to all cell types found in a particular cancer, and are therefore tumorigenic causing relapse and metastasis by giving rise to new tumors. Breast tumors from African-American and Hispanic women often lack the human epidermal growth factor receptor 2, estrogen receptor and progesterone receptor, termed triple-negative breast cancer (TNBC), creating a phenotype and disease quite distinct from that seen in Caucasian women. TNBC are extremely aggressive and generally insensitive to most available hormonal or targeted

therapeutic agents. In collaboration with **Dr Sunil Krishnan (MD Anderson)**, who developed a nanotechnology-based method to generate hyperthermia (HT) non-invasively using optically activated gold nanoshells, we will use HT in combination with radiotherapy (RT) to induce the regression of TNBC-CSC in female mice. The underlying mechanism is studied using proteogenomics. Our long-term goal is to establish combined triple-modality of HT plus RT plus chemotherapy (CT) as standard practice for patients with TNBC. The objective of this project, which is the next step in achieving our long-term goal, is to understand the mechanism by which combined RT plus HT induces the regression of TNBC-CSC in female mice.

(iii) Heat Shock Protein (HSP)-Based Vaccine Development: Recently, novel therapeutic strategies like hyperthermia and heat shock protein (HSP)-based cancer therapies are in various stages of clinical trials and show great potential. One caveat is that the size of the tumor is a limiting factor to whether there will be enough tumor-derived HSP preparation to complete the scheduled treatment. To overcome this problem, we have developed heat shock protein (HSP)-vaccines by fusing HSP with antigenic peptides relevant to breast cancer including MUC-1 and ErbB2. Our preclinical data shows good efficacy. Our *long-term goal* is to develop highly effective and potent HSP-based vaccines for breast cancer in humans.

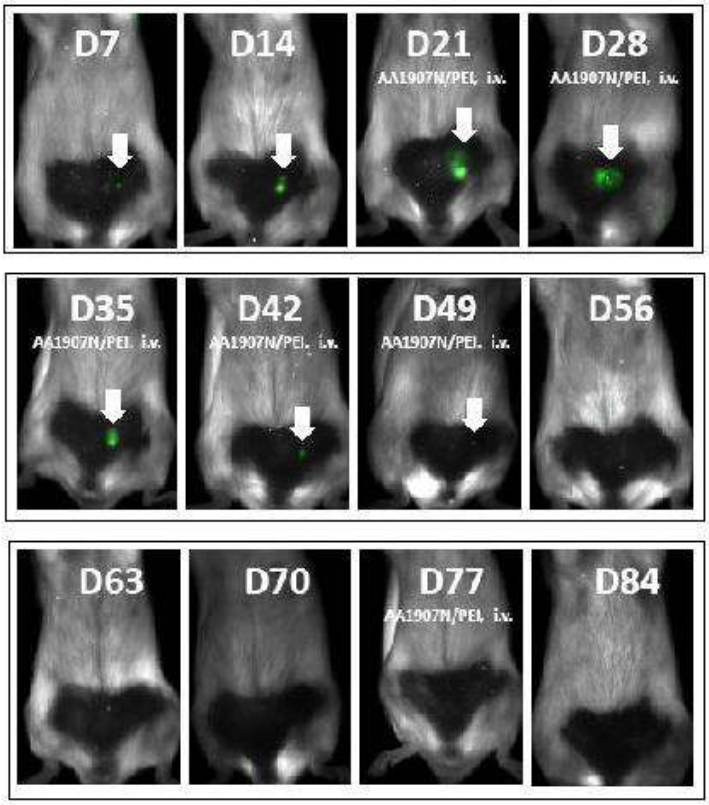

Fig 3. NampEVA induces the regression of established 4T1 triple-negative breast tumors in mice. GFP-tagged 4T1 cells (10^4) were implanted into the mammary pad of female BALB/c mice *via* s.c. injection on day 0, and tumor growth monitored using a Maestro™ live imaging system (CRI, Cambridge, MA) starting on day 7 post tumor cell inoculation (D7). On day 21 (D21) mice were injected i.v. with 0.5 mg/kg NampEVA. This was repeated weekly for 4 consecutive weeks followed by once monthly injections. Data are fluorescence micropictograms and are representative of two independently performed experiments (n=5).

Reference: Nagaraja, G. M., Kaur, P., Neumann, W., Asea, E. E., Bausero, M. A., Multhoff, G., Asea, A. Silencing Hsp25/Hsp27 gene expression augments proteasome activity and increases CD8+ T-cell-mediated tumor killing and memory responses. Cancer Prev Res (Phila). 2012 Jan;5(1):122-37. PubMed PMID: 22185976. Pubmed Central PMCID: 3252476. 10.1158/1940-6207.CAPR-11-0121.

(iv) Treatment of Established Tumors using RNA Interference (RNAi) Technology: RNAi technology is a type of technique that inhibits gene expression at the stage of translation or by hindering the transcription of specific genes. RNAi targets include RNA from viruses and transposons (significant for some forms of innate immune response), and also plays a role in regulating development and genome maintenance. Small interfering RNA strands (siRNA) are key to the RNAi process, and have complementary nucleotide sequences to the targeted RNA strand. Specific RNAi pathway proteins are guided by the siRNA to

the targeted messenger RNA (mRNA), where they "cleave" the target, breaking it down into smaller portions that can no longer be translated into protein. We have constructed a HSP-based siRNA (NampEVA) which targets and selectively silences the expression of a specific sequence in both murine Hsp25 and human Hsp27, and effectively stops the growth of established tumors for up to 86 weeks (**Fig 3**). This data has been used to apply for Good Clinical Practice (GCP) Phase I clinical trial of NampEVA therapy of triple-negative metastatic breast cancer at Morehouse School of Medicine. In this experiment, on day zero GFP-tagged 4T1 triple-negative tumor cells were implanted into the mammary pad of female BALB/c mice and tumor growth was monitored weekly non-invasively using a Maestro^{TM} live imaging system (CRI, Cambridge, MA). On day 21 post tumor cell inoculation (TCI), tumors had grown to approximately 200mm^3 at which time mice were injected i.v., with 0.5 mg/kg NampEVA. This was repeated once weekly for 4 consecutive weeks followed by once monthly injections. Significant tumor regression can be observed by day 35 post TCI and there are no detectable tumors by day 56 post TCI (**Fig 3**). Mice not treated with NampEVA were sacrificed by day 35 post TCI due to tumor burden and metastasis (data not shown). In a separate experiment, mice have remained tumor free for up to 1-year post TCI.

2. Prostate Cancer

Heat shock proteins (HSP) play key roles in the stress response and immune modulation. We hypothesized that radiation (RT) induces extracellular release of Hsp70 from tumors with resultant increased pro-inflammatory cytokines and stimulation of immune effector mechanisms designed to kill tumors. In collaboration with **Dr. Mark D. Hurwitz (Harvard Medical School)**, blood was obtained from patients undergoing RT for prostate cancer with or without hormonal therapy (ADT). Our studies demonstrate that serum Hsp70, pro-inflammatory cytokines, cytotoxic T lymphocytes (CTL), and CD8$^+$ CTL, natural killer (NK) cells, IL-6 and TNF-α levels increased concomitant with RT but not with ADT. The role of Hsp72 in long-term tumor-free survival of patients is currently being elucidated using proteogenomic techniques, and mechanisms of action are being determined using transgenic animal models.

3. Pancreatic Cancer

Pancreatic ductal adenocarcinoma is the fourth leading cause of cancer death in USA and has the lowest survival rate for any solid tumor. Early diagnosis of pancreatic cancer may improve survival rate. However, to date there are no markers that can indicate the early onset of pancreatic cancer. Lack of this knowledge is an important problem, because, without it, we will not be able to capitalize on the strategy of harnessing this cost effective early diagnosis that is needed to improve the survival rate of cancer patients including pancreatic cancer. The *long-term goal* of this program is to find one or a panel of diagnostic marker/s for pancreatic cancer. We have currently discovered 5 novel candidate biomarkers for pancreatic cancer by analysing 20 pancreatic juice samples using high throughput proteogenomics approach that involves multiple separation techniques and state-of-the-art HPLC-chip-ion-trap mass spectrometer.

4. Leukemia

In contrast to solid tumors, leukemic blasts frequently present both Hsp70 and HLA-E on their cell surface and thereby present activating and inhibitory signals to CD94$^+$ NK cells. In collaboration with the group of **Dr Multhoff (Munich, Germany)** and **Dr Pockley (Nottingham, UK)**, we demonstrated that in the first 12 months after stem cell transplantation (SCT) CD94$^+$ NK cells clearly dominate over CD3$^+$/CD16$^-$/56$^-$ T and CD3$^+$/CD16$^+$/56$^+$ NK-like T cells. An incubation of post-SCT-derived peripheral blood lymphocytes with the Hsp70 peptide TKD and IL-15 enhances the cell surface density of CD56/CD94 and initiates the cytolytic activity of NK

cells against Hsp70/HLA-E double-positive autologous and allogeneic leukemic blasts. The *long-term goal* of this project is to establish Hsp70 peptide TKD and IL-15 as a treatment for leukemic blasts.

Complementary and Alternative Medicine (CAM) Research Program

Complementary and alternative medicine (CAM) is the term for medical products and practices that are not part of standard medical care. CAM therapies include a wide variety of botanicals and nutritional products, such as dietary supplements, herbal supplements, and vitamins. Our research team has focused on botanical and medicinal plants.

1. *Petiveria alliacea*

A variety of natural product-derived compounds, particularly those from common and exotic plants such as taxol, acemanan and Ganaderma lucidum, have been recognized for their potent anti-tumor activity both *in vitro* and *in vivo*. We have identified a specific botanical extract, termed FS1, derived from the Colombian plant *Petiveria alliacea*, which has been extensively used as a traditional herbal Colombian medication to treat cancers.

In preliminary studies, we demonstrate that the F4 and S3 extract induce cytotoxicity of tumor cells *in vitro*. We have used a fraction, which contains both F4 and S3, termed FS1, which induces the regression of established breast adenocarcinoma tumors in mice (**Fig 4**).

The *long-term goal* of this project is to identify and characterize, at the molecular and cellular level, effective therapeutic agents from natural products, in order that improved treatment strategies for cancer and other diseases can ultimately be developed. These studies are being conducted in collaboration with **Dr Fiorentino's group in Bogotá (Colombia).**

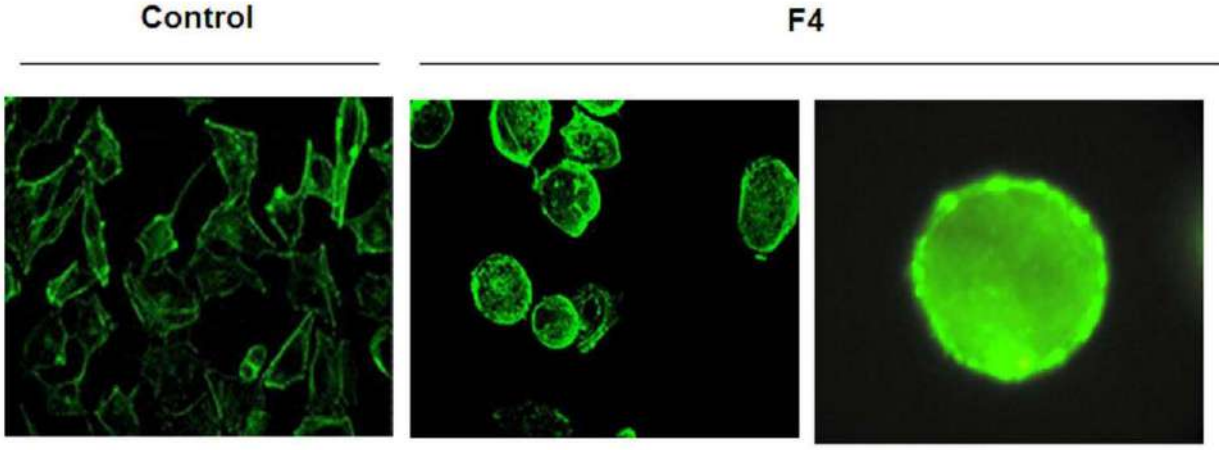

Fig 4. F4 fraction induces morphological changes in tumor cells. A375 (10^4) treated with ethanol 0.2% (left panel) or F4 fraction 31.2 µg/ml (middle and right panels) for 24 h. Cells were stained with Oregon Green-phalloidin were analyzed under fluorescent microscope. Results show photos representing four independent experiments.

Reference: Uruena, C., Cifuentes, C., Castaneda, D., Arango, A., Kaur, P., Asea, A., Fiorentino, S. Petiveria alliacea extracts uses multiple mechanisms to inhibit growth of human and mouse tumoral cells. BMC Complement Altern Med. 2008;8:60. PubMed PMID: 19017389. Pubmed Central PMCID: 2613870. 10.1186/1472-6882-8-60.

2. Adaptogens

In collaboration with the **Swedish Herbal Institute (Sweden)**, we are studying the role of heat shock proteins in adaptogens. Adaptogens are medicinal plants that augment resistance to stress, and increases concentration, performance and endurance during fatigue.

Experiments were carried out with BALB/c mice feed ADAPT-232 forte, a fixed combination of three genuine (native) extracts of *Eleutherococcus senticocus*, *Schisandra chinensis*, *Rhodiola rosea*, characterised for the content of active markers eleutherosides, schisandrins, salidroside, tirosol, rosavin and in doses of about 30 mg/kg, 90 and 180 mg/kg for 7 consecutive days followed by forced swimming test to exhaustion. ADAPT-232 forte strongly augments endurance of mice increasing the time taken to exhaustion (TTE) in a dose dependent manner. Repeated administration of adaptogen dose dependently increases basal level of Hsp72 in serum of mice. This effect is even stronger than effect of stress including both physical (swimming) and emotional impacts. Our studies suggest that this could be one of the mechanisms of action of plant adaptogens.

Neuroscience Research Program

Neuroscience research is a multidisciplinary branch of biology that combines physiology, anatomy, molecular biology, developmental biology, cytology, mathematical modeling, and psychology to understand the fundamental and emergent properties of neurons and neural circuits. Our neuroscience research program is designed:

- To study the molecular biology and cellular physiology of neuronal cells, tissues and systems.
- To study neuronal degeneration and related diseases and disorders (e.g., amyotrophic lateral sclerosis (ALS), Alzheimer's disease, and Parkinson's disease, Huntington's disease, depression and anxiety).
- To study neuronal regeneration and associated molecular, chemical and biological factors that influences these processes.
- To study various risk factors arising from nervous system dysfunction.
- To cooperate at the national and international level in all matters related to cellular therapeutics (e.g., stem cells, multipotent adult progenitor cells, embryonic stem cells, tissue transplantation, regenerative medicine, etc).

1. Role of HSP in Depression and Anxiety

The hypothalamic-pituitary-adrenal (HPA) axis plays a primary physiological role in the response to stress and restoration of system homeostasis. Glucocorticoids (GC), as the final effectors of HPA axis activation, are involved in the regulation of its activity by exerting negative feedback on several brain structures including the hippocampus (HIPPO) and prefrontal cortex (PFC).

Abnormal GC secretion has been described in several psychiatric disorders such as post-traumatic stress disorder, depression and anxiety, suggesting that GC secretion from adrenal glands and their homeostatic balance are indispensable for normal physiological function. At the molecular level the effects of GC are mediated by the glucocorticoid receptor (GR), a hormone-dependent transcription factor.

In the cytoplasm, the inactivated GR is associated with a chaperone complex consisting of several molecules including seventy kilo-Dalton heat shock protein (Hsp70) and the ninety kilo-

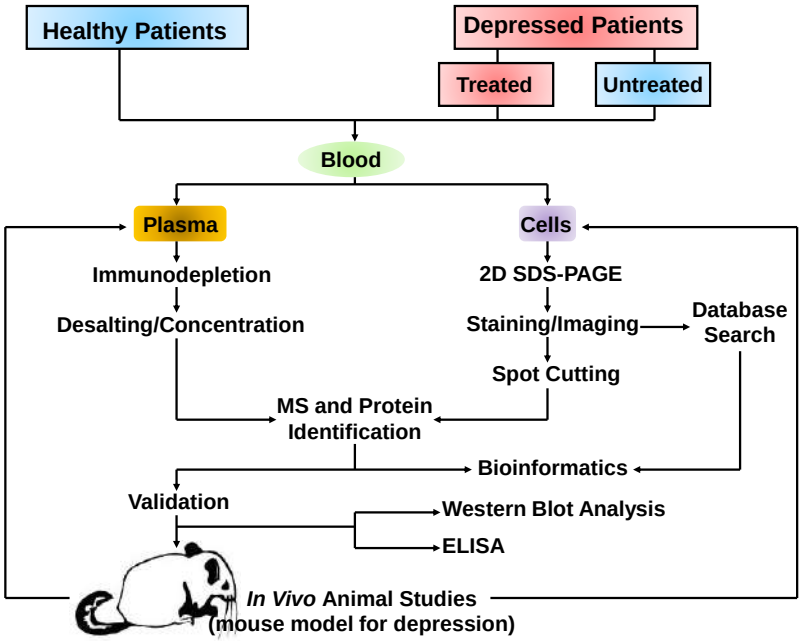

Fig 5. Schematic representation of the workflow for the proposed study to examine the role of HSP in depression.

Reference: "*Functional Proteomics for the Discovery of Biomarkers Associated with Psychology and Neuroscience*" Psychology & Neuroscience Department Colloquium. Baylor University, September 23, 2011, Waco, Texas, USA

Dalton heat shock protein 70 (Hsp70). The main role of Hsp90 and Hsp70 is in maintaining proper GR conformation for ligand binding, its intracellular shuttling, stabilization and protection. Upon hormone binding, GR dissociates from the chaperone protein complex and undergoes a conformational change in the cytoplasm, which allows its translocation to the nucleus where it regulates transcription of GR-responsive genes, either directly or through the interaction with other transcription factors and cell signaling systems.

Our long-term goal is to develop diagnostic markers for the treatment of depression and anxiety. The objective of this application, which is next step in pursuit of that goal, is to identify and validate candidate biomarkers, which will determine the patients who will benefit from adaptogen treatment (**Fig 5**).

The central hypothesis of the application is that patients with major depression present with very low levels of the seventy-kilo-Dalton stress-inducible heat shock protein (Hsp72) in systemic circulation, as compared to healthy individuals. Adaptogens used to successful treat depression increases the level of circulating Hsp72.

2. Role of Extracellular Hsp70 Autocrine Signaling in Multiple Sclerosis (MS)

Multiple sclerosis (MS) is the most diffuse chronic inflammatory disease of the central nervous system. Both immune-mediated and neurodegenerative processes apparently play roles in the pathogenesis of this disease. Heat shock proteins (HSPs) are a family of highly evolutionarily conserved proteins; their expression in the nervous system is induced in a variety of pathologic states, including cerebral ischemia, neurodegenerative diseases, epilepsy, and trauma. To date, investigators have observed protective effects of HSPs in a variety of brain disease models (e.g. of Alzheimer disease and Parkinson disease).

In collaboration with **Dr. Fabiana Geraci (University of Palermo, Italy),** we have put forth an exciting new paradigm shift in our understanding of the molecular mechanisms that regulates mesoangioblast stem cells' ability to traverse the extracellular matrix (ECM). Extracellular vesicles (EV) are recently described as specialized structures for intercellular communication. Their role in the central nervous system was diffusely studied in both physiological and pathological condition. In particular, an increase in extracellular vesicle number was detected in several autoimmune diseases, including multiple sclerosis, a chronic autoimmune, inflammatory, demyelinating and neurodegenerative disease. This chapter summarizes the

available information on the involvement of the extracellular vesicles in multiple sclerosis pathogenesis and their possible use as biomarker of therapy efficacy.

Our studies reveal for the first time that membrane vesicles (EV) released by mesoangioblasts contain Hsp70 as a transmembrane protein and that it is able to interact by an autocrine mechanism to stimulate chemotactic migration through ECM. We further demonstrate that Hsp70 has a positive role in regulating MMP2/9 expression and that MMP2 has a more pronounced effect on cell migration as compared to MMP9. Our studies are significant because our findings may be of fundamental importance in clinical application as Hsp70 overexpression can increase mesoangioblast migration/homing potential (**Fig 6**).

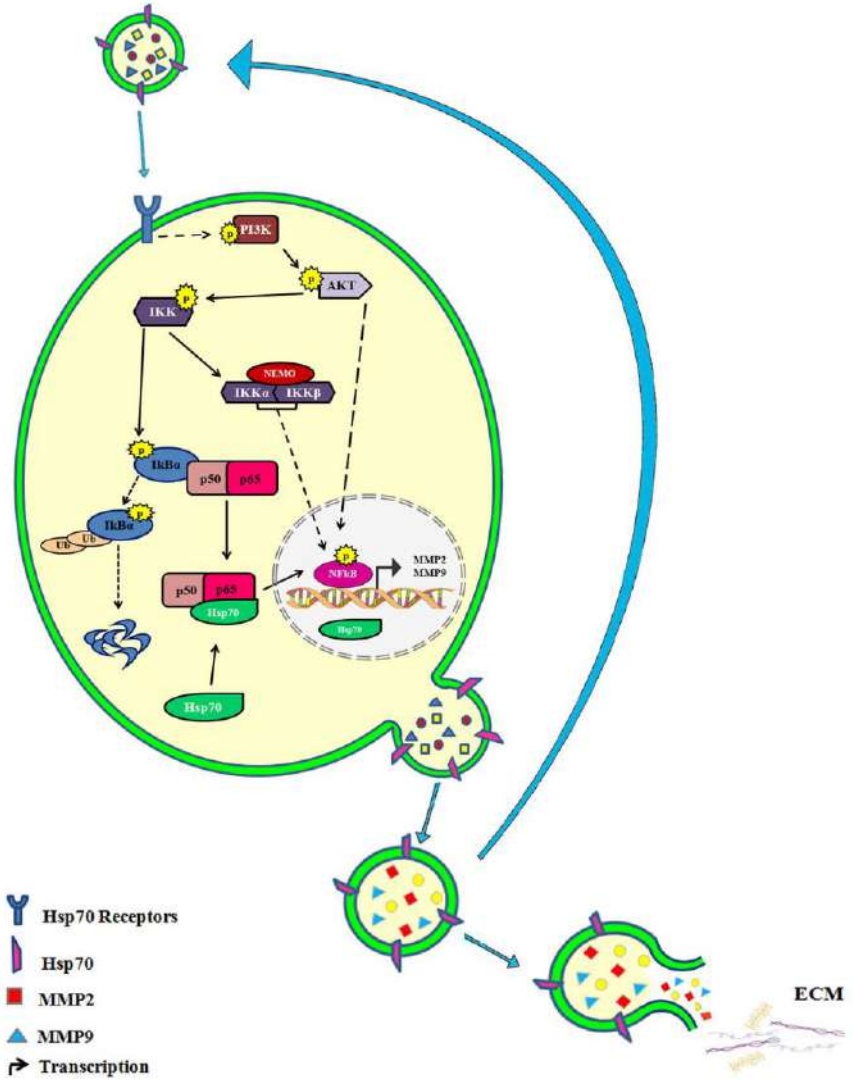

Fig 6. Schematic representation of extracellular Hsp70 autocrine signaling. Mesoangioblasts release EV containing Hsp70 as a transmembrane protein, in addition to MMP2 and MMP9. Some of the EV may break down releasing MMPs, which are able to degrade ECM components Other EV, may interact in an autocrine way with mesoangioblasts. In particular, the interaction between EV bound Hsp70 and its receptors could transduce an intracellular signal, responsible for the activation of PI3K/AKT pathway, known to be involved in p65 transactivation (Sizemore et al., 1999; Toubiana et al., 2015). Furthermore, intracellular Hsp70 contributes to NF-kB activation by increasing nuclear import.Nuclear NF-kB is involved in MMP2 and MMP9 transcription activation (Rhee et al., 2007; Li et al., 2011). Dotted arrows indicate data already reported in literature, solid arrows represent data demonstrated in this paper.

Reference: Barreca, M.M., Spinello, W., Cavalieri, V., Turturici, G., Sconzo, G., Kaur, P., Tinnirello, R., Asea, A.A., Geraci, F. Extracellular Hsp70 enhances mesoangioblast migration via an autocrine signaling pathway. J. Cell Physiol. 2017 Jul;232(7):1845-1861. doi: 10.1002/jcp.25722. Epub 2017 Jan 31.

3. Interplay between HSP and NPY in Regulating Neuroprotection

NPY is a stress-responsive hormone widely distributed in the central and peripheral nervous system. In the brain, the concentration of NPY are significantly higher than other neuropeptides, and is found mainly in the limbic system, including the amygdala and the hypothalamus, which are areas of the brain involved in the regulation of emotional behaviors and stress response. In the peripheral nervous system, NPY is concentrated in sympathetic nerve endings. The elevation of NPY in blood of CFS patients is associated with severity of stress, negative mood and clinical symptoms. On the other hand, psychological stress elevated plasma NPY in healthy subjects. In the periphery, sympathetic nerve- and platelet-derived NPY act in a stimulatory fashion; synergizing with glucocorticoids and catecholamines to potentiate the stress response, induce vasoconstriction and increase vascular smooth muscle cell proliferation. However, in the brain NPY acts as an anxiolytic and inhibits sympathetic activity that results in lowering blood pressure and heart rate, and inhibiting the production of cortisol in human adrenal cells. NPY can regulate both immune cells and neuronal cells, e.g. NPY strongly inhibits NO synthesis through Y(1) receptor activation, which prevents IL-1β release and thus inhibits nuclear translocation of NF-κB in microglia.

NPY plays a protective role in viral infections associated with glial cell activation and the production of pro-inflammatory cytokines in the CNS. It has been suggested that the stimulation of NPY gene expression is related to food deprivation and its overexpression causes disordered energy balance leading to increased eating.

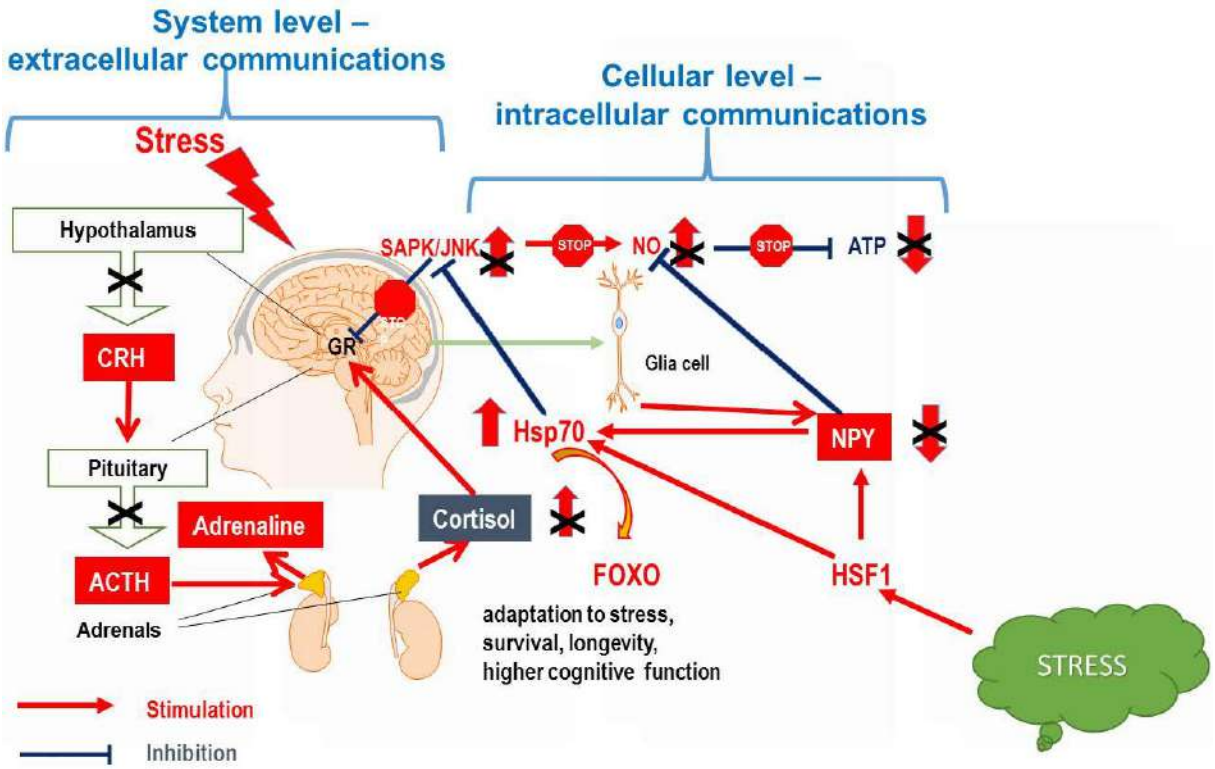

Fig 7. Schematic representation of the model system for the mechanism by which NPY and HSP regulates neuroprotection at the system and cellular level.

Reference: Asea, A., Kaur, P., Panossian, A., Wikman, K. G. Evaluation of molecular chaperons Hsp72 and neuropeptide Y as characteristic markers of adaptogenic activity of plant extracts. Phytomedicine. 2013 Nov 15;20(14):1323-9. PubMed PMID: 23920279. 10.1016/j.phymed.2013.07.001.

We recently demonstrated that the stimulation and release of the stress hormones, NPY and Hsp72, into systemic circulation is an innate defense response against mild stressors, which increase tolerance and adaptation to stress (**Fig 7**).

Cardiovascular Disease (CVD) Research Program

Cardiovascular Disease (CVD) is the number 1 cause of death globally. More people die annually from CVD than from any other cause. An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke. Our CVD research program is focused on the inflammatory process induced by atherosclerosis.

Lipid uptake by macrophages and the activation of inflammatory processes are key features in the development of atherosclerosis. Activation of endothelial cells and recruitment of monocytes and T-lymphocytes to the vascular wall are early events in the atherosclerotic process. In the intima, the monocytes differentiate to macrophages that secrete pro-inflammatory cytokines that induce inflammation in the atherosclerotic plaque. Importantly, the degree of inflammation correlates with plaque rupture and part of the clinical benefit from statins may involve anti-inflammatory effects. We recently demonstrated that OxLDL could induce both interleukin (IL)-1β and IL-12 secretion in naïve macrophages. We also demonstrated that the effect of oxLDL on cytokine production and release could be blocked by inhibition of HSP70 transcription or secretion or by the use of HSP70 neutralizing antibodies. This suggests that extracellular HSP70 can mediate pro-inflammatory changes in macrophages in response to oxLDL.

Diabetes Research Program

Diabetes is a disease that occurs when your blood glucose, also called blood sugar, is too high. Blood glucose is your main source of energy and comes from the food you eat. Insulin, a hormone made by the pancreas, helps glucose from food get into your cells to be used for energy.

Currently there are no appropriate model systems for the rapid study of protein aggregates and the resultant toxicity exhibited in pancreatic β-cells of patients with type 2 diabetes. Our diabetes program is designed to addresses this need by establishing a novel *in vivo* model system for the expression of human pro-islet amyloid polypeptide hormone (h-proIAPP), utilizing C. *elegans*. Importantly, we demonstrate that h-proIAPP expression in body wall muscles, pharynx and neurons of C. *elegans* adversely affects the development of the worm (**Fig 8**). In addition, we demonstrate that h-proIAPP forms insoluble aggregates and that the co-expression of human Hsp72 in the h-proIAPP C. *elegans* model increases the solubility of proIAPP aggregates. Furthermore, we show that treatment of transgenic h-proIAPP C. *elegans* animals with ADAPT-232, a compound known to induce the expression and release of Hsp72 in cells, significantly improved the growth retardation phenotype of transgenic h-proIAPP C. *elegans* worms.

Our studies are significant and we predict that this novel *in vivo* model system can be used to identify compounds that may attenuate h-proIAPP aggregation and toxicity, which would be extremely helpful in the fight against type 2 diabetes. We are currently developing a high throughput kit for the identification of compounds that can effectively mitigate toxic aggregates in patients with type 2 diabetes. In addition, we demonstrate that h-proIAPP forms insoluble

aggregates and that the co-expression of human Hsp72 in the h-proIAPP C. *elegans* model increases the solubility of proIAPP aggregates. Furthermore, we show that treatment of transgenic h-proIAPP C. *elegans* animals with ADAPT-232, a compound known to induce the expression and release of Hsp72 in cells, significantly improved the growth retardation phenotype of transgenic h-proIAPP C. *elegans* worms.

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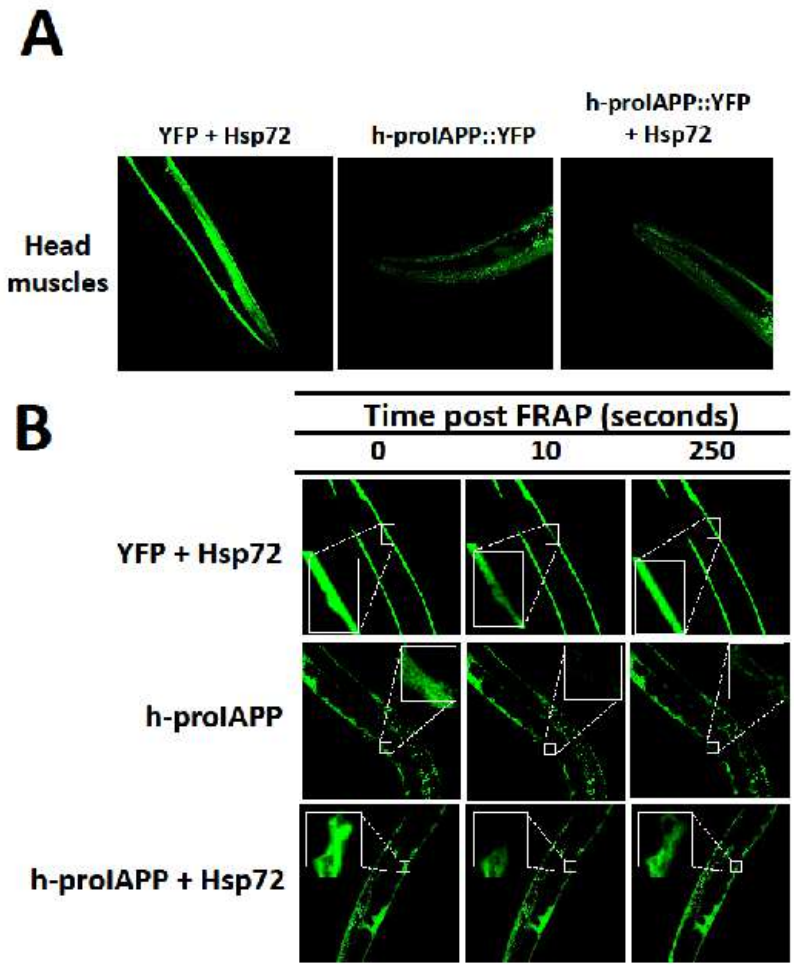

Fig 8. Hsp72 expression improves the solubility of h-proIAPP aggregates. Transgenic h-proIAPP::YFP + Hsp72 C. *elegans* animals were generated by gonad co-injection of h-proIAPP tagged with YFP protein expressed in body-wall muscles (plasmid pPR3) and Hsp72 expressed in the same tissue (plasmid pPR21) (right panel). A: Maximum intensity projections were created using all the planes of the acquired stacks of head muscles of YFP + Hsp72 C. *elegans* model (left panel), h-proIAPP::YFP C. elegans model (middle panel) and h-proIAPP::YFP + Hsp72 C. *elegans* animals (right panel). Images were acquired using 60X magnification. Results are a representative experiment from at least three independently performed experiments with similar results. B: Transgenic YFP + Hsp72 C. *elegans* model (top panels), transgenic h-proIAPP::YFP C. *elegans* model (middle panels) and transgenic h-proIAPP::YFP + Hsp72 C. elegans model (bottom panels) were subjected to FRAP analysis (square).

Reference: Rosas, P.C., Nagaraja, G.M., Kaur, P., Panossian, A., Wickman, G., Garcia, L.R., Al-Khamis, A.F., Asea, A. Insoluble aggregates produced in a novel transgenic human-proIAPP C. elegans model are attenuated by coexpression of human Hsp72. PLoS ONE 2016 Mar 9;11(3):e0149409. doi: 10.1371/journal.pone.0149409. eCollection 2016.

Sickle Cell Disease (SCD) Research Program

Sickle cell disease is a group of disorders that affects hemoglobin, the molecule in red blood cells that delivers oxygen to cells throughout the body. People with this disorder have atypical hemoglobin molecules called hemoglobin S, which can distort red blood cells into a sickle, or crescent, shape.

The pathophysiology of sickle cell disease (SCD) is initiated by sickle hemoglobin (HbS) polymerization, sickling of the red blood cell under hypoxic conditions and vasoocclusive disease (VOC). Pro-inflammatory mediators including superoxide, hydrogen peroxide, peroxynitrite and the hydroxyl radical may contribute to sickle acute chest syndrome. This study is designed to examine the possibility that extracellular Hsp70 might play a role in SCD in general and specifically in VOC. We have demonstrated that circulating serum Hsp70 levels are elevated in sickle cell disease and increases further during VOC, suggesting that circulating serum Hsp70 might be a marker for VOC in SCD. Our group is currently developing a diagnostic kit for the early detection of crisis in SCD patients.

COVID-19 other Respiratory Viruses Research Program

The clinical features of COVID-19 range from a mild illness to patients with a very severe illness with acute hypoxemic respiratory failure requiring ventilation and Intensive Care Unit admission. Risk factors for a fatal disease include older age, respiratory disease, diabetes mellitus, obesity and hypertension. Little is known about the mechanisms behind observed episodes of sudden deterioration or the infrequent idiosyncratic clinical demise in otherwise healthy and young subjects. As in other diseases, the answer to some of these questions may in time be provided by genotyping as well careful clinical, serological, radiological and histopathological phenotyping, which enable mechanistic insights into the differences in pathogenesis and underlying immunological and tissue regenerative response patterns. We currently have 2 CIVID-19-related projects:

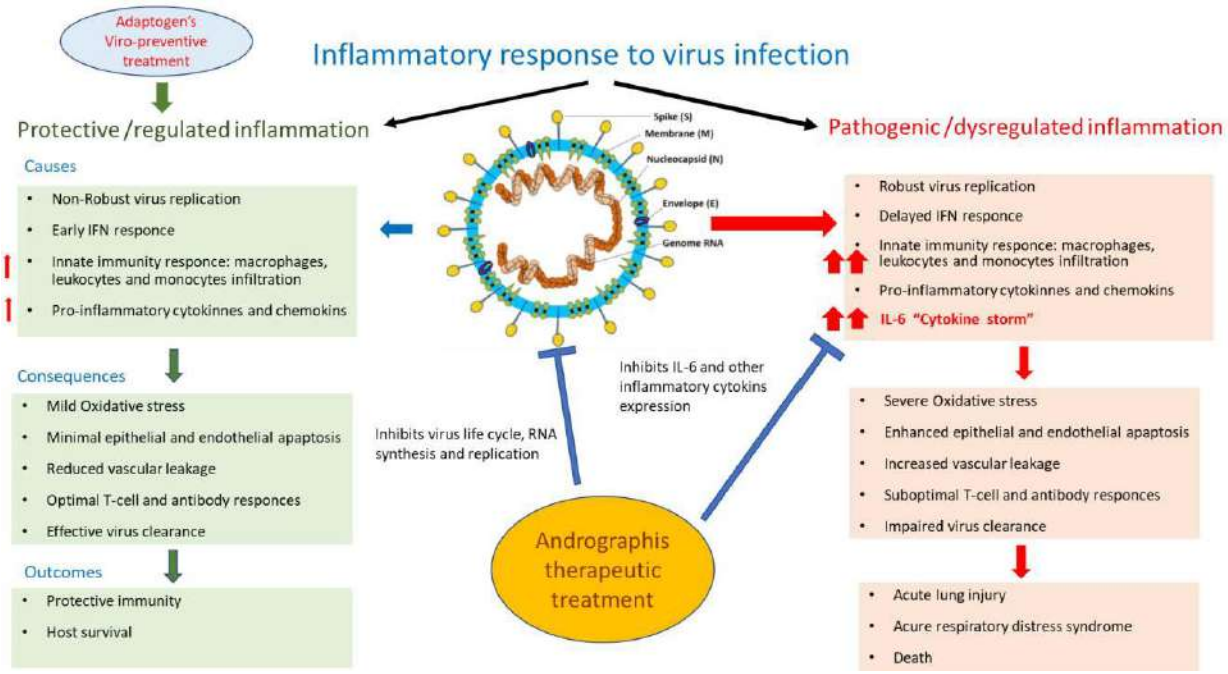

Fig 8. Andrographolides use different mechanisms that targets both in the virus (targets preventing the virus RNA synthesis and replication) and in host immune.

References: Panossian A, Seo EJ, Wikman G, Efferth T. Synergy assessment of fixed combinations of Herba Andrographidis and Radix Eleutherococci extracts by transcriptome-wide microarray profiling. Phytomedicine. 2015 Oct 15;22(11):981-92.

1. Determination of Efficacy and Mechanism of Action of a Medicinal Plant Extract against Respiratory Infections including COVID-19, Influenza and H1N1. There are two options to combat viral infection by pharmaceutical intervention: (i) Directly affecting virus replication and life cycle; (ii) Indirectly destroying the virus by stimulating host defense systems including innate and adaptive immune systems, which are deregulated or overcome by virus.

In collaboration with the **Swedish Herbal Institute (Sweden)** we are focused on developing a proprietary compound derived from a medicinal plant that has demonstrated potent therapeutic efficacy against COVID-19 (**Fig 9**). We plan to perform confirmatory *in vitro* experiments to establish therapeutic potency and to perform subsequent proteogenomics analysis to determine mechanism(s) of action. Briefly, the Swedish Herbal Institute has developed a proprietary compound derived from a medicinal plant that we have been working on for another indication, but which has recently demonstrated potent therapeutic efficacy against COVID-19.

2. A Multiplex Diagnostics Point-of-Care Platform for the Simultaneous Detection of Respiratory Infections including COVID-19, Influenza and H1N1. In the current scenario of the COVID-19 pandemic, there are many qPCR-based methods that have become popular and eventually approved for COVID-19 diagnostics. However they do not address a common situation where the patient is suffering from common cold or other respiratory infections other than COVID-19, the diagnostic tests take 4-5 hours and it requires skilled technicians and costly equipment. In collaboration with **NextGen Invitro Diagnostics (India)**, we have developed a low cost, field operable device that can not only detect nucleic acid of COVID-19 but can also differentiate it from other respiratory viruses. We will test the sensitivity and selectivity of the diagnostic the devise and use our proteogenomics platform to improve its range.

Research Summary

In summary, my research involves multidisciplinary biomedical translational research programs. We look for and work closely with the most innovative basic research scholars, translation drug discovery-based researchers, population and clinical research scientists from all around the world. The programs/projects described here are designed to enable students at any stage of their career including High School Students, Undergraduate and Graduate Students, Postdoctoral Scholars, Medical Residents and Junior Faculty gain fundamental, hands-on knowledge about the role of heat shock proteins (HSP) in a number of human disease and disorders for the benefit of human health. All our programs are designed to match students and faculty with appropriate mentors.

In addition, all the programs utilize innovative *in vitro* and *in vivo* animal models that closely mimic human diseases and disorders, and we utilize novel cellular and molecular biology techniques, including multi-omics (e.g., metabolomics, proteomics, genomics, transcriptomics), personalized medicine (e.g., patient's entire clinical data) and machine learning (ML) approaches in order to elucidate and enhance novel host defenses against numerous diseases and disorders that compromise human health and well-being.

Finally, the programs/project offered by my lab are designed to ensure that our scholars will have successful and meaningful careers in academia including, basic sciences, information technology (including algorithm design and artificial intelligence), clinical research/healthcare, patent law, and in the biotechnology and pharmaceutical industry.

B. Teaching Philosophy

Statement of Personal Attitudes Towards Teaching

I consider teaching to be an essential component of a professional career in medical sciences. This is reflected in my strong commitment towards teaching. My personal attitude towards teaching can be summarized in six tenets of effective teaching that I have developed over time.

First, is a thorough mastery of the subject matter at the level at which it is to be taught i.e., the material must be presented at the appropriate level. Hence, I devote considerable time in preparing each lecture.

Second, effective teaching requires the ability to connect with the students. It is my belief that the study of medical sciences is particularly rewarding when it provides insights into major medical issues. Hence, I try to provide strong motivation for each topic covered in class and to encourage and stimulate questions and discussions about the course material.

Third, I believe that the instructors' presentational style must be active and enthusiastic. This will help retain and nurture the student's attention and interest in the course material.

Fourth, biomedical science is a rapidly advancing subject with new techniques being developed that enable previously unknown mechanisms to be elucidated. All this is happening at a rapid pace. Hence, I try to provide the students with current information on the most recent advances in biomedical science that is relevant to the course material.

Five, the instructor must be accessible to the students outside the class. Depending on the size of the class, I try to meet with small groups of students for lunch or coffee once or twice a week throughout the semester. This enables me to get to know my students as individual and to become aware of any difficulties they may be having in class so that I can adapt my style of teaching to address any of these problems.

Finally, I believe that I must be a mentor to my students. Mentoring is important, not only because of the knowledge and skills students can learn from mentors, but also because mentoring provides professional socialization and personal support to facilitate success in graduate school and beyond. Quality mentoring greatly enhances students' chances for success. Research shows that students who experience good mentoring also have a greater chance of securing academic tenure-track positions, or greater career advancement potential in administration or sectors outside the university.

C. Administrative & Leadership Philosophy

Statement of Personal Attitudes Towards Leadership

Administrative success on an academic level flourishes and thrives when the corporate leaders works collaboratively to set the company, provides leadership and direction for all aspects of the companies programs, and supervises related company activities. In addition, the President and Vice Presidents work in concert with Departmental Leaders to ensure that all the staff understand and supports their goals.

Over the years I have found that success in leading companies comes from letting the staff know that their views are important and valuable. Therefore, I strongly adhere to the administrative policy of shared governance. This means that critical decisions affecting staff should initially be discussed in an open forum together with a council comprised of representative junior and senior staff. In addition, there should always be a continuous process of strategic planning. Such strategic planning should not be performed in a vacuum but must be integrated with the overall long-term vision and goals of the entire company.

Although I prefer the administrative policy of consensus-building and shared governance, I however, do not shy away from taking full responsibility for making potentially unpopular executive decisions when necessary. Although the pursuit of excellence must be the guiding principle for all staff members the value of compassion in the face of adversity and fairness toward all members must be beyond question. In addition, the diversity of staff is extremely important and adds concrete value to the company and society.

Although, there are numerous approaches to leadership, I believe that no single approach is best for all situations. That said, in any new position I will spend a great deal of time and energy first learning about the culture and customs of the company before making any significant changes, whatsoever.

I consider that a corporate leader must be intellectually curious, enthusiastic and empathetic, as well as a forceful and passionate advocate for Departments, Programs and Staff. I believe a leader must be forthright, honest and sincere, as well as open minded and of the very highest personal integrity.

An essential aspect of leadership also involves spending time actively engaging and mentoring junior staff. Mentoring is the key for developing and sustaining a satisfying professional career and enables each of us to grow, learn, transform, and accomplish our corporate goals.

D. Research Funding Information

ONGOING

UT-ASEA ASEA, A. (PI) 02/01/2018-01/31/2023
University of Toledo College of Medicine & Life Sciences $500,000
"*Precision Therapeutics Proteogenomics Diagnostics Center*"
The major goal of this project is to establish a Precision Therapeutics Diagnostics Center at the University of Toledo College of Medicine & Life Sciences that will seamlessly integrate Proteogenomics into patient care.
Role: Principal Investigator (PI)

R01CA248304-01 FURUTA, S. (PI) 03/01/2020-02/28/2025
National Cancer Institute (NCI)/National Institutes of Health (NIH) $1,250,000
"*Normalizing Arginine Metabolism with Sepiaptein for Immunostimulatory-Shift of HER2+ Breast Cancer*"
The major goal of this proposal is to monitor changes in arginine metabolism during breast tumor progression and determine whether normalization of arginine metabolism will improve the immunogenicity of breast tumor and inhibit tumor growth.
Role: Co- Principal Investigator (Co-PI)

N-127772-01 ASEA, A. (PI) 07/01/2019-08/16/2020
House of Invention International $15,000
"*Visiting Students to PI Lab*"
The major goal of this project is to give international medical students hands-on training in cellular and molecular biological techniques.
Role: Principal Investigator (PI)

PENDING

COVID-11/187/2020 ASEA, A. (PI) Sept 2020
United States - India Science and Technology Endowment Fund $130,000
"*A Multiplex Point-of-care Diagnostics Solution for COVID-19 and Other Respiratory Infections*"
The major goal of this project is to establish a multiplex point-of-care diagnostics solution for COVID-19 and other respiratory infections.
Role: Principal Investigator (PI)

W81XWH-20-PRMRP-IIRA-COV ASEA, A. (PI) July 2020
Department of Defense (DoD) $1,603,356
"Determination of Efficacy and Mechanism of Action of a Medicinal Plant Extract Against Respiratory Infections including COVID-19, Influenza and H1N1"
The major goal of this project is to establish a preventative, mitigating and curative model for SARS-CoV-2 using plant extract adaptogen.
Role: Principal Investigator (PI)

R21-NCI ASEA, A. (PI) Sept 2020
National Cancer Institute/NIH $1,208,080

"*Heat Shock Protein Expression is a Source for Breast Cancer Health Disparity*"
The goal of this study is to further our understanding of why triple-negative breast cancer is such an aggressive disease, by elucidating the role of HSP signaling pathways using a combination of proteogenomics, microbiome, artificial intelligence and machine learning.
Role: Principal Investigator (PI)

W81XWH-20-PRMRP-IIRA-COV KAUR, P. (PI) July 2020
Department of Defense (DoD) $1,603,356
"Multiplex Point-of-care Diagnostics Platform for Simultaneous Detection of Respiratory Infections including COVID-19, Influenza and H1N1"
Pre-proposal - The major goal of this project is to establish a multiplex point-of-care diagnostics platform for simultaneous detection of respiratory infections including COVID-19, Influenza and H1N1.
Role: Co-Principal Investigator (Co-PI)

AWS-COV KAUR, P. (PI) July 2020
Amazon COVID19 Grant $1,603,356
"Multiplex Point-of-care Diagnostics Platform for Simultaneous Detection of Respiratory Infections including COVID-19, Influenza and H1N1"
Pre-proposal - The major goal of this project is to establish a multiplex point-of-care diagnostics platform for simultaneous detection of respiratory infections including COVID-19, Influenza and H1N1.
Role: Co-Principal Investigator (Co-PI)

R21-NCI KAUR, P. (PI) Sept 2020
National Cancer Institute/NIH $1,824,999
"*HSP Regulation Eliminates Treatment Resistance in Triple Negative Breast Cancer*"
The goal of this study is to developed a nanotechnology-based method to generate hyperthermia (HT) non-invasively using optically activated gold nanoshells. This is because our preliminary results demonstrate that when combined with radiation (RT), this technique induces the regression of triple-negative breast cancer-cancer stem cells (TNBC-CSC) in female mice.
Role: Co-Principal Investigator (Co-PI)

RO1-NCI EISENMANN, K. (PI) Sept 2020
National Cancer Institute (NCI)/National Institutes of Health (NIH) $1,603,356
"*Weaponizing the Formin-Associated Cytoskeleton to Target Glioblastoma Invasion*"
The major goal of this project is to establish a breast cancer model targeting arginine metabolism.
Role: Co-Investigator (Co-I)

RO1-NCI DE LA SERNA, I. (PI) Sept 2020
National Cancer Institute (NCI)/National Institutes of Health (NIH) $1,603,356
"Role of SWI/SNF Chromatin Remodeling Enzymes in Melanocyte Development and SWI/SNF Chromatin Remodeling Enzymes During Postnatal Melanocyte Differentiation"
The major goal of this project is to establish a role of SWI/SNF chromatin remodeling enzymes in melanocyte development and SWI/SNF chromatin remodeling enzymes during postnatal melanocyte differentiation.
Role: Co-Investigator (Co-I)

COMPLETED

UOD 145-07 ASEA, A. (PI) 04/01/15-03/30/17
Deanship for Scientific Research (DSR) $2,000,000
"*PDA to Improve Healthy Lifestyle and Diet*"
The major goal of this project is to use a PDA improve healthy life style of students at the University of Dammam.
Role: Principal Investigator

MSM-Asea ASEA, A. (PI) 11/01/12-12/31/13
Morehouse School of Medicine (MSM) $2,250,000
"*Treatment of Triple-Negative Breast Cancer*"
The major goal of this project is to commercialize a heat shock protein-based siRNA drug by conducting translational research and Phase I/II clinical trials in women with metastatic triple-negative breast cancer.
Role: Principal Investigator

Cain Chair Endowment ASEA, A. (PI) 05/01/05-10/30/12
Baylor Scott & White Hospital and Texas A&M Health Science Center $1,600,000
"*Role of Heat Shock Proteins in Biology and Medicine*"
The major goal of this project is to study the immunobiology of heat shock proteins, to examine the role of heat shock proteins in the progression of diseases, and to design therapies that might lead to cures.
Role: Principal Investigator

Baylor Scott & White Hospital Grant ASEA, A. (PI) 09/01/08-08/31/12
Baylor Scott & White Foundation $110,000
"*Role of Heat Shock Proteins in Biology and Medicine*"
The major goal of this project is to study the immunobiology of heat shock proteins, to examine the role of heat shock proteins in the progression of diseases, and to design therapies that might lead to cures.
Role: Principal Investigator

Department of Pathology Grant ASEA, A. (PI) 09/01/08-08/31/12
Baylor Scott & White Foundation $65,000
"*Role of Heat Shock Proteins in Biology and Medicine*"
The major goal of this project is to study the immunobiology of heat shock proteins, to examine the role of heat shock proteins in the progression of diseases, and to design therapies that might lead to cures.
Role: Principal Investigator

SW-091204 ASEA, A. (PI) 09/01/09-08/31/11
Baylor Scott & White Foundation Grant $50,000
"*Development of HSP-Based Vaccine for Breast Cancer*"
The major goal of this project is to develop an anti-cancer vaccine using chimeric fusion proteins from Hsp72 and HER2 tumor associated antigens.
Role: Principal Investigator

SW-90479 KAUR, P. (PI) 07/01/10-06/30/11
Baylor Scott & White Foundation Grant $50,000
"*Molecular Mechanisms by which Hyperthermia plus Radiotherapy Induces the Regression of Triple-Negative Breast Cancer-Cancer Stem Cells"*
The major goal of this project is to elucidate the mechanism by which Hsp72 modulates anti-tumor immunity in response to hyperthermia plus radiotherapy in triple-negative breast cancer stem cells.
Role: Co-Principal Investigator

1RO1 AI057797-01 FLESHNER, M. (PI) 07/01/04-06/31/10
NIAID/NIH $625,000
National Institute of Allergy and Infectious Diseases/National Institutes of Health
"Stress, Heat-Shock and Innate Immunity"
The major goal of this project is to understand the role of extracellular HSP70 in acute mental or physical stress.
Role: Consultant

ACCPGD459 JONES, S. (PI) 09/01/08-08/30/10
American College Chest Physician Geriatric Development Award $150,000
"*Understanding the Relationship between Circadian Rhythm, Sleep and ICU Delirium*"
The major goal of this project is to understand the molecular mechanisms that link circadian rhythm, sleep and ICU delirium.
Role: Collaborator

SW-071087 BAUGH, R. (PI) 02/01/08-01/31/09
Baylor Scott & White Foundation Grant $40,000
"*Protein Expression in Adults with Obstructive Sleep Apnea*"
The major goal of this project is to determine possible biomarkers for the presence of obstructive sleep apnea.
Role: Co-Principal Investigator

SW-071188 NAGARAJA, G.M. (PI) 03/01/08-02/28/09
Baylor Scott & White Foundation Grant $40,000
"*Development of Anti-Tumor Therapy for Breast Cancer*"
The major goal of this project is to develop an anti-cancer drug using combined lentivirus and siRNA technology.
Role: Co-Principal Investigator

SW-071044 BHAT, V.B. (PI) 05/01/08-04/31/09
Baylor Scott & White Foundation Grant $40,000
"*Proteomic Profile of Pancreatic Fluid from Cancer Patients*"
The major goal of this project is to map the proteomic profile of pancreatic fluid in patients with pancreatic cancer.
Role: Co-Principal Investigator

2RO1 CA091889-06 ASEA, A. (PI) 03/21/03-02/28/08
NCI/NIH $1,670,000
National Cancer Institute/National Institutes of Health

"*Circulating HSP70 in Hyperthermia and Cancer Therapy*"
The major goal of this project is to investigate the mechanism by which extracellular HSP70 activates the immune response during hyperthermia treatment.
Role: Principal Investigator

SW-071188 ASEA, A. (PI) 01/01/08-12/31/08
Baylor Scott & White Foundation Grant $5,000
"4th International Symposium on Heat Shock Proteins in Biology and Medicine"
The major goal of this project is to organize a conference in which clinicians and scientists on the cutting edge of heat shock protein research can present their work and to highlight the work that we are doing in this area.
Role: Principal Investigator

CHSW-1245 ASEA, A. (PI) 02/01/06-01/31/08
The Children's Hospital at Baylor Scott & White Foundation Grant $12,000
"*Development of Novel RNA Interference Therapy for Children with Spinal Muscular Atrophy* (SMA)"
The major goal of this project is to determine the efficacy of a novel oligonucleotide on a mouse model of SMA
Role: Principal Investigator

3RO1 CA91889-02S1 ASEA, A. (PI) 09/01/03-02/28/06
NCI/NIH $255,000
National Cancer Institute/National Institutes of Health
"*Circulating HSP70 in Hyperthermia and Cancer Therapy*"
The major goal of this project is to investigate the mechanism by which extracellular HSP70 activates the immune response during hyperthermia treatment.
Role: Principal Investigator

SW-071188 ASEA, A. (PI) 01/01/06-12/31/06
Baylor Scott & White Foundation Grant $5,000
"3rd International Symposium on Heat Shock Proteins in Biology and Medicine"
The major goal of this project is to organize a conference in which clinicians and scientists on the cutting edge of heat shock protein research can present their work and to highlight the work that we are doing in this area.
Role: Principal Investigator

Institutional Support, ASEA, A. (PI) 04/16/02-04/15/05
Boston University School of Medicine, Boston, MA $425,000
"*Role of Heat Shock Proteins in Biology and Medicine*"
The major goal of this project is to study the immunobiology of heat shock proteins, to examine the role of heat shock proteins in the progression of diseases, and to design therapies that might lead to cures.
Role: Principal Investigator

3RO1 CA47407-12S1 CALDERWOOD, S.K. (PI) 06/30/88-06/30/05
NCI/NIH $255,000
National Cancer Institute/National Institutes of Health

"*Transmembrane Signaling by Hyperthermia*"
The major goal of this project is to explore the regulatory and signal transduction mechanisms that control and coordinate the heat shock response.
Role: Co-Principal Investigator

JCRT/HMS ASEA, A. (PI) 07/01/00-06/31/02
Joint Center for Radiation Therapy, Harvard Medical School $35,000
"Role of HSP70 in Hyperthermia-Induced Tumor Killing"
The major goal of this project is to examine the mechanism by which the seventy kilo-Dalton heat shock protein (HSP70) modulates hyperthermia-induced tumor killing.
Role: Principal Investigator

JCRT/HMS CALDERWOOD, S.K. (PI) 07/01/02-06/31/03
Joint Center for Radiation Therapy, Harvard Medical School $25,000
"2nd International Symposium on Heat Shock Proteins in Biology and Medicine"
The major goal of this project is to organize a conference in which clinicians and scientists on the cutting edge of heat shock protein research can present their work and to highlight the work that we are doing in this area.
Role: Co-Principal Investigator

RO1 CA77464-03S1 CALDERWOOD, S.K. (PI) 04/01/98-03/31/02
NCI/NIH $425,000
National Cancer Institute/National Institutes of Health
"*Gene Repression by HSF1 during Hyperthermia*"
The major goal of this project is to explore the mechanisms of transcriptional repression by HSF1 and its role in cellular responses to stress.
Role: Co-Principal Investigator

R13 CA78512 CALDERWOOD, S.K. (PI) 07/01/00-06/31/01
NCI/NIH $5,000
National Cancer Institute/National Institutes of Health
"*1st International Symposium on Heat Shock Proteins in Biology and Medicine*"
The major goal of this project is to organize a conference in which clinicians and scientists on the cutting edge of heat shock protein research can present their work and to highlight the work that we are doing in this area.
Role: Co-Principal Investigator

UNCF/Merck Science Initiative ASEA, A. (PI) 09/01/97-08/31/98
United Negro College Fund (UNCF)/Merck Pharmaceuticals $100,000
"Role of RSK2 Kinase in Cell Proliferation and Transcriptional Activation of Cytokine Genes"
The major goal of this project is to study the role of RSK2 kinase in cell proliferation and transcriptional activation of human cytokine genes during hyperthermia and other stresses, and to characterize the anti-inflammatory effect of NSAIDs on cytokine gene transcription.
Role: Principal Investigator

E. Report on Teaching

E1. Local (National) Contributions: Medical and Graduate Courses

University of Gotheburg, Gothenburg, Sweden

1991-1995 Teaching Assistant, University of Gothenburg, Gothenburg, Sweden.

1991-1996 Teaching undergraduate Medical, Dental Medicine Students and Medical Laboratory Technologists.

Theoretical courses:

"*Tumor Immunology*"

Practical courses:

"*Mycoplasma Detection*"

"*Medical Virology*"

1993-1995 Teaching Assistant, University of Gothenburg, Gothenburg, Sweden.

Teaching Undergraduate and Postgraduate Scholars.

Theoretical courses:

"*Tumor immunology*"

"*Role of Natural Killer (NK) Cells in Viral Infection*"

"*Apoptosis in Cell-Mediated Immunity*."

Practical courses:

"*Flow Cytometry*"

"*Lymphocytes Separation Techniques*."

Miami-Dade Community College, Miami, Florida, USA

1996-1996 Lecturer, "*Chemistry and Earth Science*", Miami-Dade Community College, Miami, Florida, USA

University of Miami School of Medicine, Miami, Florida, USA

1995-1996 Lecturer, "*Flow Cytometry: Principles and Practice*," University of Miami School of Medicine, Miami, Florida, USA

Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

1999-2001 Lecturer, "*Radiation-Induced Apoptotic Cell-Death*" Radiation Oncology Fellowship Program, Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2002-2005 Lecturer, "*Immunobiology of Heat Shock Proteins*" Center for Molecular Stress Response Seminar Series, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2005-2012 Lecturer, "*Advanced Topics in Cell Signaling (MSCI 689)*" Division of Molecular Cardiology, Texas A&M Health Science Center, College Station, Texas, USA

2008-2012 Lecturer, "*Cell Adaptation, Injury and Aging: Molecular Control*" 2nd Year Medical Students, Texas A&M Health Science Center, College Station, Texas, USA

2009-2012 Lecturer, "*Microbiology & Molecular Pathogenesis*" 1st Year Medical Students, Texas A&M Health Science Center, College Station, Texas, USA

Baylor Scott & White Hospital, Temple, Texas, USA

2005 "*Proteomic Breakthroughs*" in association with Agilent Technologies
"*Next Generation Proteomics*" Technology Seminar in association with Invitrogen
"*Functional Genomics Workflow Solutions: New RNAi Vectors and siRNA Collections*" Technical Seminar in association with Invitrogen

2006 "*Basic Proteins in Biology and Medicine*" Department of Surgery, Surgical Residents courses. Baylor Scott & White Hospital, Temple, TX
"*Understanding and Improving the Properties of siRNA for Gene Function Analysis*" Technical Seminar in association with Dharmacon "*Tools for Investigating and Improving Protein-Protein Interactions Studies*"
Technical Seminar in association with Pierce Regional Flow Cytometry Training Program in association with FloCyte
Class 1: Basic Flow Cytometry
Class 2: Multiparameter Flow and Compensation

2010 Summer Research Program for Medical Students from Al-Imam University, Riyadh, Saudi Arabia

2011 Summer Research Program for International Medical Students – Al-Imam University, Riyadh, Saudi Arabia

2012 Summer Research Program for International Medical Students – Al-Imam University, Riyadh, Saudi Arabia

Central Texas Veterans Health Care System, Temple, Texas, USA

2006-2012 "*Role of Heat Shock Proteins in Biology and Medicine*"

Temple College, Temple, Texas, USA

2006-2012 "*Use of Proteomics for Biomarker Discovery*"

2008-2012 Proteomics Course for Biotechnologists. Developed an online Proteomics Course for Temple College, including:

<u>Proteomics Theory</u>:
Introduction to Proteins

- Protein Structure - Primary, Secondary, Tertiary, Quaternary; Fibrous and Globular
- Nature and Properties - Acid-Base Properties and Titration Curves, Optical Properties
- Classification and Nomenclature - Peptide Bonds, Non-Polar, Uncharged Polar and Charged Polar Bonds
- Function - Structure, Enzymes, Messenger and Carrier Proteins
- Protein-Protein Interactions - Hemoglobulin, Cell signaling, Transcriptional Regulation
- Techniques for Protein Purification:

- Chromatography - Ion exchange, Paper, Gel filtration, Affinity, Adsorption, Thin layer, Reverse-phase, HPLC
- Electrophoresis - Paper, Gel, SDS-PAGE, 2-D, Capillary
- Ultracentrifugation - Sedimentation, Ultracentrifugation

- Quantitative Analysis
  - Lowry, Bradford, Biuert, NBT, Stable Isotope Labeling and DIGE

Proteomics:

- Clinical Applications - Challenges and Opportunities in Various Diseases
- Proteomics Tools: 2-D, MALDI, SELDI

Mass Spectrometry:

- Overview - Sample Ionization, Analysis and Separation of Sample Ions, Recording and Detection
- Types - Electrospray and Nanospray Ionization, MALDI, Tandem mass spectrometry
- Database Search with MS and MS/MS Spectral Data
- Applications - Protein Identification, Phosphorylation and other Post-Translational Modifications

Proteomics Laboratory Tutorials:
Protein Sample Preparation:

- Harvesting, Washing, Sonication, Ultracentrifugation, Bacteria, Biopsies, Blood and Eukaryotic Cells
- Protein Estimation Methods

Purification Methods:

- Capillary Liquid Chromatography and HPLC
- Native and SDS-PAGE
- Peptide Isoelectric Focusing (IEF)
- Gel analysis and Image Processing by PDQuest
- In-Gel Digestion and Peptide Extraction
- Interpretation of CID Tandem Mass Spectra of Peptides and Interpretation of Database Search Results
- Electro/Nanospray-Q-TOF-MS/MS

Morehouse School of Medicine, Atlanta, Georgia, USA

2013 Summer Research Program for International Medical Students – Alfaisal University Medical School, Saudi Arabia

The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

2016-2018 Summer Research Program for International Medical Students – Al-Imam University Medical School, Saudi Arabia

The University of Toledo College of Medicine & Life Sciences, Toledo, Ohio, USA

2018 · Summer Research Program for International Medical Students – Dammam University Medical School, Saudi Arabia

2019 · "*Opportunities for Research Addressing the Proteogenomics Platform in Precision Therapeutics*," PI Parade, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

· "*Summer Research Program for International Medical Students*," Dammam University Medical School, Saudi Arabia

2020 · Bioinformatics Component of Systems Pathophysiology Course, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

· "*Precision Medicine: Application of Proteogenomics*" Bioinformatics Component of Systems Pathophysiology Course, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

· "*Precision Medicine: Application of Proteogenomics*" Methods in Biomedical Science Program (BMSP) courses, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

· "*Precision Medicine: Application of Proteogenomics*" Biomarkers Discovery Validation & Implementation (BRIM) Program in Bioinformatics & Proteomics/Genomics, University of Toledo College of Medicine and Life Sciences, Toledo, Ohio, USA

E2. International Contributions: Medical and Postgraduate Courses

University of Health Science, Antigua

1999 Visiting Professor of Immunology, University of Health Science, St. John's, Antigua

Ludwig Maximilian's University Hospital, Munich, Germany

2001-2001 Visiting Professor of Radiology, Ludwig Maximilian's University Hospital, Munich, Germany

Javeriana University, Bogotá, Colombia

2002 Visiting Professor of Medicine, Javeriana University, Bogotá, Colombia

Makerere University, Kampala, Uganda

2010 Visiting Professor of Medicine, Makerere University, Kampala, Uganda

Guangxi Medical University, Nanning, China

2013 Visiting Professor of Medicine, Guangxi Medical University, Nanning, China

Guangxi University of Chinese Medicine, Nanning, China

2013 Visiting Professor of Medicine, Guangxi University of Chinese Medicine, Nanning, China

University of Palermo, Palermo, Italy

2013-2016 Visiting Professor, University of Palermo, Palermo, Italy

Euro-Mediterranean Institute of Science and Technology, Palermo, Italy

2013-2016 Head, Section of Translational Medicine, Department of Cutting-Edge Medicine and Neuroscience, Euro-Mediterranean Institute of Science and Technology (IEMEST), Palermo, Italy

University of Dammam, Dammam, Saudi Arabia

2014-2016 Professor, University of Dammam, Dammam, Saudi Arabia

E3. Advisory Responsibilities:

High School Research Trainees

1999-2000 Rachel Kropa, Emmanuel College, Boston, Massachusetts, USA
2000-2002 Monique T. Bonhomme, Massachusetts College of Pharmacy, Boston, Massachusetts, USA
2003-2004 Edwina E. Asea, Emmanuel College, Boston, Massachusetts, USA
2004-2005 Diana T. Page, Wheaton College, Norton, Massachusetts, USA
2004-2005 Jason W. Eng, North Western University, Chicago, Illinois, USA
2004-2005 Dimitri Jones, Roxbury Community College, Boston, Massachusetts, USA
2004-2005 Susana L. Orodonez, Wellesley College, Wellesley, Massachusetts, USA
2004-2006 Kristen D. Perez, Boston University, Boston, Massachusetts, USA
2006-2008 David Onyango, University of Mary Hardin Baylor, Belton, Texas, USA
2007-2007 Kiran Rao, St. Andrews High School, Austin, Texas, USA
2007-2008 Victoria Mendoza, Harvard University, Boston, Massachusetts, USA
2007-2008 Chere Brown, Baylor Scott & White Hospital, Temple, Texas, USA
2008-2008 Michael Zacher, Central Texas Bioscience Institute, Temple, Texas, USA
2008-2008 Laura Miramontes, Central Texas Bioscience Institute, Temple, Texas, USA
2009-2009 Rachel Kimbrough, Baylor University, Waco, Texas, USA
2009-2010 Linda Wolf, Central Texas Bioscience Institute, Temple, Texas, USA
2009-2010 Shahrum Lillard, Central Texas Bioscience Institute and Belton High School, Belton, Texas, USA
2009-2010 Shahrum Lillard, Baylor University, Waco, Texas, USA
2010-2010 Alexzander Asea, Jr., Belton High School, Belton, Texas, USA
2010-2010 Gretel Nabeta, United Nations International School, New York, New York, USA
2010-2010 Geraldine Nabeta, United Nations International School, New York, New York, USA
2010-2011 Viraj Mehta, Central Texas Bioscience Institute and Westlake High School, Austin, Texas, USA
2010-2010 John Mark Carruth, Central Texas Bioscience Institute and Belton High School, Belton, Texas, USA
2010-2010 Miguel Rodriguez, Central Texas Bioscience Institute and Belton High School, Belton, Texas, USA
2011-2011 Michael McNamara, Central Texas Bioscience Institute, Temple, Texas, USA
2011-2011 Ian Collier, Central Texas Bioscience Institute, Temple, Texas, USA

Undergraduate Research Trainees

1998-2002 Rahilya Napoli, B.Sc., Brigham and Women's Hospital, Boston, Massachusetts, USA
2003-2004 Frederick Powell, B.Sc., Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA
2003-2004 Elizabeth Palaima, B.Sc., Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA
2009-2010 Princess Bempong, B.Sc., Gallaudet University, Washington, District of Colombia (DC)
2010-2012 Princess Bempong, B.Sc., Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2010-2012 Vaidehi Agrawal, B.Sc., Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

Masters of Science (M.Sc.) Research Trainees

2019-present Catalin Dragomirescu, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Jennifer Page, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Kaila Herold, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Bhakti Dixit, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Connar McCarthy, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Lord Boachie, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Chino, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Anik Khondaker Alam, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Annie Ruth Morrison, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Ahmed Khalil, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Ali Sajid Imami, Masters of Science in Biomedical Sciences Graduate, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

Masters of Science (M.Sc.) Thesis Committee Member

1992-1994 Mirjana Todorovic, B.Sc., Department of Medical Microbiology and Immunology, University of Gothenburg, Gothenburg, Sweden

1998-2001 Edith Kabingu, M.Sc., Dana-Farber Cancer Institute, Boston, Massachusetts, USA

2000-2003 Alfonso Barretto, M.Sc., Javeriana University, Bogotá, Colombia

2001-2002 Olivia Bare, M.Sc., Brigham Young University, Provo, Utah, USA

2018-present Scott Miruzzi, Graduate student, Masters in Bioinformatics, University of Toledo College of Medicine and Life Sciences, Toledo, OH

Doctor of Medicine (M.D.) Research Trainees (International)

2010 Moath Mohammed A. Albarrak, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia

2010 Abdulrahman Hatem H. Aman, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia

2010 Munahi Hadhram M. Aldawsari, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia

2010 Abdulrahman Ahmad A. Alghulikah, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia

2010 Ahmad Abdulaziz A. Alrubaian, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia

2010 Faisal Fahad M. Aloufi, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Abdulrahman Mohammed A. Aljuayli, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Abdullatif Abdulaziz S. Alkhurayji, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Meshal Mohammad I. Almotair, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Dhaifallah Sultan S. Mulafikh, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Fares Abdulmajed I. Alkhayal, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Morabet Fahad M. Al-Hemaid, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Hamad Saleh H. Alturki, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Mohammed Saad S. Aleid, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Ibrahim Mansour I. Bin Hazzaa, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Yousef Abud S. Alanazi, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Omar Abdullah M. Ahmad, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Ahmad Mohammad A. Alrasheed, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Abdulaziz Khaled M. Alkahtani, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Mohammed Waleed M. Al-Shaqhaa, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Abdullah Mohammed M. Alowayed, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Muath Salman A. Almuhaini, 2nd year Medical Student, College of Medicine, Al-Imam Muhammad bin Saud University, Riyadh, Kingdom of Saudi Arabia
2010 Sadek Obeidat, 2nd year Medical Student, College of Medicine, Al-Faisal University, Riyadh, Kingdom of Saudi Arabia
2010 Mustafa Obeidat, 2nd year Medical Student, College of Medicine, Al-Faisal University, Riyadh, Kingdom of Saudi Arabia
2013 Abdullah Binobaid, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Abdullah Bin Salamah, 2nd year Medical Student, College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia
2013 Abrar Alhazzani, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Ahmad Faisal Allaf, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Ameera Elias Sheikh, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia

2013 Ayah Farfour, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Hadi Al Halabi, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Loud M. K. Kahial, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Leen Raddaoui, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Rakan Wael Al-Ghanamah, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Ranim Chamseddin, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Reem Al-Shaikh, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Sawsan Obeidat, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Seham Abdulkader, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Yasin Obeidat, 1st year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Yasmeen Atia Almattboli, 2nd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2013 Yazeed Alsumih, 2nd year Medical Student, College of Medicine, Al Imam University, Riyadh, Kingdom of Saudi Arabia
2019 Abdulrahman Baqatyan, 3rd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2019 Hafss Bashaiwth, 3rd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2019 Ahmed Batheeb, 3rd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2019 Abdulmalek Bawazir, 3rd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia
2019 Abdallah Madhi, 3rd year Medical Student, College of Medicine, Alfaisal University, Riyadh, Kingdom of Saudi Arabia

Doctor of Medicine (M.D.), Medical Resident Trainees (National)

1999-2001 Rajani Mallick, M.D., Dana-Farber Cancer Institute, Boston, Massachusetts, USA
1999-2000 Nicholas Oldenberg, M.D., Resident, Dana-Farber Cancer Institute, Harvard Medical School, Boston, Massachusetts, USA
2006-2007 Melissa Crchova, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA
2006-2007 Kabir Jahangir, M.D., Pathology Resident, Memorial Hermann-Texas Medical Center (TMC), Houston, Texas, USA
2006-2007 Rebecca Wiatrek, M.D., General Surgery Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA
2007-2010 William Neumann, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2008-2010 Nitasha D. Thompson, 3rd Year Medical Student, Texas A&M HSCCM, Temple, Texas, USA

2009-2010 Renu Khode, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2009-2012 Yoshiyuki Kikuchi, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2009-2012 Daniel Smith, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2010-2012 Paola C. Rosas, M.D., Texas A&M Health Science Center College of Medicine, College Station, Texas, USA

2011-2012 Jared Barker, M.D., Pathology Resident, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2019-2019 Anthony Mitchell, 2nd Year Medical Student, University of Toledo College of Medicine and Life Sciences, Ohio, USA

2019-2019 Michael McHugh, 2nd Year Medical Student, University of Toledo College of Medicine and Life Sciences, Ohio, USA

2019-2019 Sean Mack, 2nd Year Medical Student, University of Toledo College of Medicine and Life Sciences, Ohio, USA

2019-2019 Nealie Ngo, 2nd Year Medical Student, University of Toledo College of Medicine and Life Sciences, Ohio, USA

2019-2019 Susan Morand, 2nd Year Medical Student, University of Toledo College of Medicine and Life Sciences, Ohio, USA

Doctor of Philosophy (Ph.D.) Thesis Committee Member

1993-1996 Thomas A. Houze, M.Sc., Department of Oncology, Östra University Hospital, University of Gothenburg, Gothenburg, Sweden

2001-2004 Masters Contact, Brigham Young University, Provo, Utah, USA

2001-2004 Claudia Cifuentes, Javeriana University, Bogotá, Colombia

2001-2002 Olivia Bare, M.Sc., Department of Medical Microbiology and Immunology, Brigham Young University, Salt Lake City, Utah, USA

2002-2005 Maria A. Bausero, M.Sc., Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2004-2005 Billy Chen, B.Sc., Molecular Medicine Program, Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2004-2005 Nicolas Currier, M.Sc., Molecular Medicine Program, Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2006-2009 Randall Alfano, M.Sc., Graduate School of Biomedical Science (GSBS) Texas A&M HSCCM, Temple, Texas, USA

2008-2012 Yu-Jen (Johnny) Lee, M.Sc., Graduate School of Biomedical Science (GSBS) Texas A&M HSCCM, Temple, Texas, USA

2008-2011 Rosaria Tinnirello, Dipartimento di Scienze e Tecnologie Biologiche Chimiche e Farmaceutiche (STEBICEF), Palermo, Italy

2008-2011 Giuseppina Turturici, Dipartimento di Scienze e Tecnologie Biologiche Chimiche e Farmaceutiche (STEBICEF), Palermo, Italy

2010-2012 Paola C. Rosas, M.D., Graduate School of Biomedical Science (GSBS) Texas A&M HSCCM, Temple, Texas, USA

2010-2013 Vaidehi Agrawal, M.Sc., Graduate School of Biomedical Science (GSBS) Texas A&M HSCCM, Temple, Texas, USA

2019-present Shruti Ghai, PhD in Biomedical Sciences Cancer Biology Track, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Ryan Harris, PhD in Biomedical Sciences Cancer Biology Track, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Deepti Gurung, PhD in Biomedical Sciences Cancer Biology Track, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

2019-present Shreyasi Ganguly, PhD in Biomedical Sciences Cancer Biology Track, The University of Toledo College of Medicine and Life Sciences, Toledo, OH

Doctor of Philosophy (Ph.D.) External Examiner

2009 Kerry Alexandra McLoughlin, from the King's College, London, United Kingdom

Postdoctoral Research Scholars

2000-2002 Xiaozhe Wang, Ph.D., Postdoctoral Research Fellow, Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

2000-2001 Jennifer Vincent, Ph.D., Postdoctoral Research Fellow, Dana-Farber Cancer Institute and Harvard Medical School, Boston, Massachusetts, USA

2002-2004 Salamatu S. Mambula, Ph.D., Postdoctoral Research Fellow, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2002-2004 Dennis O. Gor, Ph.D., Postdoctoral Research Fellow, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2004-2005 Kishiko Ogawa, Ph.D., Postdoctoral Research Fellow, Department of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2005-2005 Sungjae Shin, Ph.D., Postdoctoral Research Associate, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2005-2006 Nirmal Singh, Ph.D., Postdoctoral Research Associate, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2005-2088 Nagaraja Mallappa, Ph.D., Postdoctoral Research Associate, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2005-2008 Hongying Zheng, Ph.D., Postdoctoral Research Associate Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2006-2007 Juergen Radons, Ph.D., Postdoctoral Research Associate, Regensburg University Hospital, Regensburg, Germany

2007-2008 Appukuttannair R. Pradeep, Ph.D., Visiting Scientist, Seribiotech Research Laboratory, Central Silk Board, Government of India, Bangalore, India

2007-2008 Suchitra Joshi, Ph.D., Research Associate, University of Virginia, Charlottesville, Virginia, USA

2007-2011 Punit Kaur, Ph.D., Postdoctoral Research Assistant, Texas A&M HSCCM, Temple, Texas, USA

2011-2012 Prabhakar Tiwari, Ph.D., Postdoctoral Research Assistant, Texas A&M HSCCM, Temple, Texas, USA

Faculty Mentees

2002-2005 Ajit K. Bharti, Ph.D., Research Assistant Professor of Medicine, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2004-2005 Adeboye H. Adewoye, M.D., Assistant Professor of Medicine, Center for Excellence in Sickle Cell Disease, Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts, USA

2005-2008 Vadiraja B. Bhat, Ph.D., Research Assistant Professor, Baylor Scott & White Hospital and Texas A&M HSCCM, Temple, Texas, USA

2008-2009 Hongying Zheng, Ph.D., Assistant Professor of Pathology and Laboratory Medicine, Texas A&M HSCCM, Temple, Texas, USA

2008-2012 Ganachari M. Nagaraja, Ph.D., Assistant Professor of Pathology and Laboratory Medicine, Texas A&M HSCCM, Temple, Texas, USA

2008-present Fabiana Geraci, Assistant Professor of Medicine, Dipartimento di Scienze e Tecnologie Biologiche Chimiche e Farmaceutiche (STEBICEF), Palermo, Italy

2010-present Dawit Gizachew, Ph.D., Assistant Professor of Medicine, Texas A&M HSCCM, Temple, Texas, USA

2010-present Moses Galukande, M.D., Ph.D., Makerere University, Kampala, Uganda

2011-present Punit Kaur, Ph.D., Assistant Professor of Pathology and Laboratory Medicine, Texas A&M HSCCM, Temple, Texas, USA

2014-present Ebtesam Al-Suhaimi, Ph.D., Associate Professor of Medical Sciences, Department of Sciences, University of Dammam, Dammam, Saudi Arabia

2015-present Fahd Al-Khamis, M.D., Assistant Professor of Medicine, Department of Neurology, University of Dammam, Dammam, Saudi Arabia

2015-present Erum Sheriff, M.D., Assistant Professor of Medicine, Department of Neurology, University of Dammam, Dammam, Saudi Arabia

2015-present Muhammad Inman, M.D., Assistant Professor of Medicine, Department of Neurology, University of Dammam, Dammam, Saudi Arabia

2015-present Badarubbin Abbasi, M.D., Assistant Professor of Medicine, Deanship for Scientific Research, University of Dammam, Dammam, Saudi Arabia

2015-present Naif Al-Masoud, DDS, Ph.D., Assistant Professor of Dentistry, Department of Preventive Dental Sciences, College of Dentistry, University of Dammam, Dammam, Saudi Arabia

2015-present Ahmed El-Hashash, Ph.D., Assistant Professor, Keck School of Medicine Ostrow School of Dentistry, University of Southern California Children's Hospital Los Angeles, USA

2018-present Raj Gupta, M.D., Assistant Professor of Cardiology, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present Raman Dayanidhi, PhD., Assistant Professor of Cancer Biology, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present Steven Heller, PhD., Assistant Professor of Medicine, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present David Kennedy, PhD., Assistant Professor of Medicine, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present Nagalakshmi Nadiminty, PhD., Assistant Professor of Urology, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present Firas G. Petros, M.D., Assistant Professor of Urology, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2018-present Shi-He Liu, PhD., Assistant Professor of Surgery, University of Toledo College of Medicine and Life Sciences, Toledo, USA

2019-present Tatiana Marquez-Lago, PhD., Assistant Professor of Medicine, University of

Alabama at Birmingham Medical Center, Birmingham, Alabama, USA

2019-present Andre Leier, PhD., Assistant Professor of Medicine, University of Alabama at Birmingham Medical Center, Birmingham, Alabama

E4. Invited Speakerships:

1997

"Role of RSK2 Kinase in Cell Proliferation and Transcriptional Activation of Cytokine Genes" UNCF/Merck Postdoctoral Science Initiative Fellowship Award, Merck Research Laboratories. August 29, 1997, Rahway, New Jersey, USA

1998

"*Role of Histamine In The Regulation of NK Cell Activity*" Department of Medicine, University of California, Los Angeles (UCLA). February 15, 1998, Los Angeles, California, USA

2000

"*HSP70: a Chaperokine*" Department of Physiology and Pharmacology, University of Gothenburg, April 20, 2000, Gothenburg, Sweden

"*Extracellular HSP70 a Chaperokine*" 8th International Congress of Hyperthermic Oncology, April 26-29, 2000, Kyông-Ju, South Korea

"*HSP70 A Chaperokine*" Fellows Day, Merck Research Laboratories. June 26, 2000, Rahway, New Jersey, USA

"*The Chaperokine Effect of HSP70*" International Symposium on Heat Shock Proteins in Biology and Medicine, November 6, 2000, Woods Hole, Massachusetts, USA

"*The Chaperokine Effect*" Institute of Hematology, Saint-Louis Hospital, INSERM Paris, December 15, 2000, Paris, France

2001

"*Chaperokine-Induced Hyperthermia-Mediated Tumor Killing*" Annual Meeting of the Radiation Research Society and North American Hyperthermia Society, April 21-26, 2001, San Juan, Puerto Rico

"*The Black Plague: Health, Population, Cancer & AIDS in the African Diaspora*" 2nd Conference, West Virginia State College. May 3-5, 2001, Institute, West Virginia, USA

"*The Chaperokine Effect*" Institute for Animal Health, Pirbright Laboratory. May 24, 2001, Surrey, United Kingdom

"*Potential Mechanism for Hyperthermia-Induced Tumor Killing*" European Society for Hyperthermic Oncology. May 30-June 2, 2001, Verona, Italy

"*Role of Toll-Like Receptors in HSP70-Induced Signaling*" 3rd International Workshop Molecular Biology of Stress Responses. October 9-13, 2001, Mendoza, Argentina

2002

"*Chaperokine Effect in Hyperthermia-Induced Tumor Killing*" University of Texas Medical School at Houston, May 8, 2002, Houston, Texas, USA

"*Mechanisms of Hyperthermia to Enhance Tumor Immunogeneity*" German Congress for Radiation Oncology, June 28-July 2, 2002, Berlin, Germany

"*Flavonoids, Polysaccharides and HSP as Mediators of Anti-Tumor Responses*" at the "Tumor Immunity Workshop" Javeriana University, July 29-August 5, 2002, Bogotá, Colombia

"*Chaperokine Effect in Hyperthermia-Induced Tumor Killing*" University of Connecticut Medical Center, October 6-9, 2002, Farmington, Connecticut, USA

"*Distinguished Lecturer Award*", Center of Excellence, College of Pharmacy & Pharmaceutical Sciences. Florida A&M University, November 20, 2002, Tallahassee, Florida, USA

2003

"*Chaperokine-Induced Signaling*" Department of Hematology, Nacker Hospital, INSERM, Paris, March 14, 2003, Paris, France

"*Stress-Induced Release of HSC70 from Human Tumors*" 21st Annual Meeting of the European Society for Hyperthermic Oncology (ESHO), June 4-7, 2003, Munich, Germany

"*Signal Transduction Pathways Activated by Chaperokine*" 6th International Society of Exercise and Immunology (ISEI), July 17-19, 2003, Copenhagen, Denmark

"*The Chaperokine Activity of HSP70*" Department of Physiology and Pharmacology, University of Gothenburg, July 21, 2003, Gothenburg, Sweden

"*Active Release of Heat Shock Proteins From Tumors: Role of Chaperokine In Hyperthermia-Induced Tumor Killing*" IInd International Symposium on Heat Shock Proteins in Biology and Medicine, Cell Stress and Chaperone Society and the North American Hyperthermia Society, September 10-14, 2003, Quebec City, Quebec, Canada

2004

"*Mechanisms of Active Release of Heat Shock Proteins from Tumors*" Department of Obstetrics and Gynecology, Division of Immunology and Infectious Diseases, Weill Medical College of Cornell University, July 8, 2004, New York, New York, USA

"*Role of Heat Shock Proteins in Innate Immunity*" Defense Advanced Research Projects Agency (DARPA) Endogenous Defense Workshop, Department of Defense, July 13-15, 2004, Fairfax, Virginia, USA

"*Role of Exosomes and Lipid Rafts in Stress-Induced Release of Hsp70*" Department of Integrative Physiology, Center for the Neuroscience, University of Colorado-Boulder, November 11, 2004, Boulder, Colorado, USA

"*Innate Immunity and its Value to Biodefense*", Department of Defense, National Defense University, November 10, 2004, Washington, District of Colombia, USA

2005

"*Molecular and Cell Biology of HSP70*" 2nd Annual Integrative Neural Immune Program (INIP) NIMH/NIH Biodefense Workshop on Neural & Neuroendocrine Host Factors in Shock and Immune Tissue Damage: Implications for Biodefense Treatment Strategies, January 31, 2005, Bethesda Maryland, USA

"*Are You In Or Out? The Immunobiology of HSP70*" Berlin University Hospital, April 8, 2005, Berlin, Germany

"*Development of Effective HSP-Based Immunotherapy*" Departamento de Microbiología, Facultad de Ciencias, Pontificia Universidad Javeriana, August 15, 2005, Bogotá, Colombia

"*Stress Proteins and Initiation of the Immune System*" 7th International Society of Exercise and Immunology (ISEI), September 15-17, 2005, Monte Carlo, Monaco

"*Mechanism of Cytokine-Medicated Release of Hsp70 From Tumor Cells*" Institute for Animal Health, Pirbright Laboratory. September 20, 2005, Surrey, United Kingdom

"*Active Release of Hsp70 From Cells*" 2nd International Congress on Stress Response, September 22-29, 2005, Tomar, Portugal

"*Chaperokine Activity of Heat Shock Proteins*" Department of Pathology and Laboratory Medicine, Texas A&M Health Science Center College of Medicine, October 17, 2005, College Station, Texas, USA

"*Role of Heat Shock Proteins in Biology and Medicine*" 1st Annual Cardiovascular Research Institute Retreat, Texas A&M Health Science Center College of Medicine, Baylor Scott & White Hospital, Central Texas Veterans Health Care System, October 27-28, 2005, Temple, Texas, USA

2006

"*Chaperokine Comes of Age*" 5th International Workshop on the Molecular Biology of Stress Responses, March 21-26, 2006, Concepción, Chile

"*Role of Hsp70 in SMA*" IIIrd International Symposium on Heat Shock Proteins in Biology and Medicine in association with the European Society for Hyperthermia Oncology (ESHO) May 24-27, 2006, Berlin, Germany

"*Chaperokine and Neurodegeneration*" International Symposium on Environmental Factors, Cellular Stress and Evolution, Banaras Hindu University, October 13-15, 2006, Varanasi, India

"*Proteomic Profiling of Plant Extracts: Biomarker Discovery*" Departamento de Microbiología, Facultad de Ciencias, Pontificia Universidad Javeriana, November 8-10, 2006, Bogotá, Colombia

2007

"*Development of Novel RNA Therapy for Children with Spinal Muscular Atrophy*" Pediatric Department Grand Rounds, Baylor Scott & White Hospital and Clinic, January 31, 2007, Temple, Texas, USA

"*Mechanisms of Heat Shock Protein Release*" Institute of Genetic Engineering, Kyungpook National University, March 21, 2007, Daegu, South Korea

"*Role of Heat Shock Proteins in Biology and Medicine*" Dongguk University Medical School, March 23, 2007, Kyông-Ju, South Korea

"*HSP70: a Chaperokine*" The Novartis Foundation Symposium, June 5-7, 2007, London, United Kingdom

"Role of Heat Shock Proteins in Biology and Medicine" UNCF/Merck Science Initiative, Merck Research Laboratories. June 25 27, 2007, Rahway, New Jersey, USA

"*HSP Release: Passive vs Active Release Mechanisms*" 3rd International Congress on Stress Responses in Biology and Medicine and 2nd International Congress of Stress Research, August 23-26, 2007 Budapest, Hungary

"*Cancer Researchers and CAM Practitioners: Fostering Collaborations; Advancing the Science*" NIH/NCI Office of Cancer Complementary and Alternative Medicine (OCCAM), October 22-23, 2007, Bethesda, Maryland, USA

2008

"*A Career in Drug Discovery at Baylor Scott & White Hospital*" Texas Bioscience Institute, March 4, 2008, Temple, Texas, USA

"*Heat Shock Proteins in Biology and Medicine*" 6th International Workshop on the Molecular Biology of Stress Responses, March 25-29, 2008, Bangkok, Thailand

"*Role of Hsp27 in Cancer Growth and Metastasis*" 10th International Congress on Hyperthermic Oncology April 9-12, 2008, Munich, Germany

"*Newsmakers Show About Cancer Research Featuring Dr Alexzander Asea*" KWTX Channel 10 News. June 28, 2008, Temple, Texas, USA

"*Hsp27 and Cancer Growth*" IVth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 3-6, 2008, Woods Hole, Massachusetts, USA

2009

"*Role of Heat Shock Proteins in Biology and Medicine*" Baylor University, Office of the Vice Provost for Research, February 23, 2009, Waco, Texas, USA

"*Role of Hsp27 in Cancer Growth and Metastasis*" Society of Thermal Medicine Annual Meeting, April 3-7, 2009, Tucson, Arizona, USA

"*Targeting Hsp27 for Therapeutic Gain" Role in Tumor Recognition*" King's College London, April 16, 2009, London, United Kingdom

"*Use of Heat Shock Proteins for Therapeutic Gain*" 25th Annual Meeting of the European Society for Hyperthermia Oncology (ESHO), June 4–6, 2009, Verona, Italy

"*Adaptogens as Mitigators of Radiation-Induced Tissue Damage*" 57th International Congress & Annual Meeting of the Society for Medicinal Plant Research August 16-21, 2009, Universitè Genève, Genève, Switzerland

"*Newsmakers Show About Cancer Research Featuring Dr Alexzander Asea*" KWTX Channel 10 News. September 10, 2009, Temple, Texas, USA

"*siRNA: New Technology towards a Cure for Breast Cancer*" Survivors Celebration - Susan G. Komen for the Cure, Central Texas Affiliate Region XII Education Service Center, September 17, 2009, Waco, Texas, USA

"*New Technologies in the Fight Against Breast Cancer*" Surviving and Thriving Retreat for Adults – Central Texas Cancer Network, September 26, 2009, Salado, Texas, USA

"*Modulation of Heat Shock Proteins by Adaptogens*" Adaptogen Symposium, Swedish Herbal Institute, October 8, 2009, Stockholm, Sweden

"*Role of Heat Shock Proteins in Adaptogen-Mediated Repression of Stress*" Green Medicine Institute, October 9, 2009, Stockholm, Sweden

"*Breast Cancer Call-In: National Breast Awareness Month*" KWTX Channel 10, October 22, 2009, Waco, Texas, USA

"*Biomarkers in Basic and Clinical Research*" Department of Family Medicine Retreat, Baylor Scott & White Hospital. November 20, 2009, Temple, Texas, USA

"*Hsp27 as a Target for Anti-Cancer Therapy*" Winthrop P. Rockefeller Cancer Institute, University of Arkansas for Medical Science. November 30, 2009, Little Rock, Arkansas, USA

2010

"*AA1907: A New Drug in the Fight Against Breast Cancer*" American Cancer Society's Relay for Life, January 12, 2010, Hilton Garden Inn, Temple, TX

"*Role of Heat Shock Proteins in Drug Discovery*" Texas Bioscience Institute, February 4, 2010, Temple, Texas, USA

"*Harnessing Heat Shock Proteins for Therapeutic Gain*" 16th Annual HMO Research Network Conference: Emerging Frontiers in Healthcare Research and Delivery, March 21-24, 2010, Hyatt Regency, Austin, Texas, USA

"*Designing Heat Shock Protein-Based Drugs*" College of Medicine, Al-Imam University, April 12, 2010, Riyadh, Saudi Arabia

"*Newsmakers Show About Cancer Research Featuring Dr. Alexzander Asea*". KWTX Channel 10 Morning News. April 23, 2010.

"Hsp27 and Tumor Suppressor Genes" Society for Thermal Medicine Annual Conference, April 24-26, 2010, Clearwater, Florida, USA

"New Possibilities in Targeted Breast Cancer Therapy" Relay for Life – American Cancer Society Luminary Service, April 24, 2010, Temple High School, Temple, Texas, USA

"*RNAi Technology in the Fight Against Breast Cancer*" Breast Cancer Survivors Network of Central Texas, April 28, 2010, Lampasas Middle School, Lampasas, Texas, USA

"*A Promising New Drug in the Fight Against Breast Cancer*" Gatesville Lion's Club, May 19, 2010, Gatesville, Texas, USA

"*Role of Heat Shock Proteins in Cell Death Pathways*" 1st Inaugural Symposium of the Baylor Scott & White/TAMHSC Center for Cell Death and Differentiation, May 20, 2010, Temple, Temple, Texas, USA

"*Development of Heat Shock Protein-Based Therapeutic: Principals and Practice*" Texas A&M MD/PhD Summer Lecture Series, June 9, 2010, College Station, Texas, USA

"*NampEVA a Promising New Drug in the Fight Against Breast Cancer*" Dental Society of Central Texas, June 24, 2010, Temple, Texas, USA

"*Role of Heat Shock Proteins in Neurodegenerative Disorders*" NeuroTalk-2010: From Nervous Functions to Treatment. June 25-28, 2010, Singapore

"*International Visitors to Baylor Scott & White Hospital*" KWTX Channel 10 News. August 4, 2010

"*Medical Student Overcomes the Odds*" KWTX Channel 10 News. August 6, 2010

"*Radiation Therapy Induces Circulating Serum Hsp72 in Patients with Prostate Cancer*" 1st Biennial Science of Global Prostate Cancer Disparities (GPC) Conference, August 27-29, 2010, Jacksonville, Florida, USA

"*Progress Towards a Promising Anti-Breast Cancer Drug*" Surviving and Thriving Retreat for Adults – Central Texas Cancer Network, September 25, 2010, Salado, Texas, USA

"*Possibilities for a Promising Anti-Breast Cancer Drug*" Today's Girls Pageant, Taylor Creek Elementary School, October 10, 2010, Copperas Cove, Texas, USA

"*NampEva: Research Towards a Promising Anti-Breast Cancer Drug*" Zumba For a Cure - Central Texas College, October 12, 2010, Killeen, Texas, USA

"*NampEva: A possible Breast Cancer Drug Developed in Central Texas*" Purina Pink Fifty - Fundraiser for Breast Cancer Awareness Month, October 16, 2010, Belton, Texas, USA

"*NampEva: A possible Breast Cancer Drug Developed in Central Texas*" Clem's Pink Out Day - Fundraiser for Breast Cancer Awareness Month, October 22, 2010, Temple, Texas, USA

"*NampEva: A possible Breast Cancer Drug Developed in Central Texas*" Pink Pajama Party at En Fuego Restaurant - Fundraiser for Breast Cancer Awareness Month, October 24, 2010, Killeen, Texas, USA

"*Two Potential Breast Cancer Drugs*" Root For the Cure – Metroplex Hospital, October 28, 2010, Killeen, Texas, USA

"*Basic Science Breast Cancer Research for a Cure*" Breast Cancer Awareness Months for the Greater Frisco Chapter of Jack and Jill of America, October 30, 2010, Dallas, Texas, USA

"*Extracellular Heat Shock Proteins"* Cell Stress Society International (CSSI), November 6, 2010, Boston, Massachusetts, USA

"*Targeting Hsp27 for Therapeutic Gain"* Vth International Symposium on Heat Shock Proteins in Biology and Medicine in association with the Cell Stress Society International (CSSI), November 7-11, 2010, Marine Biological Laboratories (MBL) Woods Hole, Massachusetts, USA

"Breast Cancer Research in the Division of Investigative Pathology" Edwards Academy, November 12, 2010, Killeen, Texas, USA

"*Basic Science Breast Cancer Research for a Cure*" 3rd Annual Fundraising Dinner - Early Detection is the Best Protection. Breast Cancer Initiatives of East Africa, November 13, 2010, Houston, Texas, USA

"*Choosing a Career in Biomedical Research*" Edward's Academy, December 2, 2010, Temple, Texas, USA

"Career Development and the Unwritten Rules of Academia" 12th RCMI International Symposium on Health Disparities – Bridging the Gap between Disparity and Equity, December 6-9, Nashville, Tennessee, USA

"Drug Discovery" Today's Girls, December 22, 2010, Temple, Texas, USA

2011

"*Use of Heat Shock Proteins for Therapeutic Gain*" Savara Pharmaceuticals, January 20, 2011, Temple, Texas, USA

"*Development of Anti-Cancer Drugs*" Salado High School, January 27, 2011, Salado, Texas, USA

"*Translational Research – Applications for the Development of Anti-Cancer Drugs*" Texas Bioscience Institute, March 3, 2011, Temple, Texas, USA

"*Careers in the Health Field*" University of Mary Hardin-Baylor Nursing Students present a Health Fair at Edward's Academy, March 24, 2011, Temple, Texas, USA

"*Development of Heat Shock Protein-Based Drugs*" Texas Southern University, March 25, 2011, Houston, Texas, USA

"*Latest Research on a Cure for Breast Cancer*" 1st Annual Catch a Cure Fishing Tournament, April 23, 2011, Broxton, Marine, Belton, Texas, USA

"*Translational Research Activities in the Division of Investigative Pathology*" Sacchettini Lab, Interdisciplinary Life Sciences Building (ILSB), April 22, 2011, College Station, Texas, USA

"Modulation of Anti-Tumor Effector Mechanisms via Hsp27" Society for Thermal Medicine Annual Conference, April 29-May 2, 2011, New Orleans, Louisiana, USA

"Role of Heat Shock Proteins in the Prevention of Amylin Aggregation in Type 2 Diabetes Mellitus" Society for Thermal Medicine Annual Conference, April 29-May 2, 2011, New Orleans, Louisiana, USA

"New Possibilities in Targeted Breast Cancer Therapy" Relay for Life – American Cancer Society Luminary Service, May 01, 2011, Wildcat Stadium, Temple High School, Temple, Texas, USA

"*Development of Heat Shock Protein-Based Anti-Cancer Therapies*" Patient Education Symposium Sponsored by Vasicek Cancer Center and the American Cancer Society, May 20, 2011, Temple, Texas, USA

"*Targeting HSP27 in Breast Cancer Tumors Using Combined Lentivirus-RNAi Technology*" 27th Annual Meeting of European Society for Hyperthermic Oncology (ESHO), May 26-28, 2011, Aarhus, Denmark

"*Heat Shock Protein-Based Anti-Breast Cancer Drugs*" 2nd Conference Hosted by the Breast Cancer Initiative East Africa, June 15-18, Kigali, Rwanda

"*Development of Heat Shock Protein-Based Anti-Breast Cancer Drugs*" Making Awesome Things Happen (M.A.T.H.) Camp. Austin Community College, June 30, Austin, Texas, USA

"*Research and Development of NampEVA*" Spaghetti Fundraiser hosted by the Today's Girl, July 22, Lampasas, Texas, USA

"*Adaptogens Stimulate Molecular Chaperone Hsp70 Expression in Neuroglia Cells*" 59th International Congress and Annual Meeting of the Society for Medicinal Plant and Natural Product Research, September 4-9, 2011, Antalya, Turkey

"*Functional Proteomics for the Discovery of Biomarkers Associated with Psychology and Neuroscience*" Psychology & Neuroscience Department Colloquium. Baylor University, September 23, 2011, Waco, Texas, USA

"*Basic Science Breast Cancer Research for a Cure*" Breast Cancer Awareness Months for the Greater Frisco Chapter of Jack and Jill of America, October 1, 2011, Plano, Texas, USA

"*Close to a Cure*" Heart of Texas Purple Cancer Warriors even to promote Breast Cancer Awareness Month, October 8, 2011, Killeen, Texas, USA

"*Zumba for Breast Cancer Awareness*" Central Texas College, October 11, 2011, Killeen, Texas, USA

"*Pink Day*," Clem Mikeska's Bar-B-Q, October 14, 2011, Temple, Texas, USA

"*Role of Hsp72-Containing Exosomes in Health and Disease*" Exosomes and Microvesicles 2011. October 15-17, 2011, Lake Bueno Vista, Florida, USA

"*Pink Week*," Salado High School, October 17-21, 2011, Salado, Texas, USA

"*NampEVA a Potential Breast Cancer Drug*" Root For the Cure – Metroplex Hospital, October 20, 2011, Killeen, Texas, USA

"*Role of Heat Shock Proteins as a Biomarker for Aggressive Cancers*" CERC Fourth Annual Health Disparities Institute, Partnerships, Collaborations, and Models to Reduce Health Disparities in the USVI and the Caribbean. October 20-21, 2011, Marriott Frenchman's Reef, St. Thomas, US Virgin Islands

"*Pink Heals Tour Stop*" City of Killeen event for Breast Cancer Awareness Month, October 24, 2011, Killeen, Texas, USA

"*NampEVA a Potential Breast Cancer Cure*" Taylor Lion's Club, October 28, 2011, Taylor, Texas, USA

"*New Drugs in the Fight Against Breast Cancer*" Surviving and Thriving Retreat for Adults – Central Texas Cancer Network – Peaceable Kingdom Retreat, October 29, 2011, Salado, Texas, USA

"*Today's Girl Pink Pageant*," November 12, 2011, Copperas Cove, Texas, USA

"*Targeting Hsp27 in Breast Cancer Tumors Using Combined Lentivirus-RNAi Technology*." Cancer Prevention and Research Institute of Texas (CPRIT) Innovations in Cancer Prevention and Research Conference, November 15-17, Austin, Texas, USA

"*NampEVA a Potential Breast Cancer Drug*" Leadership Temple, Temple Chamber of Commerce, December 13, 2011, Temple, Texas, USA

2012

"*NampEVA a Potential Breast Cancer Drug*" Leadership Belton, Belton Chamber of Commerce, January 10, 2012, Temple, Texas, USA

"*Elucidating the Reason for the Aggressive Phenotype of Triple-Negative Breast Cancer Tumor-Initiating Cells*" The College of Pharmacy, Xavier University of Louisiana will convene its Fifth Health Disparities Conference titled "*Achieving Health Equity through Access, Advocacy, Treatment, and Policy Development*." March 6-8, 2012, New Orleans, Louisiana, USA

"*Determining the Characteristics of Triple-Negative Breast Cancer Tumor-Initiating Cells*" Society for Thermal Medicine (STM) Annual Meeting, April 13–16, 2012, Portland, Oregon, USA

"*Hsp27 is a Repressor of Proteasome Function*" Society for Thermal Medicine (STM) Annual

Meeting, April 13–16, 2012, Portland, Oregon, USA

"*Role for Circulating Hsp72 in Hyperthermia-Induced Tumor Regression*" International Society for Extracellular Vesicles (ISEV), April 18-21 2012, Gothenburg, Sweden

"*Targeting of Hsp27 for Breast Cancer using RNAi Technology*," The 11th International Congress of Hyperthermic Oncology (ICHO) and the 29th Japanese Congress of Thermal Medicine (JCTM), August 28– 31, 2012, Kyoto, Japan

"*Hyperthermia-Induced Tumor Regression: Role for Circulating Hsp72*," Exosomes and Microvesicles 2012, September 29-October 2, 2012, Orlando, Florida, USA

"*Hsp72 Enters Early Endosomes before Late Endosomes Preparatory to Cell Release*," Sixth International Symposium on Heat Shock Proteins in Biology and Medicine in association with Cell Stress Society International, November 3–7, Alexandria, Virginia, USA

2013

"*Opportunities for Translational Medical Research Collaboration with Morehouse School of Medicine*," College of Medicine, Alfaisal University, February 24th 2013, Riyadh, Kingdom of Saudi Arabia

"*International Summer Research Program for Undergraduate Medical Students at Morehouse School of Medicine*," College of Medicine, Alfaisal University, February 25th 2013, Riyadh, Kingdom of Saudi Arabia

"*Opportunities for Translational Medical Research Collaboration with Morehouse School of Medicine*," Guangxi Medical University, March 26th 2013, Nanning, China

"*International Summer Research Program for Undergraduate Medical Students at Morehouse School of Medicine*," Guangxi Medical University, March 28th 2013, Nanning, China

"*Opportunities for Translational Medical Research Collaboration with Morehouse School of Medicine*," Guangxi University of Chinese Medicine, April 2nd 2013, Nanning, China

"*International Summer Research Program for Undergraduate Medical Students at Morehouse School of Medicine*," Guangxi University of Chinese Medicine, April 4th 2013, Nanning, China

"*Hsp72 Enters Early Endosomes Prior to Cell Release*" Society for Thermal Medicine (STM) Annual Meeting, April 17 –21, 2013, Aruba

"*New Insights into the Immmunobiology of Triple-Negative Breast Cancer Stem Cells*" 28th Annual Conference of the European Society for Hyperthermia Oncology, June 19–22, 2013, Munich, Germany

"*A Mouse Model for Triple-Negative Breast Cancer Stem Cells (TNBC-CSC) Exhibits an Aggressive Phenotype*," Health Disparities Research Training Program (HDRTP) Summer Institute at the Emory Conference Center on July 23-24, 2013, Atlanta, Georgia, USA

"*Use of Adaptogens in the Design of Central Nervous System (CNS) Related Disorders*" VIth International Congress on Stress Proteins in Biology and Medicine, August 18–22, 2013, Sheffield, United Kingdom

"*Role of Heat Shock Proteins in Trauma and Wound Healing*" Surgery Grand Rounds, Department of Surgery, Morehouse School of Medicine, September 11, 2013, Grady Hospital, Atlanta, Georgia, USA

"*Role of Heat Shock Proteins in Pediatric Cancers*" PEDS Workshop – Diagnostics, Devices and Delivery. September 30, 2013, The Petit Institute for Bioengineering and Bioscience, Georgia Institute of Technology Atlanta, Georgia, USA

2014

Association of Medical and Graduate Departments of Biochemistry (AMGDB), January 16-20, 2014, Antigua, Guatemala

Association of Medical Schools Microbiology & Immunology Chairs. January 22-26, 2014, San Jose, Costa Rica

"*Pediatric Bioengineering Institute*" Pediatric Grand Rounds, Department of Surgery, Morehouse School of Medicine, February 20, 2014, Grady Hospital, Atlanta, Georgia, USA

First Conference of the South American Chapter of Cell Stress Society International, March 11-14, 2014, Montevideo, Uruguay

2015

"*Development of Heat Shock Protein-Based Anti-Cancer Drugs"* 23rd International Conference on Targeting Cancer. February 14-21, 2015. Houston, Texas USA

"*Neuroscience Research at the University of Dammam*" Department of Neurology Grand Rounds, University of Dammam, March 29, 2015. Dammam, Saudi Arabia

"*Innovation and Translational Research & Development: The Future is Here*" 1st Annual Scientific Research Update 2015, University of Dammam, April 5-7, 2015. Dammam, Saudi Arabia.

"*Triple-Negative Breast Cancer Stem Cells (TNBC-CSC) Exhibits an Aggressive Phenotype: Role of HSPA1A-Containing Exosomes*" 32nd Annual Meeting of the Society for Thermal Medicine. April 14-17, 2015. Orlando, Florida, USA

"*A Novel High Throughput Model to Study Islet Amyloid Aggregation and β-cell Death in Type 2 Diabetes Mellitus: Role of HSPA1A*" 32nd Annual Meeting of the Society for Thermal Medicine. April 14-17, 2015. Orlando, Florida USA

"*Establishment of a Novel Stem Cell-Based Triple-Negative Breast Cancer Model*" 30th Annual Congress of the Tanta University Medical School. May 5-8, 2015. Tanta, Egypt

"*Establishment a Multifunctional Stem Cell Bank: Principles and Practice*" 30th Annual Congress of the Tanta University Medical School. May 5-8, 2015. Tanta, Egypt

2016

"*Workshop on Research Methodology*" Johns Hopkins Aramco Healthcare, March 30, 2016, Dammam, Kingdom of Saudi Arabia

"*Use of High Throughput Model to Study Islet Amyloid Aggregation for Type 2 Diabetes Mellitus*" 33rd Annual Meeting of the Society for Thermal Medicine. April 11-15, 2016. New Orleans, Louisiana, USA

"*Role of T3 and T4 in Vitamin B12 Deficiency and onset of Multiple Sclerosis*" 33rd Annual Meeting of the Society for Thermal Medicine. April 11-15, 2016. New Orleans, Louisiana, USA

"*Role on Stress Pathways in Reversing Nanomaterial-Induced Cell Death in Human Alveolar Epithelial Cells*" Third International Environmental Forum (TUEF-2016), July 12-14, 2016. Tanta, Egypt

"*Establishing a GMP-Grade Pharmaceutical Manufacturing Hub in East Africa*" East African Chamber Annual Conference, September 29th - 1st October, 2016. Dallas, Texas USA

"*Effect of Hsp27 and Hsp70 Inhibition in Triple-Negative Breast Cancer*" VIIIth International Symposium on Heat Shock Proteins in Biology and Medicine in association with Cell Stress Society International, November 2–6, 2016. Alexandria, Virginia, USA

"*Establishing a GMP-Grade Pharmaceutical Manufacturing Hub in East Africa*" DVA Consortium, December 2, 2016. Gaithersburg, Maryland USA

"*Development of an Anti-Cancer Drug*" Holland High School, December 2, 2016. Holland, Texas USA

"*Development of an Anti-Cancer Drug*" Salado High School, December 2, 2016. Salado, Texas USA

2017

"*Imaging Proteogenomics for Biomarker Discovery*" 34th Annual Society for Thermal Medicine Conference. May 5-11, 2018 Westin La Paloma Resort, Tucson, Arizona, USA

2018

"*Application of RapifleX – Quantitative MALDI Mass Spectrometry Imaging for Precision Therapy*" Division of Cardiovascular Medicine Grand Rounds, University of Toledo College of Medicine and Life Sciences. April 5, 2018. Toledo, Ohio, USA

"*RapifleX Tissue Typer™ for Quantitative MALDI Mass Spectrometry Imaging*" Department of Physiology & Pharmacology, University of Toledo College of Medicine and Life Sciences. April 18, 2018. Toledo, Ohio, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" University of Toledo College of Medicine and Life Sciences. April 19, 2018, Toledo, Ohio, USA

"*Grail/UT Cancer Prevention and Screening Discussion*" University of Toledo College of Medicine and Life Sciences. April 19, 2018, Toledo, Ohio, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" Dana Cancer Center Leadership Committee, University of Toledo College of Medicine and Life Sciences. May 2, 2018, Toledo, Ohio, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" Dana Cancer Center Leadership Committee, University of Toledo College of Medicine and Life Sciences. May 3, 2018, Toledo, Ohio, USA

"*Proteogenomics and Mutation Detection*" Dana Cancer Center Leadership Committee, University of Toledo College of Medicine and Life Sciences. May 3, 2018, Toledo, Ohio, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" Internal Lunch Education Session, University of Toledo College of Medicine and Life Sciences. May 4, 2018, Toledo, Ohio, USA

"*Proteogenomic Identification of Hsp27 in Cancer Growth and Metastasis*" 35th Annual Society for Thermal Medicine Conference. May 5-11, 2018. Tucson, Arizona, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" Internal Lunch Education Session, University of Toledo College of Medicine and Life Sciences. May 18, 2018, Toledo, Ohio, USA

"*Quantitative MALDI Mass Spectrometry Imaging (qMALDI-MSI)*" Internal Lunch Education Session, University of Toledo College of Medicine and Life Sciences. May 22, 2018, Toledo, Ohio, USA

"*Precision Cancer Program*" Update University of Toledo Medical Center Operations Council, University of Toledo College of Medicine and Life Sciences. May 23, 2018, Toledo, Ohio, USA

"*Proteogenomics and Precision Therapy: Potential for Collaborations with the Precision Therapy Program*" Dana Cancer Center Leadership Committee, University of Toledo College of Medicine and Life Sciences. June 14, 2018, Toledo, Ohio, USA

"*Precision Therapeutics Proteogenomics Diagnostics Center*" Discussion with Shimadzu Corporation at University of Toledo College of Medicine and Life Sciences. July 12, 2018. Toledo, Ohio, USA

"*Precision Therapeutics with National Impact Can be performed at the Dana Cancer Center in Affiliation with ProMedica"* University of Toledo College of Medicine and Life Sciences. October 12, 2018. Toledo, Ohio, USA

"*Proteogenomics Services: Potential for Collaborations with the Precision Therapy Program*" University of Toledo College of Medicine and Life Sciences. October 16, 2018, Toledo, Ohio, USA

"*Harnessing Heat Shock Proteins for Immunotherapeutic Gain*" Department of Surgery, Makerere University College of Medicine, October 19, 2018. Kampala, Uganda

"*The New Era of Precision Therapeutics*" The London School of Hygiene & Tropical Medicine (LSHTM), the Medical Research Council (MRC) and the Centers for Disease Control and Prevention (CDC), October 18, 2018. Entebbe, Uganda

"*Onco-Proteogenomics in Clinical Trials Management*" Uganda Cancer Institute (UCI) and Fred Hutchinson Cancer Center, October 31, 2018. Kampala, Uganda

"*Precision Medicine and the Proteogenomic Platform*" IXth International Symposium on Heat Shock Proteins in Biology and Medicine in association with Cell Stress Society International (CSSI), November 10–13, 2018. Alexandria, Virginia, USA

"*Addressing the Proteogenomic Platform in Precision Therapeutics*" 2nd Annual Toledo Cancer Research Symposium, December 7, 2018. Mahogany Ballroom at the Radisson Hotel University of Toledo Health Science Campus, Toledo, Ohio, USA

"*Precision Medicine: Application of Proteogenomics*"M1 ICL-Research: Precision Medicine, University of Toledo Health Science Campus, Toledo, Ohio, USA

2019

"*Target the Target: Precision Medicine*" Ninth International Congress on Stress Responses in Biology and Medicine, November 10-14, 2019. San Diego, California, USA

2020

"*Role of Heat Shock Proteins in Biology and Medicine*" Center of Nanoscience and Nanotechnology, Department of Life Sciences, Universidad de las Fuerzas Armadas – ESPE. May 22, 2020 Sangolquí, Ecuador

F. Publications:

Published Original Scientific Articles

1. Hellstrand, K., Asea, A., Hermodsson, S. Role of histamine in natural killer cell-mediated resistance against tumor cells. J Immunol. 1990 Dec 15;145(12):4365-4370. PubMed PMID: 2147942.
2. Hellstrand, K., Kylefjord, H., Asea, A., Hermodsson, S. Regulation of the natural killer cell response to interferon-alpha by biogenic amines. J Interferon Res. 1992 Jun;12(3):199-206. PubMed PMID: 1640122.
3. Hellstrand, K., Czerkinsky, C., Ricksten, A., Jansson, B., Asea, A., Kylefjord, H., Hermodsson, S. Role of serotonin in the regulation of interferon-gamma production by

human natural killer cells. J Interferon Res. 1993 Feb;13(1):33-8. PubMed PMID: 8454908.
4. Hellstrand, K., Asea, A., Dahlgren, C., Hermodsson, S. Histaminergic regulation of NK cells. Role of monocyte-derived reactive oxygen metabolites. J Immunol. 1994 Dec 1;153(11):4940-7. PubMed PMID: 7963557.
5. Hellstrand, K., Asea, A., Hermodsson, S. Histaminergic regulation of antibody-dependent cellular cytotoxicity of granulocytes, monocytes, and natural killer cells. J Leukoc Biol. 1994 Mar;55(3):392-7. PubMed PMID: 8120456.
6. Hellstrand, K., Asea, A., Hermodsson, S. Role of histamine in natural killer cell-dependent protection against herpes simplex virus type 2 infection in mice. Clin Diagn Lab Immunol. 1995 May;2(3):277-80. PubMed PMID: 7664171. Pubmed Central PMCID: 170145.
7. Asea, A., Hansson, M., Czerkinsky, C., Houze, T., Hermodsson, S., Strannegard, O., Hellstrand, K. Histaminergic regulation of interferon-gamma (IFN-gamma) production by human natural killer (NK) cells. Clin Exp Immunol. 1996 Aug;105(2):376-82. PubMed PMID: 8706348. Pubmed Central PMCID: 2200497.
8. Asea, A., Hermodsson, S., Hellstrand, K. Histaminergic regulation of natural killer cell-mediated clearance of tumour cells in mice. Scand J Immunol. 1996 Jan;43(1):9-15. PubMed PMID: 8560202.
9. Hansson, M., Asea, A., Ersson, U., Hermodsson, S., Hellstrand, K. Induction of apoptosis in NK cells by monocyte-derived reactive oxygen metabolites. J Immunol. 1996 Jan 1;156(1):42-7. PubMed PMID: 8598491.
10. Hansson, M., Asea, A., Hermodsson, S., Hellstrand, K. Histaminergic regulation of NK-cells: protection against monocyte-induced apoptosis. Scand J Immunol. 1996 Aug;44(2):193-6. PubMed PMID: 8711434.
11. Houze, T. A., Larsson, L., Larsson, P. A., Hansson, G., Asea, A., Gustavsson, B. Rapid detection of thymidylate synthase gene expression levels by semi-quantitative competitive reverse transcriptase polymerase chain reaction followed by quantitative digital image analysis. Tumour Biol. 1996;17(5):306-19. PubMed PMID: 8792857.
12. Jonsdottir, I. H., Asea, A., Hoffmann, P., Dahlgren, U. I., Andersson, B., Hellstrand, K., Thoren, P. Voluntary chronic exercise augments *in vivo* natural immunity in rats. J Appl Physiol (1985). 1996 May;80(5):1799-803. PubMed PMID: 8727569.
13. Jonsdottir, I. H., Asea, A., Hoffmann, P., Hellstrand, K., Thoren, P. Natural immunity and chronic exercise in rats. The involvement of the spleen and the splenic nerves. Life Sci. 1996;58(23):2137-46. PubMed PMID: 8649198.
14. Jonsdottir, I. H., Johansson, C., Asea, A., Hellstrand, K., Hoffmann, P. Acute mental stress but not enforced muscle activity transiently increases natural cytotoxicity in spontaneously hypertensive rats. Acta Physiol Scand. 1996 Aug;157(4):443-9. PubMed PMID: 8869727. 10.1046/j.1365-201X.1996.515276000.x.
15. Jonsdottir, I. H., Johansson, C., Asea, A., Hellstrand, K., Thoren, P., Hoffmann, P. Chronic intracerebroventricular administration of beta-endorphin augments natural killer cell cytotoxicity in rats. Regul Pept. 1996 Apr 23;62(2-3):113-8. PubMed PMID: 8795073.
16. Cvetkovska, E., Asea, A., Hellstrand, K., Edstrom, S. Tumor suppressive action of indomethacin is NK-cell-independent. Anticancer Res. 1997 Sep-Oct;17(5A):3403-7. PubMed PMID: 9413179.
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chronic voluntary exercise in rats. Acta Physiol Scand. 1997 Aug;160(4):333-9. PubMed PMID: 9338514. 10.1046/j.1365-201X.1997.00185.x.

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19. Stein-Streilein, J., Asea, A., Montalvo, J., Maniaci, V., Wanner, A. Role of NK1.1+ cells in immune regulation. Periodicum Biologrum 1997;23:34-39.
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22. Asea, A., Kabingu, E., Stevenson, M. A., Calderwood, S. K. HSP70 peptidembearing and peptide-negative preparations act as chaperokines. Cell Stress Chaperones. 2000 Nov;5(5):425-31. PubMed PMID: 11189447. Pubmed Central PMCID: 312872.
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26. Soncin, F., Asea, A., Zhang, X., Stevenson, M. A., Calderwood, S. K. Role of calcium activated kinases and phosphatases in heat shock factor-1 activation. Int J Mol Med. 2000 Dec;6(6):705-10. PubMed PMID: 11078832.
27. Wang, X., Asea, A., Xie, Y., Kabingu, E., Stevenson, M. A., Calderwood, S. K. RSK2 represses HSF1 activation during heat shock. Cell Stress Chaperones. 2000 Nov;5(5):432-7. PubMed PMID: 11189448. Pubmed Central PMCID: 312873.
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Part V: Community Activities

Through his work on the development of heat shock protein (HSP)-based therapeutic, Dr. Asea not only been involved in research & development but also in the education of the local community on health issues related to breast and prostate cancer and the latest research advances in these disease fields.

This education is in the form of classes, lectures and support of interns to gain hands-on research experience in cutting-edge biomedical research. In addition, Dr. Asea continues to give tours of his labs to various lay groups and governmental representatives as a way to educate them about the exciting research taking place in his laboratory.

Over the years, I have found that community/stakeholder input can help to shape our project vision and ensure that we are responding to local needs. This interaction also helps to build support for our development ideas and raise needed funds for research.

Below you will find a few examples of some local community activities during Dr. Asea's tenure in Temple, Texas and Atlanta Georgia.

A. Local High Schools, Colleges and Universities:

Temple College (Temple, TX), Texas Bioscience Institute (Temple, TX), Edward's Academy (Temple, TX), Saldo High School (Salado, TX), Lampasas Middle School (Lampasas, TX),

Central Texas College (Killeen, TX), University of Mary Hardin-Baylor (Belton, TX), Texas Southern University (Houston, TX), Frederik Douglas High School (Atlanta, GA), Booker T. Washington High School (Atlanta, GA).

B. Local Community Support Groups:

American Cancer Society (Central Texas Chapter), Susan G. Komen (Central Texas Chapter), Greater Frisco Chapter of Jack and Jill of America (Dallas, TX), Gatesville Lion's Club (Gatesville, TX), Dental Society of Central Texas (Central Texas Chapter), Today's Girls Pageant (Killeen, TX), Surviving and Thriving Retreat for Adults (Central Texas Chapter), Central Texas Cancer Network (Central Texas Chapter), Breast Cancer Initiatives of East Africa (Houston, TX), Atlanta Women's Support Group (Marietta, GA), Cancer Support Community Atlanta (Atlanta, GA).

C. Local Business:

Temple and Belton Feed & Supply Store (Belton, TX), En Fuego Restaurant (Killeen, TX), Metroplex Hospital (Killeen, TX), Scott & White Hospital (Temple, TX), Clem's Mikeska's Bar-B-Q (Temple, TX), Paschal's Restaurant (Atlanta, GA), Georgia's Own Credit Union (Atlanta, GA).

D. Local TV, Radio and Newspapers:

KWTX TV (Temple, Killeen, Waco), YNN TV (Austin, San Antonio), Temple Daily Telegram (Temple, Killeen, Waco), The Lampasas Dispatch Record (Lampasas, Gatesville, Waco), The Gatesville Messenger & Star-Forum (Gatesville, Lampasas, Waco), The Waco Tribune (Temple, Killeen, Waco), The Scott & White Healthcare Catalyst (Temple, Killeen, Waco), WTZA AM 1010 Atlanta Radio (Atlanta, GA), Atlanta Voice Newspaper (Atlanta, GA), WATC Atlanta's TV57 (Atlanta, GA), 292. Doni Miller TV Show. 13ABC WTVG, Toledo, Ohio.

E. Advisor to Community Organizations and Agencies on Health Related Matters:

American Cancer Society (ACS) Central Texas Affiliate (Temple, TX). American Cancer Society is a society dedicated to helping persons who face all types of cancer and supports research, patient services, early detection, treatment and education.

Susan G. Komen for the Cure, Central Texas Affiliate (Waco, TX). Susan G. Komen for the Cure is a foundation dedicated to education and research about causes, treatment, and the search for a cure for breast cancer.

Breast Cancer Initiative East Africa (Houston, TX). Breast Cancer Initiative East Africa (BCIEA) is a non-profit organization dedicated to take the lead in the advancement of breast cancer surveillance and improved survival rates targeted to the most neglected population in the low income communities of East Africa. BCIEA mission is to empower people through education based on proven methods and resources that are regionalized and culturally acceptable to target audiences.

Surviving and Thriving Retreat for Adults – Central Texas Cancer Network (Salado, TX). The Surviving and Thriving Retreat is a special event where cancer survivors and caregivers can get away from the pressure and stress of everyday life to gain new skills and knowledge to enhance their quality of life.

Heart of Texas Purple Cancer Warriors (Temple, TX). Heart of Texas Purple Cancer Warriors is a non-profit organization dedicated to raising funds for Dr. Alexzander Asea's research.

Pink Glove Fighters (Lampasas, TX). Pink Glove Fighters is a society organization dedicated to raising funds for Dr. Alexzander Asea's research.

Today's Girl (Gatesville, TX). The Today's Girl Youth Organization is a certifying organization for the President's Volunteer Service Awards, an initiative of the Corporation for National Community Service administered by the Points of Light Institute.

F. Participation in Health Events of Benefit to the Local Community:

"Careers in the Health Field" University of Mary Hardin-Baylor Nursing Students present a Health Fair at Edward's Academy, March 24, 2011, Temple, TX

G. Outreach Programs for College Students and High Schools (Career Counseling and Mentoring)

The Texas Southern University (TSU)'s Minority Access to Research Center (MARC) Undergraduate Student Training in Academic Research U-STAR (TSU-U/STAR)

"Translational Research – Development of Anti-Cancer Drugs" Texas Bioscience Institute, March 3, 2011, Temple, TX

"Development of Anti-Cancer Drugs" Salado High School, January 27, 2011, Salado, TX

"Choosing a Career in Biomedical Research" Edward's Academy, December 2, 2010, Temple, TX

"Breast Cancer Research in the Division of Investigative Pathology" Edwards Academy, November 12, 2010, Killeen, TX

"RNAi Technology in the Fight Against Breast Cancer" Breast Cancer Survivors Network of Central Texas, April 28, 2010, Lampasas Middle School, Lampasas, TX

"Role of Heat Shock Proteins in Drug Discovery" Texas Bioscience Institute, February 4, 2010, Temple, TX

"New Possibilities in Targeted Breast Cancer Therapy" Relay for Life – American Cancer Society Luminary Service, May 01, 2011, Wildcat Stadium, Temple High School, Temple, TX

"Development of Heat Shock Protein-Based Anti-Cancer Therapies" Patient Education Symposium Sponsored by Vasicek Cancer Center and the American Cancer Society, May 20, 2011, Temple, TX

"Research and Development of NampEVA" Spaghetti Fundraiser hosted by the Today's Girl, July 22, 2010, Lampasas, TX

"Establishing a GMP-Grade Pharmaceutical Manufacturing Hub in East Africa" DVA Consortium, December 2, 2016. Gaithersburg, Maryland USA

"Development of an Anti-Cancer Drug" Holland High School, December 2, 2016. Holland, Texas USA

"Development of an Anti-Cancer Drug" Salado High School, December 2, 2016. Salado, Texas USA

H. International Outreach Programs for Community Support Groups

"Heat Shock Protein-Based Anti-Breast Cancer Drugs" 2nd Conference Hosted by the Breast Cancer Initiative East Africa, June 15-18, 2011, Kigali, Rwanda

Part VI: Patents and Inventions

[1] United States Provisional Patent Application US 10,500,217 B2. Patent date: December 10, 2019: **Vitamin D_3, Heat Shock Proteins, and Glutathione for the Treatment of Chronic Inflammation and Diseases** (**Fig 10**).
https://patentscope.wipo.int/search/en/detail.jsf?docId=US280232334&docAn=16578757


US010500217B2

(12) **United States Patent**
Matthews et al.

(10) **Patent No.: US 10,500,217 B2**
(45) **Date of Patent: Dec. 10, 2019**

(54) **VITAMIN D_3, HEAT SHOCK PROTEINS, AND GLUTATHIONE FOR THE TREATMENT OF CHRONIC INFLAMMATION AND CHRONIC DISEASES**

(71) Applicants: **Leslie Ray Matthews**, East Point, GA (US); **Alexzander Asea**, Perrysburg, OH (US)

(72) Inventors: **Leslie Ray Matthews**, East Point, GA (US); **Alexzander Asea**, Perrysburg, OH (US)

(73) Assignee: **LESLIE RAY MATTHEWS, M.D., LLC**, East Point, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/967,516**

(22) Filed: **Apr. 30, 2018**

(65) **Prior Publication Data**

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A61P 25/28	(2006.01)
A61P 11/08	(2006.01)
A61K 38/06	(2006.01)
A61K 39/00	(2006.01)

(52) **U.S. Cl.**

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(58) **Field of Classification Search**

None

See application file for complete search history.

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Primary Examiner — Satyanarayana R Gudibande

(74) *Attorney, Agent, or Firm* — Angela J. Grayson; Precipice IP, PLLC

(57) **ABSTRACT**

The present disclosure is directed to co-administration of high dose Vitamin D_3, heat shock proteins, glutathione, and kits provided for co-administration of these compositions, for the treatment of patients with chronic inflammation and chronic diseases.

10 Claims, No Drawings

Specification includes a Sequence Listing.

Fig 10. United States Provisional Patent Application US 10,500,217 B2.

Nearly half of all Americans suffer from at least one chronic disease. More than two-thirds of all deaths are caused by one or more of five chronic diseases: heart disease, cancer, stroke, chronic obstructive pulmonary disease, and diabetes. More than one in four Americans have multiple chronic conditions, and evidence is growing that the presence of one chronic condition has a negative impact on the risk of developing others, particularly as people age. The present disclosure relates to novel methods of co-administration of high dose Vitamin D_3, heat shock proteins, glutathione, and kits provided for co-administration of these compositions, for the treatment of patients with chronic inflammation and chronic diseases.

[2] United States Provisional Patent Application Serial No. 61/432,793 filed on January 14, 2011: **Therapeutic effect of Heat Shock Proteins in Preventing Amylin Aggregation in Type 2 Diabetes Mellitus**. https://patents.google.com/patent/WO2012097255A2/en

Human amylin is amyloidogenic and is toxic to pancreatic β-cells. This toxicity is thought to be a key cause of pancreatic β-cell death which results in Type 2 Diabetes Mellitus. We currently hold the US patent for a novel therapeutic invention which functions by protecting pancreatic β-cells against amyloid-induced toxicity. We are in the process of product development/licensing and commercialization of this technology as a new approach towards treatment of Type 2 Diabetes Mellitus.

[3] United States Provisional Patent Application Serial No. 61/424,434 filed on December 17, 2010: **Plant-Derived Polysaccharides for Delivery of RNA-Based Therapies**. https://patents.google.com/patent/WO2012018594A2/en

Our group has produced a compound for the delivery of RNAs and other therapeutics into cells using plant-derived polysaccharide compositions. Currently a non-toxic delivery system has not been developed which can adequately deliver therapeutics into cancer cells. We currently hold the patent to this technology (see above). We are in the process of product development/licensing and commercialization of this technology as a new novel delivery system for anti-cancer drug therapy.

[4] USPTO Application No., 20100186102: **Methods and Compositions for Posttranscriptional Gene Silencing**. USPTO Class: 800 13; USPTO Publishing Date: 07/22/2010. http://www.freshpatents.com/-dt20100722ptan20100186102.php

NampEVA is a new generation of anti-cancer drugs based on interference RNA (RNAi) technology that resulted from the patents described above. That was discovered by Dr. Alexzander Asea and his research team in the Department of Microbiology, Biochemistry & Immunology at Morehouse School of Medicine, Atlanta, Georgia, USA.

The central dogma of biology is that DNA makes RNA which in turn, makes protein. It is now understood that the abnormal production of proteins is the cause of most human disease. RNAi creates the opportunity to silence the production of disease-causing proteins and therefore, represents a whole new approach for innovative medicines. For this RNAi technology received the 2006 Nobel Prize in Medicine and Physiology. RNAi-based drugs act by blocking the action of disease-causing proteins.

NampEVA functions by blocking the action of heat shock protein-27 (Hsp27), known to be highly expressed in certain cancers and demonstrated to confer resistance to chemotherapeutic agents through its anti-apoptotic actions. NampEVA concomitantly increases tumor's proteasome function, which in turn results in efficient antigen presentation and stimulates cytotoxic T lymphocyte ($CD8^+$ T cell) memory and tumor killing functions (**Fig 11**).

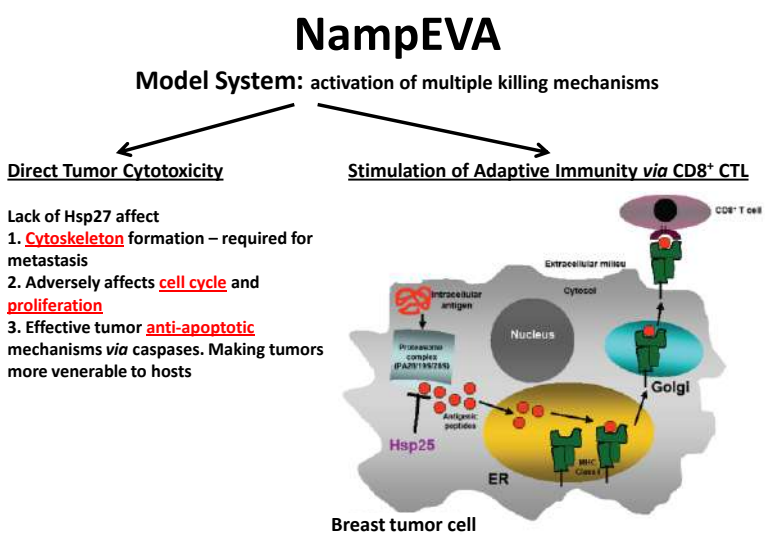

Fig 11. Schematic representation of NampEVA model system. NampEVA functions in multiple ways; (i) only targets cancer cells, (ii) kills cancer cells my disrupting anti-apoptotic mechanisms, (iii) kills cancer cells by disrupting cytoskeleton formation (important for metastasis formation), (iv) stimulates anti-cancer immune responses, which leads to long lasting memory responses.

The central dogma of biology is that DNA makes RNA which in turn, makes protein. It is now understood that the abnormal production of proteins is the cause of most human disease. RNAi creates the opportunity to silence the production of disease-causing proteins and therefore, represents a whole new approach for innovative medicines. For this RNAi technology received the 2006 Nobel Prize in Medicine and Physiology. RNAi-based drugs act by blocking the action of disease-causing proteins. NampEVA functions by blocking the action of heat shock protein-27 (Hsp27), known to be highly expressed in certain cancers and demonstrated to confer resistance to chemotherapeutic agents through its anti-apoptotic actions. NampEVA concomitantly increases tumor's proteasome function, which in turn results in efficient antigen presentation and stimulates cytotoxic T lymphocyte ($CD8^+$ T cell) memory and tumor killing functions (**Fig 11**).

Currently, most anti-cancer drugs function by killing all rapidly growing cells or stimulating the immune response against tumors. NampEVA is unique because it functions in multiple ways;

I. Only targets cancer cells
II. Kills cancer cells my disrupting anti-apoptotic mechanisms
III. Kills cancer cells by disrupting cytoskeleton formation (important for metastasis formation)
IV. Stimulates anti-cancer immune responses, which leads to long lasting memory responses

We predict that NampEVA will be effective against cancers which highly express Hsp27, including breast cancer, prostate cancer, uterine cancer, ovarian cancer, head & neck cancer, gastric cancer and cancers arising from the nervous system and urinary system.

Part VII: Graduate Thesis

Dissertation Title: Role of Histamine in the Regulation of Natural Killer Cells

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May 30, 1995

ABSTRACT

This study has addressed the regulatory role of the biogenic amine histamine on natural killer (NK) cell function *in vitro* and *in vivo* with special emphasis on its modulatory effect on interactions between phagocytes and NK cells. Autologous monocytes, recovered from human peripheral blood by centrifugal elutriation, were found to effectively inhibit the baseline anti-tumor cytotoxicity of NK cells as well as the activation of cytotoxicity, proliferation and production of interferon-gamma (IFN-γ) in response to interleukin-2 (IL-2). The monocyte-induced suppression was related to the reduction of oxygen to hydrogen peroxide and other reactive oxygen species (respiratory burst) by monocytes. Thus, catalase, which efficiently degrades hydrogen peroxide, potently reversed the inhibitory signal. Further, monocytes recovered from patients with chronic granulomatous disease, who have a defective capacity to generate reactive oxygen species, did not suppress NK cell function. Histamine, at concentrations within the micromolar range, completely reversed the monocyte-derived suppression of NK cells. This effect of histamine was specifically mediated by histamine H_2-type receptors (H_2R). In mixtures of monocytes and NK cells, histamine strongly synergized with IL-2 to activate cytotoxicity and to induce proliferation and production of IFN-γ. Histamine, acting *via* H_2R, effectively inhibited the generation of hydrogen peroxide in isolated monocytes. NK cells acquired features characteristic of apoptosis after contact with monocytes. The induction of apoptosis was prevented by catalase and histamine. In contrast to NK cells, T-cells did not become apoptotic after contact with monocytes. Accordingly, NK cells were considerably more prone to acquire apoptotic morphology after exogenous addition of hydrogen peroxide than T-cells. Treatment of mice with histamine was found to reduce lung metastasis induced by B16 melanoma cells and to augment the clearance of YAC-1 lymphoma cells from mouse lungs *in vivo*. Effects of histamine on melanoma metastasis and elimination of YAC-1 cells *in vivo* required an intact population of NK cells. Combined treatment with histamine and low doses of IL-2 completely protected animals from B16/F1 metastasis. Treatment with histamine prolonged survival time in NK cell-sufficient but not in NK cell-deficient mice infected with herpes simplex virus type 2 (HSV-2). Ranitidine, an antagonist at H2R, aggravated the metastatic spread of B16 melanoma cells, reduced the clearance of YAC-1 cells and reduced survival time in mice infected with HSV-2. It is concluded that histamine may serve to protect NK cells from oxidative damage from phagocytes and that histaminergic regulation may be important for NK cell-mediated defense against viruses and metastatic tumor cells.

Key words: *Natural Killer (NK) Cells, Phagocytes, Histamine*
ISBN 91-628-1681-0

Part VIII: Minicase Report: "Triple Threat"

A renowned Scott & White researcher, a new drug, and a support group aim to eradicate a common form of breast cancer

TRIPLE THREAT

Alexzander Asea, PhD, an internationally recognized scientist, and his team at Scott & White Healthcare have developed a drug that could become an effective treatment for an aggressive form of breast cancer. A group of breast cancer survivors in Central Texas has taken an interest in this work and is making very real contributions to his success.

The drug that Dr. Asea and his team have developed targets triple-negative breast cancer, which accounts for up to 15 percent of breast cancer cases, but 25 percent of all breast cancer deaths. In 2008, more than 170,000 women worldwide were diagnosed with this form of breast cancer. Triple negative breast cancer spreads quickly and affects African Americans, Hispanics, and premenopausal women at a higher rate than other breast cancers. (For more information, send an email to asea@swmail.sw.org.)

The disease gets its name because of negative testing for estrogen and progesterone receptors and negative testing for the human epidermal growth factor receptor 2 (HER2) gene over expression. Without these receptors, triple-negative breast cancer resists the therapies used against other breast cancers. The only treatment available is chemotherapy, which Dr. Asea says is not always effective. Dr. Asea is the director of the Division of Investigative Pathology; and holds the Effie and Wofford Cain Centennial Chair in Clinical Pathology. A world-renowned cancer researcher, Dr. Asea came to Scott & White in 2005 after doing research at Harvard University and Boston University, both in Boston, Massachusetts.

Five years ago Dr. Asea began developing a new drug, recently named NamplEVA, which has been found to stop the growth of breast tumors in laboratory mice. "What we find very unique [about this drug] is that it also activates the immune system," he says. The fact that NamplEVA turns on the immune system is what separates it from other cancer drugs. Other drugs either kill the tumor or act as a vaccine to boost the immune system's ability to fight cancer, but they don't do both.

> "We're really in a unique position...to have the development of the drug right here, the manufacturing of the drug right here, and the Phase I and II [trials] right here. There are not many centers around the world that can boast that."
> —Dr. Alexzander Asea

Dr. Alexzander Asea and team members (front row) Princess Bomgono, Punit Kaur, (back row) Paola Rosas, and Nagaraja Ganachari-Mallappa.

Support from Pink Glove Fighters

When breast cancer survivors in Central Texas heard about the drug's potential, they formed a group specifically to raise funds for Dr. Asea's research and hasten it toward clinical trials. "They sort of adopted me," he says.

The drug's dual-action feature spurred Terri Wood, of Gatesville, Texas, and other Central Texas breast cancer survivors to rally around Dr. Asea's research. "It's not another chemotherapy-based drug. It could lead to a cure and a vaccine," Ms. Wood says. "That's the most exciting thing to me."

Ms. Wood was successfully treated for breast cancer at Scott & White from 2001 to 2002. Now cancer free, she heard Dr. Asea describe his research last year at a retreat for breast cancer survivors. She and several others were so impressed with Dr. Asea's charisma, his gift for speaking to lay audiences, and the drug he was developing that they formed the nonprofit corporation Pink Glove Fighters of Central Texas. The organization's mission is to raise funds to bring NamplEVA to clinical trials. "I personally know people who need to be in this clinical trial now," Ms. Wood says.

> "If you have a breast cancer advocate on your team, she'll create a sense of urgency to complete the research and move on to clinical trials."
> —Dr. Alexzander Asea

Pink Glove Fighters founder Mrs. Terri Wood and Dr. Alexzander Asea.

The path that must be taken

It's enormously expensive to test the effectiveness of any medication. Dr. Asea says that NamplEVA can be ready for clinical trials in two years at a cost of $2 million, but another $4 million is needed to complete Phase I and Phase II clinical trials. He has applied for a $4.5 million grant from the United States Department of Defense. He also is seeking funds from the Cancer Prevention and Research Institute of Texas and various foundations, such as Susan G. Komen for the Cure. Dr. Asea also will be submitting an application for funding from the National Institutes of Health (NIH).

Pink Glove Fighters are working with Scott & White's Office of Development to seek donations from breast cancer survivors throughout Central Texas. In further outreach efforts, the group is planning to develop its own website as well as a page on the social networking website Facebook.

Dr. Asea points out that the women of Pink Glove Fighters were instrumental in his application for the Department of Defense grant, which required the input of at least three consumer advocates who were breast cancer survivors.

The women have also arranged for him to discuss his research on local television. And they keep him focused on the cure.

"The focus of research is primarily on understanding mechanisms," Dr. Asea says. "If you have a breast cancer advocate on your team, she'll create a sense of urgency to complete the research and move on to clinical trials."

Dr. Alexzander Asea.

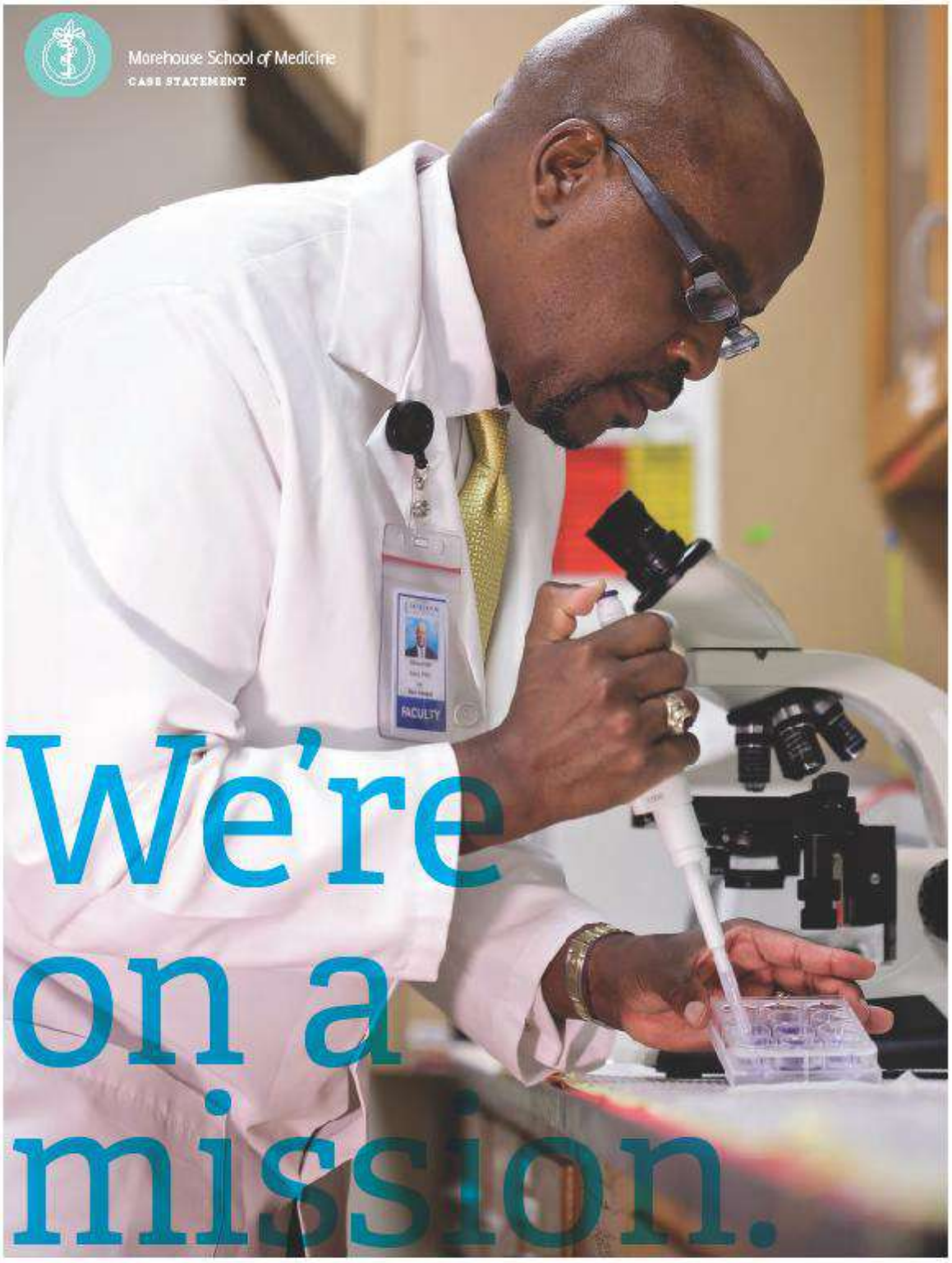
As the project moves toward trials, the drug will be manufactured in Scott & White's Cancer Research Institute's Clinical Good Laboratory Practice (cGMP) laboratories under the leadership of Dr. Arthur Frankel. This will take six to nine months, Dr. Asea says. Pending Food and Drug Administration (FDA) approval, Phase I and Phase II of the clinical trials will be conducted at Scott & White with Dr. Frankel as lead clinical oncologist. Dr. Asea says about 50 patients will be needed for the first two phases, which will take two years. If the drug is deemed safe and works as predicted, then the research will proceed to Phase III, a nationwide trial with thousands of patients.

At the Phase III stage the project will move beyond Scott & White for the first time. "We're really in a unique position to be able to have the development of the drug right here, the manufacturing of the drug right here, and Phases I and II right here. There are not many centers around the world that can boast that," says Dr. Asea, emphasizing that Scott & White's Cancer Research Institute is one of only a few centers in the world that focus on development of drugs.

Dr. Asea is optimistic that NamplEVA will advance toward clinical trials. ■

Dr. Asea is an associate professor of pathology and laboratory medicine, The Texas A&M Health Science Center College of Medicine and the director of the Division of Investigative Pathology, College of Medicine in the Scott & White Department of Pathology. Dr. Asea also holds the Effie and Wofford Cain Centennial Chair in Clinical Pathology.

Part IX: Minicase Report: “We’re On A Mission”



To deliver innovative research in the fight against cancer.

In recent years, life expectancy and overall health have improved for most Americans, ***but not all.***

Persistent disparities exist among racial and ethnic minorities and medically underserved communities. Information gathered by the National Cancer Institute of the National Institutes of Health (NIH) and The Centers for Disease Control and Prevention (CDC), reveals the tragic impact of cancer on these populations:

- Death rates for all cancers combined for both men and women are highest among African Americans.
- Incident rates of colon and rectal cancer are higher among African American men and women than among Caucasians.
- African American men have far higher death rates from prostate cancer than any other racial or ethnic group.
- Cancer has been the number one killer of Asian American women since 1980.
- Prostate cancer is on the rise among Asian American men.
- Breast cancer is the leading cause of death among Hispanic women.

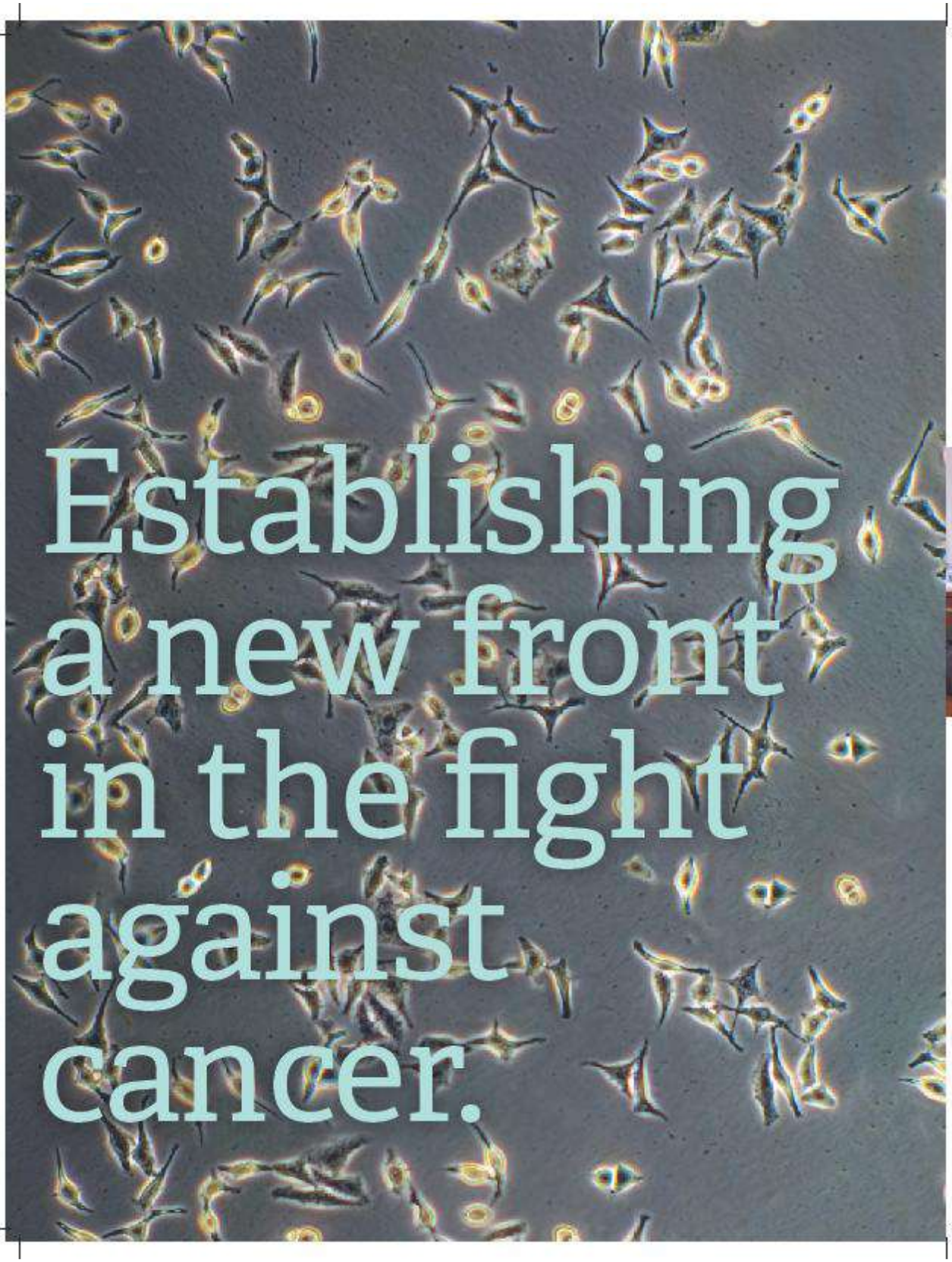
Morehouse School of Medicine (MSM) is committed to researching the causes and cures of such health inequities. Our strong legacy of service, research and advocacy on behalf of vulnerable populations in Georgia, across the nation, and around the world makes us a natural leader in conducting such research. Our NIH-sponsored partnership with Emory University and the Georgia Institute of Technology in the Atlanta Clinical and Translational Science Institute provides a rich opportunity for collaboration and the leveraging of area resources. And, the recruitment of distinguished scholars to the MSM faculty, as well as the development of critical research infrastructure on the MSM campus, further supports our emergence as a leader in researching the causes and cures of health inequities in the United States and around the world.

Today, federal funding is so competitive that only twelve percent of first phase cancer research applications are being funded by the NIH. As the availability of public research funds has been reduced and pharmaceutical companies have limited their external investment in research and development, MSM must increasingly turn to philanthropic contributions to underwrite the innovative research of our gifted faculty.

MSM is seeking $7.25 million to fund:

1) Phase I clinical trials for a new drug that promises to help cure a particularly aggressive form of breast cancer and revolutionize the delivery of chemotherapy for other types of cancer.
2) Research and development of an early detection kit for pancreatic cancer.

The cutting-edge research being conducted at MSM has the potential to impact the lives of countless cancer patients battling some of the most aggressive forms of this deadly disease.


Establishing
a new front
in the fight
against
cancer.

1. Introducing a Promising New Cancer Drug with Multiple Capabilities

Alexzander A.A. Asea, Ph.D.

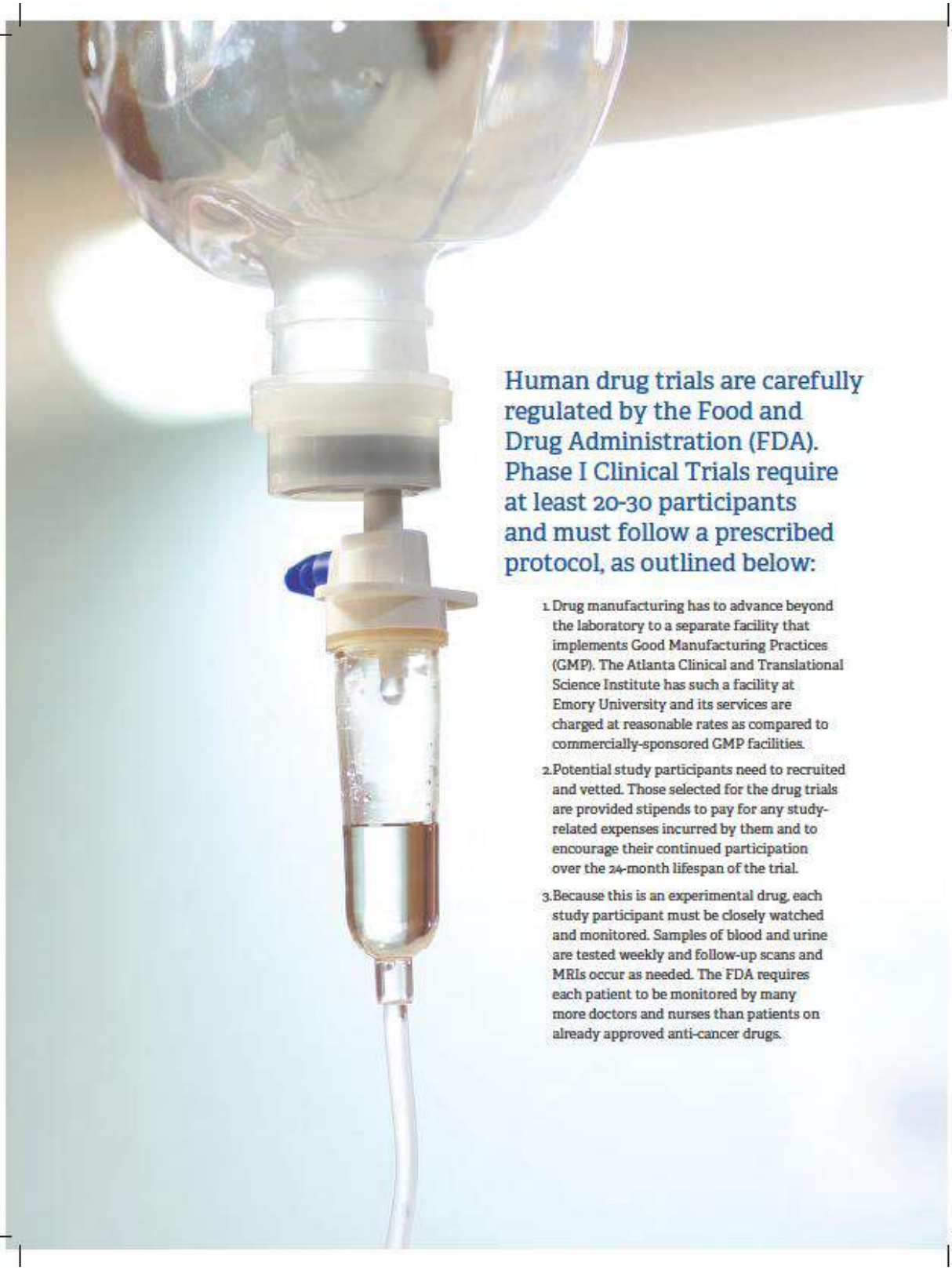
In 2012, MSM recruited internationally renown distinguished cancer researcher Alexzander A.A. Asea, Ph.D. and his dedicated team of investigators to pursue cancer research using "proteomics" – a study that links genes, proteins and disease. Dr. Asea is now Professor and Chairman of the Department of Microbiology, Biochemistry and Immunology, one of the largest departments at MSM.

A world-renowned cancer researcher, Dr. Asea received his Ph.D. in Medical Microbiology and Immunology from the University of Gothenburg, Sweden. He went on to perform postdoctoral training at the University of Miami School of Medicine and Harvard Medical School, where he was a junior faculty member of the Dana-Farber Cancer Institute. Subsequently, Dr. Asea was recruited to faculty positions at the Boston University School of Medicine and the Texas A&M Health Science Center College of Medicine.

Dr. Asea's research centers on the potential role of **heat shock proteins** in treating disease. Heat shock proteins are found in all cellular organisms, including microorganisms, plants and animals, as well as humans. Their specific function is to prevent cells from dying in response to a wide variety of stressors by "chaperoning" proteins that carry information to, from, and within each cell.

While all cells have heat shock proteins, cancer cells have more. The number of such proteins in a cancer cell increases as the cell responds to stress created by both the disease and the treatment of the disease. Immediately after treatment, any remaining live cancer cells are many more times resistant to treatment, due to the higher number of heat shock proteins they contain. Additional treatment has to be delayed for a period of time to reduce the cancer cells' heat shock proteins, or larger doses of chemotherapy, radiation, or hypothermia must be used, further weakening already fragile patients and increasing the side effects they experience.

Dr. Asea and his team are using their knowledge of heat shock proteins to devise different kinds of drugs to treat cancer. Since 2005, they have been working on developing **NampEVA – a drug that reduces the level of heat shock proteins in cancer cells, turns on the body's immune system, and stops the growth and metastatis of breast cancer tumors. The drug has also been successful in mitigating the toxicity of chemotherapy used in the treatment of other types of cancer.** While Dr. Asea's team has demonstrated proof of the principles behind the drug, they must now advance the research beyond mice and treat actual cancer patients.



Human drug trials are carefully regulated by the Food and Drug Administration (FDA). Phase I Clinical Trials require at least 20-30 participants and must follow a prescribed protocol, as outlined below:

1. Drug manufacturing has to advance beyond the laboratory to a separate facility that implements Good Manufacturing Practices (GMP). The Atlanta Clinical and Translational Science Institute has such a facility at Emory University and its services are charged at reasonable rates as compared to commercially-sponsored GMP facilities.
2. Potential study participants need to recruited and vetted. Those selected for the drug trials are provided stipends to pay for any study-related expenses incurred by them and to encourage their continued participation over the 24-month lifespan of the trial.
3. Because this is an experimental drug, each study participant must be closely watched and monitored. Samples of blood and urine are tested weekly and follow-up scans and MRIs occur as needed. The FDA requires each patient to be monitored by many more doctors and nurses than patients on already approved anti-cancer drugs.

NampEVA has been shown to stop the growth of triple negative breast cancer,

a particularly aggressive breast cancer that grows rapidly, spreads quickly, and is resistant to traditional breast cancer therapies.

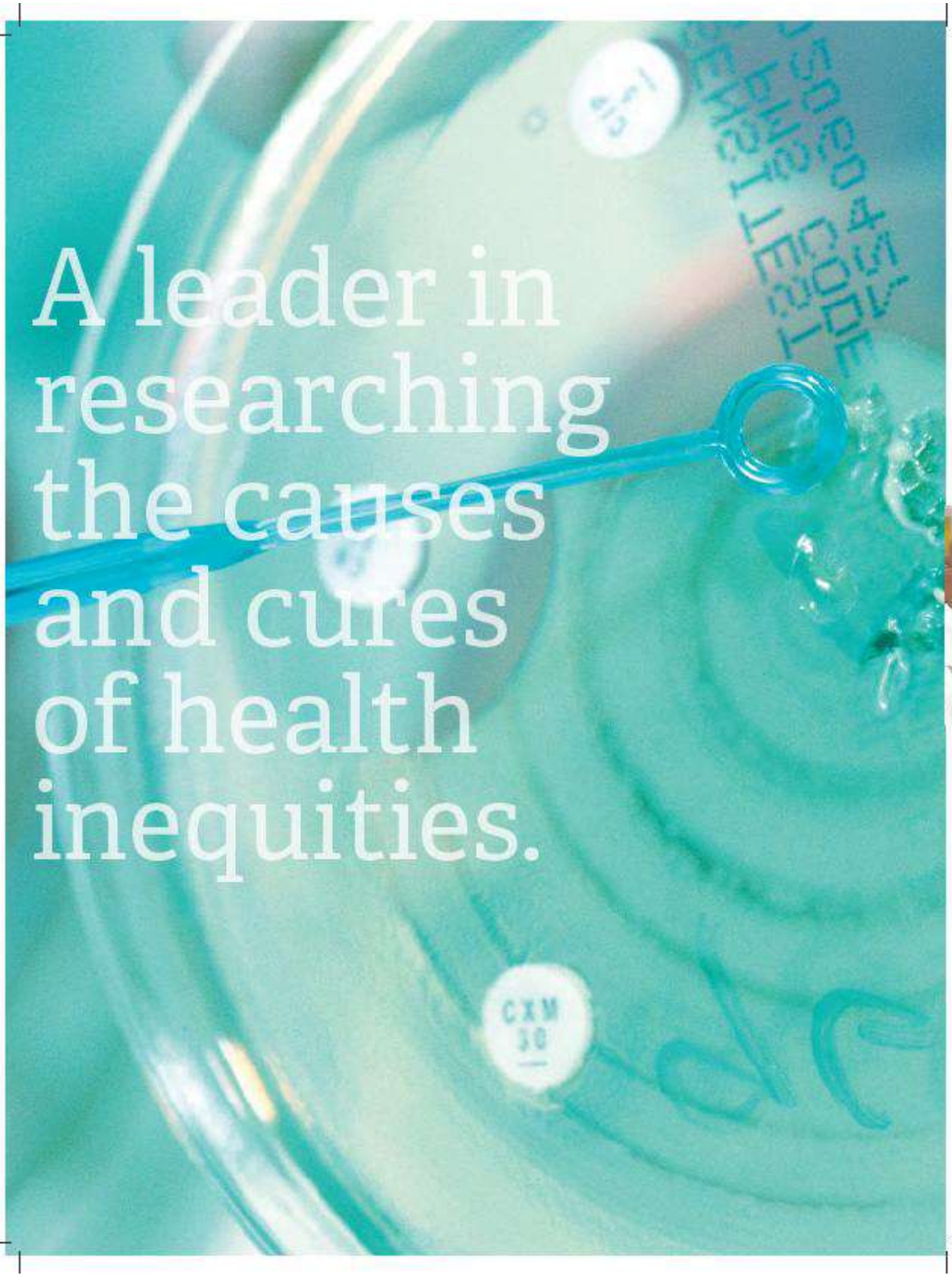
There are no known successful therapies for this type of breast cancer. While triple negative breast cancer accounts for only up to 15% of all breast cancer cases, it is responsible for 25% of all breast cancer deaths and affects African Americans, Hispanics, and pre-menopausal women at a higher rate than other breast cancers. With promising results from Phase I trials, the National Cancer Institute will fund and fast track future development of NampEVA, using multiple research institutions and thousands of patients.

NampEVA also diminishes the toxicity of chemotherapy,

allowing patients to enjoy a better quality of life. Chemotherapy patients suffer from numerous uncomfortable side effects, many of which are irreversible. Others have low tolerance for the chemotherapy itself and experience sickness after treatment.

Using NampEVA in combination with a standard chemotherapy approved for the treatment of colon and rectal cancers has been shown to reduce the amount of chemotherapy drug required to have the same efficacy by 1,000-fold. Similar reductions in the amount of chemotherapeutic drugs required for breast cancer, pancreatic cancer and prostate cancer also have been demonstrated. By reducing the amount of chemotherapy drug administered, NampEVA has the potential to significantly improve the quality of life for patients undergoing cancer treatment. These results have been accomplished by using mice. To advance the work, future studies must use monkeys, and multiple chemotherapy toxicity studies must be conducted to demonstrate the drug's effect on other cancers.

NampEVA has the potential of changing the course of cancer in multiple ways, but that potential will never be realized without philanthropic support.


A leader in researching the causes and cures of health inequities.

2. Early Detection of Pancreatic Cancer

Dr. Asea and his team are also working on early detection methods for pancreatic cancer. Pancreatic cancer is one of the most devastating cancers because there is no way to detect the disease early. Once patients are diagnosed with this type of cancer, the disease has typically spread to other organs and life expectancy is less than nine months. The American Cancer Society estimates that in 2013 approximately 45,000 new cases of pancreatic cancer will be diagnosed, and some 38,000 deaths from the disease will occur. Unfortunately, pancreatic cancer rates have been increasing over the past ten year.

By using state-of-the-art techniques such as proteomics and bioinformatics (computerized analysis of biological data), Dr. Asea's team has identified five possible proteins that might indicate the early onset of pancreatic cancer. Further research is required to determine whether these proteins are indeed early detection methods.

While other researchers are studying actual samples of pancreatic tissues, Dr. Asea's research approach is unique: the team is using the pancreatic "juices." The research methodology calls for blood, urine and tissue samples to be collected from at least 5,000 patients (1,000 patients/protein) falling into three categories – those with pancreatic cancer, those without pancreatic cancer, and those with pancreatitis (inflammation of the pancreas). These samples will be analyzed and studied to identify the one or more proteins that may indicate the onset of pancreatic cancer. With this knowledge, the research team can move forward in developing a prototype of an early detection test kit, much like the prostate-specific antigen (PSA) test that detects prostate cancer. The kit will be tested on another 1,000 individuals worldwide, thus establishing the evidence required to turn this research into a viable application.

Philanthropic investment will fund research and development of the early detection kit. The kit offers MSM and future investors a potential opportunity to translate research into an income-producing commercial application that can benefit MSM in the future. More importantly, the kit could mean the difference between life and death for thousands of patients who may now have the hope of early detection of this deadly disease.