

## **Shaker A. Mousa, PhD, MBA, FACC, FACB**

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### **EDUCATIONAL BACKGROUND**

MBA Widener University, School of Management, Rochester, PA, 1998

PhD Ohio State University, Columbus, OH, 1983  
Pharmacology, Department of Pharmacology, College of Medicine  
Supervisor: Dr. D. Couri, PhD

M.Sc. University of Alexandria, Egypt, 1976  
Pharmacology, Department of Pharmacology, College of Pharmacy

B.Pharm. University of Alexandria, Egypt, 1973  
College of Pharmacy  
Honors: Ranked first in class of 500 for each of 5 years

Postdoctoral Experience  
Postgraduate Training Postdoctoral Fellow, PSP Fellowship.  
Dr. G. Van Loon MD, PhD 1989 Department of Medicine, Division  
of Endocrinology, UK Medical Center,  
University of Kentucky, Lexington, KY

### **ADMINISTRATIVE AND ACADEMIC EXPERIENCE**

#### **Albany College of Pharmacy and Health Sciences (ACPHS), 2002–Present**

2002–Present ***Tenured Professor***

2002–Present ***Endowed Chair, Department of  
Pharmaceutical Sciences***

2003–Present ***Chairman and Executive Vice President of  
PRI***

2010–Present ***Vice Provost of Research at ACPHS***  
(reporting directly to the President)

As Chairman and Executive Vice President of PRI:

- Initiated and continuously implemented PRI Strategic Plans, 2003 to present.
- Member of the ACPHS President's Cabinet and key contributor to the overall College strategic plans (2002 – 2007, 2008 – 2012, and 2012 – 2017).
- Recruited senior administrators and faculty (Provost, Deans, and Chairs) and provided an environment of personal and professional growth.
- Recruited a multidisciplinary team of researchers with PhD, and/or MD skilled in Nanotechnology, Biotechnology, Formulation, Medicinal Chemistry, Analytical Chemistry, Pharmacokinetic, Pharmacology, Toxicology, Hematology, Oncology, Vascular medicine, Cardiovascular medicine, Endocrinology, Business development, Marketing, Medical and grant writers.
- Developed and secured funding in excess of \$7M in building translational research infrastructure and implementation of collaborative strategies.
- Successfully established and equipped state-of-the art laboratory facilities at the Pharmaceutical Research Institute (Genomic, Cell Biology, Bio-imaging, Medicinal Chemistry, Nanotechnology, Biotechnology Molecular Diagnostics, Clinical Chemistry, Hematology, Oncology, Analytical chemistry, Formulation, and clinically relevant pharmacological models).
- Conducted grantsmanship, fundraising and negotiation of contracts with federal, industrial and academic entities in excess of \$35M.
- Oversaw resource allocation and budgets.
- Conducted recruitment in support of preclinical and clinical Research programs (vascular, cardiovascular, hematology, oncology, rare diseases, and other diseases with unmet medical needs).
- Developed research partnerships with various regional academic institutes such as Rensselaer Polytechnic Institute (RPI), State University of New York (SUNY) at Albany, SUNY Polytechnic Institute, Albany Medical Center, Department of Health-Wadsworth, University of Rochester, Cornell University, Cornell Medical School, SUNY Buffalo, and others.
- Worked very closely with the founding of Health Sciences in establishing and involving PRI members in mentoring in the MS in Health Outcomes and Biotechnology Programs.
- Established unique international articulation that attracted physicians, pharmacists and laboratory scientists. This resulted in over \$4M in tuition revenue and \$1M in research revenue.
- Established intra- and inter-School mentoring of junior faculty in research and graduate student thesis supervision.
- Oversaw outreach to clinical and non-clinical affiliates and establishment of scholarships and internships.
- Oversaw outreach to faculty and colleagues at area institutions (Albany Medical College, College of St. Rose, Rensselaer Polytechnic Institute, University of Rochester, and Wadsworth).

- Served as academic advisor for over 25 MS in Biotechnology, MS in Health Outcome Research and MS in Cytotechnology and Molecular Cytology graduate students with the participation of my PRI research team.
- Developed core and elective curricula for Pharmacy and Health Sciences undergraduate and graduate students.
- Oversaw regional and national School and College advocacy with Alums, Chamber of Commerce, UNYTE, and Pharmaceutical Industrial partners.
- Organized the First International Nanomedicine Symposium and Workshop, ACPHS, August 3-7, 2015.

As Vice Provost of Research at ACPHS:

- Member of the ACPHS President's Cabinet and key contributor to the overall College strategic plans (2002 – 2007, 2008 – 2012, and 2012 – 2017).
- Interfaced with College constituents including President, Provost, Vice-Presidents, Deans, Chairs and faculty.
- Served on diverse administrative and faculty search committees: Presidential search committee (2013); Provost Search committee (2014-2015); Chair of Pharmaceutical Science Search Committee (Chair) (2014-present); several Pharmaceutics and Health Sciences Faculty Search Committees (2009-2014); Director of Office of Grants Administration Search Committee (Chair) (2013, 2015); Nominated members of Board of Trustees (2003-present).
- Oversaw budget management and advocacy.
- Oversaw undergraduate and graduate student recruitment and facilitation of the admission process.
- Oversaw establishment of intramural undergraduate, graduate, and faculty funding venues to launch research careers and opportunities. Faculty recruitment, evaluation and mentorship.
- Oversaw development of national and international program articulations.
- Promoted rigor and research in curricula to provide opportunities for faculty and students.
- Oversaw the Institutional Animal Care and Use Committee (IACUC), Institutional human Research Board (IRB), Institutional Laboratory Safety Committee (ILSC), and Institutional Research Committee.

DuPont Pharmaceuticals/DuPont-Merck Pharmaceuticals, 1985–2002

1993–2002

**DuPont Research Fellow** (reporting directly to the CEO)  
Working Group Chairman - Platelet GPIIb/IIIa Antagonist,  
Angiogenesis & Cell Adhesion Molecules Research Programs  
DuPont Pharmaceuticals Co., Wilmington, DE

- 1992–1993                    **Senior Principal Research Pharmacologist**  
Working Group Chairman -Thrombosis - Platelet GPIIb/IIIa Program, DuPont Merck Co., Wilmington, DE
- 1991–1992                    **Principal Research Pharmacologist**  
Working Group Chairman -Thrombosis Program, DuPont Merck Co., Wilmington, DE
- 1989–1991                    **Senior Research Pharmacologist**  
Thrombosis Research- Antiplatelet, Thrombin Inhibitors, others, DuPont Pharmaceutical & Imaging Agents
- 1987–1989                    **Senior Research Investigator**  
Program Leader: Anti-ischemia Drug Discovery  
Cardiovascular Safety Evaluations  
DuPont Critical Care, Waukegan, IL
- 1985–1987                    **Program Leader: Radiopharmaceutical Research Division**  
Duties: Carry out and prepare the preclinical Research for IND and NDA submissions to the FDA (non-invasive diagnosis of ischemic heart diseases: Cardiolite<sup>R</sup>  
DuPont/Biomedical Dept., N. Billerica, MA

As DuPont Fellow:

- Top scientific and business rank, regularly meetings with DuPont CEO discussing company scientific and business strategies, listed on DuPont annual report in directing company strategies.

As Working Group<sup>1</sup> Chair, and Champion of the following programs:

- Platelet GPIIb/IIIa Antagonist: Discovery and clinical development of injectable and oral antiplatelets that targeted the platelet activation final common pathways (GPIIb/IIIa receptors) including **DMP728** and **Roxifiban**.
- Angiogenesis Modulators: Identified novel targets for the modulation of physiological and pathological angiogenesis that are advanced to clinical development.
- Cell Adhesion Molecules Research Programs: Discovery of novel adhesion molecules that are currently leading the way toward various clinical applications in various disorders and for Nano-targeting and bio-imaging.
- Thrombosis Research: Antiplatelet, Anticoagulant – Contributed to preclinical and clinical candidates in the prevention and treatment of thromboembolic disorders.

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<sup>1</sup> Each working group was composed of members of the discovery (pharmacology, property chemistry, analytical, biotechnology, pharmaceuticals, scale up chemistry, intellectual property and other research support teams) and the development (clinical trial, Safety, Scale up, regulatory affairs, medical affairs, business development, marketing, and other development members). The number of working group members increased to 100–200 as the lead became a clinical candidate.

- Low Molecular Weight Heparin: Acquired and facilitated FDA approval of **tinzaparin** based on trials reported globally and expanded the clinical utility of heparin and derivatives in various vascular and inflammatory and oncological diseases based on key mechanistic studies.
- Anti-ischemia and Ischemia-Reperfusion Injury: Established drug discovery program in myocardium ischemia – reperfusion injury using various novel targets.
- Ultra-short acting Cardio selective adrenergic receptor antagonist: Discovery and development of *Esmolol (Breviblock)*, FDA approved as the gold standard in patient management during anesthesia and surgery to control heart beats.
- Non-invasive diagnosis of ischemic heart diseases (Myocardial Perfusion), **Cardiolite<sup>®</sup>**:
  - Preclinical and Clinical Research for IND and NDA submissions to the FDA.
  - **Tc99m Sestamibi Marluma**: for breast cancer detection, approved by the FDA
  - **Tc99m platelet GPIIb/IIIa antagonist**: For thrombus imaging in venous and arterial thrombotic disorders, which guides the therapeutic management.
- Discovery of several novel concepts: In vascular, cardiovascular, oncology, and ophthalmology diseases.
- Working Group member of other groups:
  - Member of the Hypertension working group: Discovery and Development of the First Angiotensin Receptor Antagonist (Losartan).
  - Member of the general Pharmacology safety assessment group: This group evaluated all discovery candidates in various diseases areas including Inflammatory, CNS, Infectious Diseases, and others.
  - Member of the Diagnostic Imaging group: Non-invasive imaging of various organs such liver, kidney, brain, clot, and tumor imaging.

### **Other Academic Appointments**

2014–Present	Visiting Professor, University of Belgrade, Belgrade, Serbia
2009–Present	Adjunct Professor, Rensselaer Polytechnic Institute, Troy, NY
2009–Present	Visiting Professor, King Saud University, Riyadh, Saudi Arabia
2003–Present	Adjunct Professor, University at Albany (SUNY), Chemistry Department. Albany, NY
2003–Present	Research & Educational Consultant to the Veterans' Administration Medical Center, Albany, NY
1999–2011	Adjunct Professor of Pharmacology, Temple University School of Medicine, Sol Sherry Thrombosis Research Center, Philadelphia, PA

1998–Present	Visiting Scholar, Johns Hopkins University, Baltimore, MD
1997–2011	Adjunct Professor of Pharmacology, Dept. of Pharmacology, College of Medicine, University of Pennsylvania, PA
1996–2012	Adjunct Professor of Pharmacology, Dept. of Medicine, State University of New York (SUNY) at Buffalo, Buffalo, NY
1996–2005	Adjunct Professor of Pharmacology, University of Delaware, Newark, DE

### **Other Appointments**

2000–Present	Chairman of the Board of Vascular Vision Pharmaceuticals
2013–Present	Board Member of NanoPharmaceuticals, LLC
2014–Present	Chairman of Scientific Advisory Board of Karunix Pharmaceuticals
2014–Present	Board Member of Karunix Pharmaceuticals
2015–Present	Chairman of the Board of Virothera Pharmaceuticals
2002–Present	Consultant and advisory board member of a number of other pharmaceutical and biotechnology companies

### **SPEAKING ENGAGEMENTS**

Organized several continuing education programs for pharmacists and physicians and invited as keynote speaker nationally and internationally in the following areas:

- Hematology (Advances in anticoagulants, antiplatelets, and thrombolytics).
- Glycosaminoglycans in coagulation and beyond.
- Oncology (Role of angiogenesis modulations in cancer management, Role of Nanobiotechnology in targeted delivery of chemotherapy, and other anti-cancer modalities).
- Vascular disorders (Angiogenesis stimulation and stem cell in regenerative vascularization and wound healing).
- Dyslipidemia (Lipid Lowering beyond statins).
- Angiogenesis in health and diseases.
- Nano-Targeted Drug Delivery and the future of medicine and personalized medicine.
- Nanomedicine and the future of medicine and precision medicine.
- Advances in Osteoporosis management.
- Pharmacogenomics and Personalized Medicine.

## **PROFESSIONAL AND ACADEMIC SERVICES**

- Established the Office of Research and Scholarly Activity at ACPHS in 2010.
- Established Institutional Safety office (established employee training programs, and obtained Certification from safety organizations).
- Established Animal facility, obtained accreditations from various agencies, and assembled IACUC.
- Established Institutional human Research Board.
- Established ACPHS Research Committee represented by research faculty from the different units.
- Participated and chaired several Search Committees for Provost, Department chairs, and faculties.
- Member of the President's Cabinet.
- Provided bi-annual progress reports to the Board of Trustees.
- Founded Bioconnex (Biotechnology organization that brings together academic and corporate institutes under the chamber of commerce in NY State Capital Region.
- Organized First International Symposium on Nanomedicine (Nanobiotechnology Impact on the Future of Medicine and Personalized Medicine) in the Capital Region.
- Organized annual conference on Issues in Pharma and Medicine.
- Member of UNYTE and Upstate New York Consortium - organization for academic Institutes in NY State.

## **PROFESSIONAL PROGRAM ACCREDITATION**

(Biomedical Science and Pharmaceutics Curriculum)

- Pharm D (Accreditation Council Pharmacy Accreditation: ACPE), Albany College of Pharmacy and Health Sciences.

## **SCIENTIFIC EDITORIAL ACTIVITIES AND PEER REVIEW**

- **Member of the editorial board and reviewer for a number of national and international society journals, including:** American Heart Association Journals, American Cancer Society Journals, American Society of Hematology Journals, American Society of Pharmacology Journals, American Society of Nanomedicine Journals, International Society of Thrombosis and Hemostasis Journals, and several other high impact non-society journals.

## **PROFESSIONAL ORGANIZATIONS AND COMMITTEES**

- Fellow of the American College of Cardiology (FACC)
- Fellow of the National Academy of Clinical Biochemistry (FACB)

- Fellow of the American Heart Association (FAHA)
- American Association of Cancer Research (AACR)
- American Society of Clinical Oncology (ASCO)
- American Association for Advancement of Science
- Association for Research in Vision and Ophthalmology (ARVO)
- New York Academy of Sciences
- International Society for Heart Research (ISHR)
- American Society of Pharmacology & Exp. Therapeutics (ASPET)
- American Society of Hematology (ASH)
- International Society of Angiology
- Honorary Member of Egypt Vascular Society
- Honorary Member of Egypt Cardiology Society
- Honored member of Phi Kappa Phi Society, cumulative graduate course GPA of 3.94/4.00
- International Society of Thrombosis and Hemostasis

#### **GRANT REVIEW COMMITTEES**

- NIH Study Section, Fellowships (F30-F33).
- NIH Study Section, Vascular Biology (R21, R15, R03).
- NIH Scientific Advisory Committee.
- American Institute of Biological Science
- NIH Study Section, SBIR/STTR, Vascular & Pulmonary Biology.
- Department of Defense Study Section.
- Department of Veteran Affairs Review Committee.
- Various pharmaceutical and biotechnology company grant review committees.
- Various foreign grant review committees including the Swiss National Science Foundation and the Australian National Science Foundation.
- NCI Study Section, Angiogenesis & Anti-angiogenesis.
- Qatar Science Foundation.

#### **NATIONAL AND INTERNATIONAL ACADEMIC INSTITUTIONS**

- Member of the faculty promotion committee at various universities in the Middle East, Asia, and Europe.



- Member of various international expert panels representing the United States and Middle East<sup>2</sup>

## **FELLOWSHIPS, TEACHING HONORS AND AWARDS**

- Top Ten Biotechnology Driver in Upstate New York
- Top 1% most cited author in life sciences and translational research world wide
- Listed in Frontier of Science and Technology, US Marquis Who's Who
- Nominated to the National Academy of Science (Institute of Medicine)
- Fellow of the National American Clinical Biochemistry (FACB), 1997- Present
- Fellow of the American College of Cardiology (FACC), 1995-Present
- Fellow of the Circulation Council, 1994-Present
- First Summit Award, Du Pont Merck Pharmaceutical Co., 1992
- Marketing Excellence Award, Du Pont Merck Pharmaceutical & Diagnostic Imaging, 1991
- Marketing Excellence Award, Biomedical Dept. Diagnostic Imaging Research Div., E.I. Du Pont de Nemours Co. (Inc.), 1988
- Clayton and Smith Memorial Award for Excellence in Original Research, Department of Pharmacology, College of Medicine, Ohio State Univ., 1981, 1982
- ICSABER Award for the top Research Project presented, Ohio State Univ., 1982
- Scholarship Graduate Research Associate, Pharmacology Department, Ohio State University, Columbus, Ohio, 1980-1983
- CID-Pharmaceutical Company: First prize for Honor Distinction in B. Pharm. Program, Alexandria University, Alexandria, Egypt, 1973
- NILE-Pharmaceutical Company, First prize for 5 year first class Ranking in B. Pharm. Program, Alexandria University, Egypt, 1973
- MEMPHIS-Pharmaceutical Company First prize for Pharmacognosy, Medicinal Plant & Natural Products. College of Pharmacy, Alexandria University, Alexandria, Egypt, 1973

## **STUDENT TRAINING IN RESEARCH AND SCHOLARLY ACTIVITY**

### **Community Outreach for Curricular Enrichment in Science and Technology**

- Teachers summer training, translation of research methods to the pre-collegiate classroom and provide capital equipment for teachers to perform workshops at their own high schools.

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<sup>2</sup> International Clinical Practice Guidelines on the curative and preventive treatment of thrombosis in cancer patients. The panel met in October 2010 and has scheduled regular meetings in France and Japan to finalize the global guidelines.

- High School Student year-round research internships, Research training with annual oral and poster presentations at PRI and support of the advancement of several high school students in competing at regional, national, and international levels (Intel Science and Engineering Fairs).
- Scientific Workshops at Elementary, Middle, and High Schools about the Magic of Science, Performed various experiments in School gyms to illustrate complex scientific concepts that attract attention and enhance curiosity of students.
- Supported Regional, National, and International Intel Science and Engineering Fairs, Provided financial support, awards for students, and encouraged other scientists to support those events. Volunteered as a judge in various regional Science fairs and provided guidance to students.
- Undergraduate Research and Mentoring (*complete list available on request*).
- Established summer undergraduate Research program at ACPHS, Provided research internships to undergraduate students from ACPHS, SUNY, RPI, and other regional academic institutes.
- Engaged undergraduate students from different universities nationally and internationally in research internships, provided awards for top competitors to be hosted at PRI for 2-3 months in performing specific research project.
- Established International global summer internship competition for Health Sciences students, provided financial awards for top competitors to be hosted at PRI for 2-3 months in performing specific research project.
- Established International global summer internship competition for pharmacy students at the annual international Pharmacy students meeting, provided financial awards for top competitors to be hosted at PRI for 2-3 months in performing specific research project and get exposure to retail, clinical pharmacy, and role of pharmacy in pharmaceutical companies medical affairs and regulatory affairs.

**Graduate and Faculty Research Mentoring (*complete list available on request*):**

- Supervised and mentored over 100 MS, PhD, MD, and Post-doctoral fellows during my tenure at DuPont Pharmaceuticals.
- Supervise and mentored over 50 PhD, MD, and Post-doctoral fellows at the Pharmaceutical Research Institute that I founded in 2002.
- Research Advisor for over 25 MS students in Biotechnology Students over 3 years (2010–2013).
- Supervised PhD graduate students at University of Pennsylvania PA, Johns Hopkins University MD, Illinois Institute of Technology IL, University at Albany, NY, and other international Universities.
- Supervised and mentored over 100 Pharm D, MD students and fellows in various research activities at the Pharmaceutical Research Institute.
- Supervised and mentored annually over 20 High School Students and undergraduate students in various research activities at the Pharmaceutical Research Institute.
- Mentored Pharmacy and Health Sciences faculty.

## TEACHING EXPERIENCE

### Summary/Overview of Experience

I have had the enjoyable and rewarding experience of teaching undergraduate, graduate and post-graduate students at various universities including: Alexandria University, Ohio State University, University of Kentucky, Illinois Institute of Technology, Johns Hopkins, and University of Pennsylvania, State University of New York at Albany/Buffalo, Rensselaer Polytechnic Institute, and Albany College of Pharmacy and Health Sciences. Additionally, I have mentored over 100 post-doctoral fellows, Pharm D, MD Fellows, as well as PhD and MS graduates over the past 15 years. I also have organized and chaired several national and international symposiums in the fields of Cell Adhesion Molecules, Angiogenesis, Blood disorders, Anticoagulant, Antithrombotic, Thrombolytic, and Restenosis.

### Albany College of Pharmacy and Health Sciences

- BHS630G: Advanced Good Laboratory Practices and Laboratory Management, Fall and Summer, 2010–2012.
- BHS665G: Biomarkers: Exposure, Susceptibility, Effects and Efficacy, Summer 2011, 2012; Fall 2012 (guest lecturer).
- BHS820G: Pharmacogenomics and Personalized Medicine, Fall 2011-Present (guest lecturer).
- BHS825G: Nanotoxicology, (co-developer), Spring 2012.
- HRI650: Advanced Issues in Health Outcomes Research.
- Pharm D Six Week Rotation in Drug Discovery and Drug Development, 2002–Present (about 20 Pharm D students each year).
- Graduate and undergraduate courses in drug discovery and drug development.
- Graduate courses in experimental and clinical study design.

### **FUNDING & GRANT HISTORY (*complete lists available on request*):**

#### **Grants: (2003–present, over \$15 million)**

- NIH R01, R21, SBIR, STTR Phase 1 and Phase 2, DOD, NY State capital funding

#### **Contracts (2002–Present, over \$20 million)**

- Contracts and grants from different biotech and pharmaceutical companies including DuPont, Schering-Plough, Merck, Astra Zeneca, GSK, Sanofi, Eli Lilly, Novartis, Celgene, Leo Pharma., Pfizer, Shifa Biomedical, NanoPharmaceuticals, and other biotech and startup companies and foundations.

**RESEARCH SYNOPSIS: EXPERTISE, PUBLICATIONS, AND PATENTS:****Summary of Contributions to Fields of Expertise**

During my early career at DuPont and DuPont Merck Pharmaceuticals, I contributed to the discovery and development of imaging agents, namely **Cardiolite**<sup>®</sup> (Tc99m Sestamibi), a non-invasive myocardial perfusion imaging agent, antiplatelet (**Roxifiban**), anticoagulants, ultra-short acting beta blocker (**Esmolol**) and other clinical candidates in vascular and cardiovascular diseases. Since joining academia as an endowed chair, tenured Professor and Chairman of the Pharmaceutical Research Institute, PRI (2003-Present), I have contributed to the discovery of novel compositions and use for antagonists of integrins, factor VIIa, thyroid hormones, nicotinic receptors as well as Glycosaminoglycans, Collagen, and Kininogen fragments in angiogenesis modulation. I have advanced the applications of novel nanotechnology targeting strategies for existing and new pharmaceuticals and biopharmaceuticals in improving their efficacy and safety in the management of various diseases with unmet medical needs. This has included development of enabling technologies aimed at improving and simplifying drug delivery including medicated contact lenses replacing intravitreal injection, medicated catheter that prevents catheter-associated thrombosis and infection, oral heparins replacing injectable heparin, and others.

Working as a team leader with chemists & biologist, I identified a developmental candidate, defined and extended the potential implications of different integrins such as  $\alpha v \beta 3$  and  $\alpha 5 \beta 1$  integrins. I discovered a key role for the  $\alpha v \beta 3$  integrin in acute and delayed vascular occlusion along with a surrogate marker to guide the monitoring of  $\alpha v \beta 3$  integrin blockade (see selected patent and references).

**In 1997–1998**, discovered new roles and functions for the  $\alpha 5 \beta 1$  integrin (in collaboration with the University of California at San Diego and University of Minnesota). These include the role of  $\alpha 5 \beta 1$  integrin in angiogenesis-mediated disorders (tumor growth and metastasis) and in the mediation of bacterial invasion (see selected patents & references).

**In 1998–1999**, discovered in collaboration with Temple University a new role for kininogen and its domain 5 in the modulation of angiogenesis-mediated disorders (see selected patents & references). Additionally, I am continuing the search for a novel strategy to modulate angiogenesis for the potential clinical utility in the various angiogenesis-mediated disorders (See selected references).

**In 1999–2001**, discovered three amino sequences within collagen required for the modulation of angiogenesis (see attached patent). Defined the mechanisms of heparin and derivatives in the regulation of angiogenesis (see selected references and patents).

**In 2002–2006**, contributed to the discovery of pro-angiogenesis action of thyroid hormone analogs that is mediated at the cell surface integrin receptors (non-genomic actions). Using nanotechnology, designed and advanced the development of novel thyroid hormone agonists and antagonists immobilized on Nanoparticles for site directed delivery for the modulation of angiogenesis as shown in his series of patents and publications. Recent advances are in the envelopment of smart Nanoparticles for site directed delivery of chemotherapy along with molecular based targets that enhance chemo-response into various tumor types with minimal distribution to normal tissues. These strategies should enable for optimal efficacy with reduced adverse events.

In 2007–2015, advanced a number of novel concepts toward clinical development through a number of spin-off companies including: **NanoPharmaceuticals** (nano-targeting of glioblastoma, pancreatic cancer, and other solid tumors as well as in the reversal of pathological angiogenesis-mediated disorders), and **Vascular Vision Pharmaceuticals**. (Ophthalmological disorders, sickle cell disorders, fibrotic diseases, and cancer).

**NanoPharmaceuticals LLC** is a spin-off company from the Pharmaceutical Research Institute, established in 2013 to further develop intellectual property invented by Dr. Shaker Mousa. The company holds 19 issued and 16 pending U.S., regional and foreign patent applications covering composition of matter and uses for nanoparticulate formulations of thyroid hormone analogs (i.e. Nanotetrac, NanoT<sub>4</sub>, and NanoT<sub>3</sub>) for cancer and vascular therapeutics. The Company is currently focused on completing the preclinical development of Nanotetrac, which has multiple anti-cancer and anti-angiogenic effects, and entering Phase I clinical trials for glioblastoma at M D Anderson, radiosensitization of cancer (non-small cell lung or pancreatic) at the Cleveland Clinic, and highly vascular skin disorders such as poikiloderma, rosacea and psoriasis at Johns Hopkins.

**Selected Publications (from over 1,000 peer reviewed and Patents, complete list available upon request)**

Vascular Diagnostics and Therapeutics

- Michaelis W, Turlapaty P, Kornhauser D, Gray J, Fiske W, Faulkner E, **Mousa SA**: Pharmacodynamics and pharmacokinetics of DMP728, a platelet GPIIb/IIIa antagonist in healthy subjects. *Clinical Pharmacol & Therapeutics*, 63: 384-392, 1998.
- Reilly TM, **Mousa SA\***, Racanelli AL, Thoolen MJ, Flint SK, Bozarth JM, Mu DX, Walton HL. A monoclonal antibody that recognizes the GPIIb/IIIa antagonist DMP 728. Reversal of the effects of DMP 728 on platelet aggregation and bleeding time in the dog. *Arterioscler Thromb Vasc Biol*. 1995 Dec; 15(12):2195-9.
- Tsao PW, **Mousa SA**. Thrombospondin mediates calcium mobilization in fibroblasts via its Arg-Gly-Asp and carboxyl-terminal domains. *J Biol Chem*. 1995; 270(40):23747-53.
- **Mousa SA**, M. Forsythe, M. Diemer, M. Thoolen, T.M. Reilly. Thrombolytic antithrombotic, efficacy of the platelet GPIIb/IIIa antagonist DMP728. *Coronary Artery Diseases*, 5 (11): 919-927, 1994.
- Jackson S, DeGrado WF, A. Dwivedi, A. Parthasarathy, A. Higley, J. Krywko, A. Rockwell, J. Markwalder, G. Wells, R. Wexler, R. Harlow, **Mousa SA**. Template-constrained cyclic peptides: design of high affinity ligand for the platelet GPIIb/IIIa receptors. *J. Am. Chem. Soc.*, 116 (8): 3220-3230, 1994.
- DeGrado WF, Jackson S, A. Parthasarathy, M. Rafalski, M. Sworin, **Mousa SA**: New Cyclic peptide compounds as GPIIb/IIIa inhibitors- used for platelet aggregation, as thrombolytics and for treating thromboembolic disorders. WPI, ACC # 94-333114/41; US 38448, 93; WO 94 US3223, 94.
- DeGrado WF, Jackson S, **Mousa SA**: Cyclic compounds linked by a heterocyclic ring useful as inhibitors of platelet GPIIb/IIIa. *US 5,849,693, 1998.*
- **Mousa SA**, W. DeGrado, D. Mu, R. Kapil, B. Lucchesi, T.M. Reilly: Oral antiplatelet, Antithrombotic efficacy of a novel orally active platelet GPIIb/IIIa antagonist, DMP728 in dogs. *Circulation*, 93(3): 537-543, 1996.

- DeGrado WF, S.A. Jackson **Mousa SA**: Cyclic compounds linked by a heterocyclic ring useful as inhibitors of platelet GPIIb/IIIa. US 5,773,411, 1998.
- **Mousa SA**, Mu D, Lucchesi B: Prevention of Carotid Artery Thrombosis by Oral Platelet GPIIb/IIIa Antagonist. STROKE, 28: 830-836, 1997.
- Mousa SA et al: Radiolabeled Platelet GPIIb/IIIa Receptor Antagonists as Imaging Agents for the Diagnosis of Thromboembolic disorders. US Patent # 5, 879, 657, 1999.
- **Mousa SA**, Bozarth J, S. Edward, T. Carroll, J. Barrett: Novel Technetium-99m Labelled Platelet GPIIb/IIIa Receptor Antagonists For Imaging Venous & Arterial Thrombosis. Coronary Artery Disease, 9 (2/31): 1-11, 1998.
- Taheri SA, Lazar L, Haddad G, Castaldo R, Wilson M, **Mousa SA**. Diagnosis of deep venous thrombosis by use of soluble necrosis factor receptor. Angiology. 1998; 49(7):537-41.
- Taheri SA, S. Shenoy, S. Murawski, K. Divan, J. Gullin, **Mousa SA**: Diagnosis of Pulmonary embolism by use of TNF-alpha and its TNF receptor I. Angiology 50 (9): 703-706, 1999.
- **Mousa SA**, J. Bozarth, M. Cohen: Elevation of circulating smooth muscle cell chemoattractants in patients with coronary artery diseases: Potential role of alpha v/ beta3 integrin. Thrombosis Hemostasis.2557, 809, 1999.
- Somasundaram P, Sung BH, **Mousa SA**, Wilson MF. Acute Congestive Heart Failure and Tumor Necrosis Factor Alpha. Am J Geriatr Cardiol. 2000; 9(2):76-80.
- **Wilson M**, Blum R, Dandona P, **Mousa SA**. Effects in humans of intravenously administered endotoxin on soluble cell-adhesion molecule and inflammatory markers: a model of human diseases. Clin Exp Pharmacol Physiol. 2001; 28(5-6):376-80.
- Chen Z, Malhotra P, G. Thomas, F. Ondrey, D. Duffey, C. Smith, D. Enamorada, N. Yeh, G. Kroog, S. Rudy, L. McCullagh, **Mousa SA**: Expression of pro-inflammatory and pro-angiogenic cytokines in patients with head and neck cancer. Clinical cancer Res, (5): 1369-1379, 1999.
- **Mousa SA**, Khurana S, Forsythe M: Comparative in Vitro efficacy of different platelet GPIIb/IIIa antagonists on platelet-mediated clot retraction using tissue factor-thrombelastography: Distinct classes of GPIIb/IIIa antagonists. Arterioscler Thromb Vasc Biol. 2000 Apr; 20(4):1162-7.
- **Mousa SA**, Kapil R, Mu D: Intravenous and Oral antithrombotic efficacy of Roxifiban (DMP754) & its free acid form, XV459. Atherosclerosis Thrombosis & Vascular Biology, 19: 2535-2541, 1999.
- **Mousa SA**, Bozarth J, Youssef A, Levine B: Oral antiplatelet efficacy of the platelet GPIIb/IIIa antagonist, DMP754 in non-human primates. Thrombosis Research, 89: 217-225, 1998.
- **Mousa SA**, D. Mu, M. Hussain: Intranasal antiplatelet / antithrombotic efficacy of novel platelet GPIIb/IIIa antagonist, DMP755 in non-human primates. Thrombosis Research, 92 (3): 115-124, 1998.
- **Mousa SA**, Bozarth J, Lorelli W, Forsythe M, Thoolen M, Slee A, Reilly TM, Friedman PA: Discovery Of Novel Orally Active Non-Peptide Platelet GPIIb/IIIa Receptor

Antagonist, DMP754: Comparative Platelet Binding Profiles With c7E3. *Journal Pharmacol & Exp. Ther.*, 286 (3): 1277-1284, 1998.

- Wityak J, Cain G, Avonn G, Batt D, Pinto D, Hussain M, Xue C-B, Sielecki T, R. Olson, R. Eric, W. DeGrado, W. Frank, **Mousa SA**. Preparation of novel isoxazoline and isoxazole fibrinogen receptor antagonists. *WO 96-US7692 -960530, US 95-455436 950531*.
- Hantgan RR and **Mousa SA**: Inhibition of platelet -mediated clot retraction by integrin antagonists. *Thrombosis Research*, 89: 271-279, 1998.

#### Potential Clinical Utilities of $\alpha v\beta 3$ Integrin Antagonists:

- Bennett J, Chan C, Vilaire G, **Mousa SA**, DeGrado WF: Agonist-activated  $\alpha v\beta 3$  on platelets and lymphocytes binds to the matrix protein osteopontin mediates platelet adhesion to the matrix protein osteopontin. *J. Biol. Chem.* 272 (13): 8137- 8140, 1997.
- **Mousa SA**: Method of treatment of arterial and venous thromboembolic disorders. Patent: PCT, US94, DM6756.
- Srivasata S, Tsao P, Reilly T, Shwartz R, Holmes D, **Mousa SA**: Selective  $\alpha v\beta 3$  integrin blockade limits neointima hyperplasia and lumen stenosis in stented porcine coronary artery injury in Pig. *Cardiovascular Res.*, 36:408-428, 1997.
- Burgess K, Lim D, **Mousa SA**: Synthesis and Solution Conformation of Cyclo-[RGDRGD]: A Cyclic Peptide with Selectivity For The  $\alpha v\beta 3$  Receptor. *J. Medicinal Chemistry*, 39 (22): 4520-4526, 1996.
- **Mousa SA**, DeGrado WF, Harrison D, Holmes D, Srivasata S: Discovery of a key role of  $\alpha v\beta 3$  integrin in acute and delayed vascular occlusion and re-occlusion without effects on hemostasis. *Circulation*, 98 (17): *Suppl. 1, I-525, 2762*, 1998.
- **Mousa SA**, Bozarth J, DeGrado W, Bennett J: Activation-dependent  $\alpha v\beta 3$  on platelets and lymphocytes binds vitronectin and osteopontin: Potential surrogate for monitoring anti-  $\alpha v\beta 3$  integrin efficacy. *Circulation*, 98 (17): *Suppl. 1, I-524, 2753*, 1998.
- **Mousa SA**, Lorelli W, Mohamed S, Batt D, Jadhav PK, Reilly TM:  $\alpha v\beta 3$  Integrin binding affinity and specificity of SM256 in various species. *J. Cardiovascular Pharmacology*, 33: 641-646, 1999.
- Van Waes, I. Enamorado, D. Hecht, L. Sulica, Z. Chen, G. Batt, **Mousa SA**: Effects of novel  $\alpha v\beta 3$  and  $\alpha v\beta 5$  integrin antagonist SM256 and cis-platinum on growth in a murine model of squamous cell carcinoma. *Int J Oncol.* 2000 Jun; 16(6):1189-95.

#### Potential Clinical Utilities of $\alpha 5\beta 1$ Integrin:

- Kim S, Bell K, Mousa SA, Varner JA. Regulation of angiogenesis in vivo by ligation of integrin alpha5/beta1 with the central cell-binding domain of fibronectin. *Am J Pathol.* 2000; 156(4):1345-62
- Cue D, Southern SO, Southern PJ, Jadhav PK, Lorelli W, Smallheer JM, **Mousa SA**, Cleary PP. A nonpeptide integrin antagonist can inhibit epithelial cell ingestion of Streptococcus pyogenes by blocking formation of integrin alpha 5/beta1-fibronectin-M1 protein complexes. *Proc Natl Acad Sci U S A.* 2000; 97(6):2858-63.

- Cleary P, Cue D, **Mousa SA**: Fibronectin antagonists as therapeutic agents and broad-spectrum enhancers of antibiotic therapy. US patent 09, 095, 369, 1998.

#### Kininogen & Angiogenesis-Mediated Disorders:

- Colman RW, Jameson B, Lin Y, **Mousa SA**: Inhibition of Angiogenesis by Kininogen Domain 5. *Blood*, 95 (2): 543-550, 2000.
- Colman RW, Pixley RA, Sainz IM, Song JS, Isordia-Salas I, Muhamed SN, Powell JA Jr, **Mousa SA**. Inhibition of angiogenesis by antibody blocking the action of proangiogenic high-molecular-weight kininogen. *J Thromb Haemost.* 2003; 1(1):164-70.
- Colman RW, **Mousa SA**: "Inhibition of Angiogenesis by peptide analogs of High molecular Weight Kininogen Domain 5". US Application # 60, 107, 844, 360 RC, 1999.
- Colman RW, **Mousa SA**: "Inhibition of Angiogenesis by Antibodies against High molecular Weight Kininogen Domain 5". US Application # 371 RC 1999.

#### Novel Strategies for Angiogenesis Modulation:

- Ali SH, O'Donnell AL, Balu D, Pohl MB, Seyler MJ, Mohamed S, **Mousa SA**, Dandona P. Estrogen receptor-alpha in the inhibition of cancer growth and angiogenesis. *Cancer Res.* 2000; 60(24):7094-8.
- McCarty O, **Mousa SA\***, Bray P, Konstantopoulos K: Platelet P-selectin and  $\alpha$ IIb $\beta$ 3 Integrin are required for optimal adhesion of LS174T human colon adenocarcinoma cells to activated platelet under dynamic flow conditions. *Blood.* 96(5):1789-97; 2000.
- Suich D, **Mousa SA\***, Singh G, Liapakis G, Reisine T, DeGrado WF: Novel template-constrained cyclic peptide analogs of Somatostatin: subtype-Selective binding to Somatostatin receptors and anti-angiogenic efficacy. *Bioorg Med Chem.* 8(9):2229-41; 2000.
- Ali SH, O'Donnell AL, Balu D, Pohl MB, Seyler MJ, Mohamed S, **Mousa SA**, Dandona P. High levels of estrogen receptor-alpha in tumorigenesis: inhibition of cell growth and angiogenic factors. *Cell Prolif.* 2001; 34(4):223-31.
- Ali SH, O'Donnell AL, Mohamed S, **Mousa SA**, Dandona P. Overexpression of estrogen receptor-alpha in the endometrial carcinoma cell line Ishikawa: inhibition of growth and angiogenic factors. *Gynecol Oncol.* 2004 Dec; 95(3):637-45.
- Dupont E, Falardeau P, **Mousa SA**, Dimitriadou V, Pepin MC, Wang T, Alaoui-Jamali MA. Antiangiogenic and antimetastatic properties of Neovastat (AE-941), an orally active extract derived from cartilage tissue. *Clin Exp Metastasis.* 2002; 19(2):145-53.
- Bharali DJ, Yalcin M, Davis PJ, **Mousa SA**. Tetraiodothyroacetic acid-conjugated PLGA nanoparticles: a nanomedicine approach to treat drug-resistant breast cancer. *Nanomedicine (Lond)* 2013; 8(12):1943-54.
- Bergh JJ, Lin HY, Lansing L, **Mousa SA**, Davis PJ. Integrin  $\alpha$ v $\beta$ 3 contains a cell surface receptor for thyroid hormone that is linked to activation of mitogen-activated protein kinase and induction of angiogenesis. *Endocrinology* 2005; 146:2864-2871.



- **Mousa SA**, Bergh JJ, Dier E,...Davis PJ. Tetraiodothyroacetic acid, a small molecule integrin ligand, blocks angiogenesis induced by vascular endothelial growth factor and basic fibroblast growth factor. *Angiogenesis 2008; 11:183-190.*
- Glinskii AB, Glinsky GV, Lin HY, **Mousa SA**, Davis PJ. Modification of survival pathway gene expression in human breast cancer cells by tetraiodothyroacetic acid (tetrac). *Cell Cycle 2009; 8:3554-3562.*
- Rebbaa A, Chu F, Davis FB, Davis PJ, **Mousa SA**. Novel function of the thyroid hormone analog tetraiodothyroacetic acid: a cancer chemosensitizing and anti-cancer agent. *Angiogenesis 2008; 11:269-276.*
- Meng R, Tang HY, Westfall J, **Mousa SA**, Davis PJ, Lin HY. Crosstalk between integrin  $\alpha\beta3$  and estrogen receptor-alpha is involved in thyroid hormone-induced proliferation of human lung carcinoma cells. *PLoS One 2011; 6(11):e27547.*
- Yalcin M, Dyskin E, Lansing L, Glinsky GV, Davis PJ, **Mousa SA**. Tetraiodothyroacetic acid (tetrac) and nanoparticulate tetrac arrest growth of medullary carcinoma of the thyroid. *J Clin Endocrinol Metab 2010; 95:1972-1980.*
- Yalcin M, Lin HY, Sudha T, Davis PJ, **Mousa SA**. Response of human pancreatic cancer cell xenografts to tetraiodothyroacetic acid nanoparticles. *Horm Cancer 2013; 4:176-185.*
- Yalcin M, Bharali D, Lansing L, Davis PJ, **Mousa SA**. Tetraiodothyroacetic acid (tetrac) and tetrac nanoparticles inhibit growth of human renal cell carcinoma xenografts. *Anticancer Res 2013; 29:3825-3831.*
- **Mousa SA**, Yalcin M, Bharali DJ, Lin HY, Davis PJ. Tetraiodothyroacetic acid and its nanoformulation inhibit thyroid hormone stimulation of non-small cell lung cancer cells in vitro and their growth in xenografts. *Lung Cancer 2012; 76:39-45.*
- Lin HY, Tang HY, Davis PJ, **Mousa SA**. Thyroid hormone is a MAPK-dependent growth factor for thyroid cancer cells and is anti-apoptotic. *Steroids 2007; 72:180-187.*
- Davis PJ, Glinsky GV, Lin HY, **Mousa SA**. Molecular mechanisms of actions of formulation of the thyroid hormone analogue, tetrac, on the inflammatory response. *Endocr Res 2013; 38:112-118.*
- Lin HY, Landersdorfer CB, London D, **Mousa SA**, Davis PJ. Pharmacodynamic modeling of anti-cancer activity of tetraiodothyroacetic acid in a perfused cell culture system. *PLoS Comput Biol 2011; 7(2):e1001073.*
- Davis FB, **Mousa\* SA**, O'Connor L, Davis PJ. Proangiogenic action of thyroid hormone is fibroblast growth factor-dependent and is initiated at the cell surface. *Circ Res 2004; 94:1550-1506.*
- Lin HY, Sun M, Tang HY, **Mousa SA**, Davis PJ. L-Thyroxine vs. 3, 5, 3'-triiodo-L-thyronine and cell proliferation: activation of mitogen-activated protein kinase and phosphatidylinositol 3-kinase. *Am J Physiol 2009; 296:C980-C991.*
- Yalcin M, Bharali DJ, Dyskin E, Davis PJ, **Mousa SA**. Tetraiodothyroacetic acid and tetraiodothyroacetic acid nanoparticle effectively inhibit the growth of human follicular thyroid carcinoma. *Thyroid 2010; 20:281-286.*

- Lin HY, Su YF, Hsieh MT...**Mousa SA**, Davis PJ. 2013. Nuclear monomeric integrin  $\alpha v \beta 3$  in cancer cells is a coactivator regulated by thyroid hormone. *FASEB J* 27:3209-3216.
- Davis PJ, **Mousa SA**, Cody V, Tang HY, Lin HY. Small molecule hormone or hormone-like ligands of integrin  $\alpha v \beta 3$ : implications for cancer cell behavior. *Horm Cancer* 2013; 4:335-342.
- Hariri W, Sudha T, Bharali DJ, Cui H, **Mousa SA**: Nano-Targeted Delivery of Toremifene, an Estrogen Receptor- $\alpha$  Blocker in Prostate Cancer. *Pharm Res.* 2015 Mar 12. [Epub ahead of print].
- Al-Sofiani ME, Jammah A, Racz M, Khawaja RA, Hasanato R, El-Fawal HA, **Mousa SA**, Mason DL. Effect of Vitamin D Supplementation on Glucose Control and Inflammatory Response in Type II Diabetes: A Double Blind, Randomized Clinical Trial. *Int J Endocrinol Metab.* 2015 Jan 10; 13(1):e22604.
- Safer AM, Afzal M, Hanafy N, **Mousa SA**: Green tea extract therapy diminishes hepatic fibrosis mediated by dual exposure to carbon tetrachloride and ethanol: A histopathological study. *Exp Ther Med.* 2015 Mar; 9(3):787-794.
- Tarazi F, Sahli Z, \*Pleskow J, **Mousa S**. Asperger's syndrome: diagnosis, comorbidity and therapy. *Expert Rev Neurother.* 2015 Mar; 15(3):281-93.
- Davis PJ, Glinsky GV, Lin HY, Leith JT, Hercberts A, Tang HY, Ashur-Fabian O, Incerpi S, Mousa SA. Cancer Cell Gene Expression Modulated from Plasma Membrane Integrin  $\alpha v \beta 3$  by Thyroid Hormone and Nanoparticulate Tetrac. *Front Endocrinol (Lausanne).* 2015 Jan 12; 5:240.
- Shirode AB, Bharali DJ, Nallanthighal S, Coon JK, **Mousa SA**, Reliene R. Nanoencapsulation of pomegranate bioactive compounds for breast cancer chemoprevention. *Int J Nanomedicine.* 2015 Jan 9; 10:475-84.
- Alshaiban A, Muralidharan-Chari V, Nepo A, **Mousa SA**. Modulation of Sickle Red Blood Cell Adhesion and its Associated Changes in Biomarkers by Sulfated Nonanticoagulant Heparin Derivative. *Clin Appl Thromb Hemost.* 2015 Jan 19. pii: 1076029614565880. [Epub ahead of print].
- Abdolahi A, Georas SN, Brenna JT, Cai X, Thevenet-Morrison K, Phipps RP, Lawrence P, **Mousa SA**, Block RC. The effects of aspirin and fish oil consumption on lysophosphatidylcholines and lysophosphatidic acids and their correlates with platelet aggregation in adults with diabetes mellitus. *Prostaglandins, Leukotrienes, and Essential Fatty Acids.* 2014; 90(2-3):61-68.
- Alyahya R, Sudha T, Racz M, Stain SC, **Mousa SA**. Anti-metastasis efficacy and safety of non-anticoagulant heparin derivative versus low molecular weight heparin in surgical pancreatic cancer models. *International Journal of Oncology.* 2015; 46(3):1225-1231.
- Belousova V, Abd-Rabou AA, **Mousa SA**. Recent advances and future directions in the management of hepatitis C infections. *Pharmacology & Therapeutics.* 2015; 145C:92-102.
- Block RC, Abdolahi A, Tu X, Georas SN, Brenna JT, Phipps RP, Lawrence P, **Mousa SA**. The effects of aspirin on platelet function and lysophosphatidic acids depend on plasma concentrations of EPA and DHA. *Prostaglandins, Leukotrienes, and Essential Fatty Acids.* 2014. pii: S0952-3278(14) 00207-5.

- Bombard DS, 2nd, **Mousa SA**. Mayer-Rokitansky-Kuster-Hauser syndrome: complications, diagnosis and possible treatment options: a review. *Gynecological Endocrinology*. 2014; 30(9):618-623.
- Davis PJ, Glinsky GV, Lin HY, Leith JT, Hercbergs A, Tang HY, Ashur-Fabian O, Incerpi S, **Mousa SA**. Cancer cell gene expression modulated from plasma membrane integrin alphavbeta3 by thyroid hormone and nanoparticulate tetrac. *Frontiers in Endocrinology*. 2014; 5:240.
- Trpkovic A, Resanovic I, Stanimirovic J, Radak D, **Mousa SA**, Cenic-Milosevic D, Jevremovic D, Isenovic ER. Oxidized low-density lipoprotein as a biomarker of cardiovascular diseases. *Crit Rev Clin Lab Sci*. 2014 Dec 24:1-16.
- El-Sayyad HI, Khalifa SA, El-Sayyad FI, **Mousa SA**, Mohammed EA. Analysis of fine structure and biochemical changes of retina during aging of Wistar albino rats. *Clin Experiment Ophthalmol*. 2014 Mar; 42(2):169-81.
- Davis PJ, Lin HY, Sudha T, Yalcin M, Tang HY, Hercbergs A, Leith JT, Luidens MK, Ashur-Fabian O, Incerpi S, **Mousa SA**. Nanotetrac targets integrin alphavbeta3 on tumor cells to disorder cell defense pathways and block angiogenesis. *OncoTargets and Therapy*. 2014; 7:1619-1624.
- Ebright J, **Mousa SA**. Oral anticoagulants and status of antidotes for the reversal of bleeding risk. *Clinical and Applied Thrombosis/Hemostasis*. 2015; 21(2):105-114.
- Khan N, Bharali DJ, Adhami VM, Siddiqui IA, Cui H, Shabana SM, **Mousa SA**, Mukhtar H. Oral administration of naturally occurring chitosan-based Nanoformulated green tea polyphenol EGCG effectively inhibits prostate cancer cell growth in a xenograft model. *Carcinogenesis*. 2014; 35(2):415-423.
- **Mousa SA**, Lin HY, Tang HY, Hercbergs A, Luidens MK, Davis PJ. Modulation of angiogenesis by thyroid hormone and hormone analogues: implications for cancer management. *Angiogenesis*. 2014; 17(3):463-469.
- Safer A-M, Afzal M, Hanafy N, **Mousa S**: Green tea extract therapy diminishes hepatic fibrosis mediated by dual exposure to carbon tetrachloride and ethanol: A histopathological study. *Experimental and Therapeutic Medicine*. 2015;9(3):787-794.
- Siddiqui IA, Bharali DJ, Nihal M, Adhami VM, Khan N, Chamcheu JC, Khan MI, Shabana S, **Mousa SA**, Mukhtar H. Excellent anti-proliferative and pro-apoptotic effects of (-)-epigallocatechin-3-gallate encapsulated in chitosan nanoparticles on human melanoma cell growth both in vitro and in vivo. *Nanomedicine: Nanotechnology, Biology, and Medicine*. 2014; 10(8):1619-1626.
- Sudha T, Yalcin M, Lin HY, Elmetwally AM, Nazeer T, Arumugam T, Phillips P, **Mousa SA**. Suppression of pancreatic cancer by sulfated non-anticoagulant low molecular weight heparin. *Cancer Letters*. 2014; 350(1-2):25-33.
- Sweezy T, **Mousa SA**. Genotype-guided use of oral antithrombotic therapy: a pharmaco-economic perspective. *Personalized Medicine*. 2014; 11(2):223-235.
- Tarazi FI, Sahli ZT, Wolny M, **Mousa SA**. Emerging Therapies for Parkinson's disease: From Bench to Bedside. *Pharmacology & Therapeutics*. 2014; 144(2):123-133.
- Vogel R, Hussein EA, **Mousa SA**. Stem Cells in the Management of Heart Failure: What Have We Learned from Clinical Trials? *Expert Review of Cardiovascular Therapy*. 2015; 13(1):75-83.

- Yaturu S, Dier E, Cui H, **Mousa, SA**. Aspirin resistance in young men with Type 2 diabetes. *Journal of Diabetes Mellitus*. 2014;4:72-76.

### **Selected Patents and Patent Applications (Complete list available upon request)**

- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *US Patent #US 7,785,632 B2, Issued 8/31/2010*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *Australian Patent #2004273986, Issued 8/5/2010.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *Canadian Application #2539288, Issued 08/01/2013.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *Indian Patent #257208, Issued 9/12/2013.*
- **Mousa SA**, Davis PJ, Davis F: Thyroid Hormone Analogs and Methods of Use in Angiogenesis  
*European Patent #EP1670449, Issued 6/27/2012.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *Canadian Application #2805552, Issued*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *US Patent # 8518451, Issued 8/27/2013.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *US Application #13/975,725, US Application Status: Pending.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *US Application #14/078,713, US Application Status: Pending.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *European Application #10185609.4, European Application Status: Pending.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs and Methods of Use”, *US Patent #US 8,071,134, Issued 12/6/2011.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs for Inhibiting Angiogenesis” *European Application #05796606.1, Issued 1/21/2015.*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs for Promoting Angiogenesis” *Chinese Application #200580038970.X, Issued 1/1/2014*
- **Mousa SA**, Davis PJ, Davis F: “Thyroid Hormone Analogs for Promoting Angiogenesis” *Indian Patent #260602, Indian Issuance Date: 5/12/2014*
- **Mousa SA**, Davis PJ, Davis F: “Nanoparticle and Polymer for Thyroid Hormone Analogs, Antagonists, and Formulations Thereof” *US Patent #8668926, Issued 3/11/2014.*
- **Mousa SA**, Davis PJ, Davis F: “Nanoparticle and Polymer Formulations for Thyroid Hormone Analogs, Antagonists, and Formulations Thereof” *Canadian Application #2648243, Issued 2/1/2014*

- **Mousa SA**, Davis PJ: “Nanoparticle and Polymer Formulations for Thyroid Hormone Analogs, Antagonists, and Formulations Thereof”, US Application #14/184,889, Issued 2015.
- **Mousa SA**, Davis PJ: “Nanoparticle and Polymer Formulations for Thyroid Hormone Analogs, Antagonists, and Formulations Thereof”, US Application #14/185,010, Pending
- **Mousa SA**, Davis PJ: “Nanoparticle and Polymer Formulations for Thyroid Hormone Analogs, Antagonists, and Formulations and Uses Thereof” European Patent #2120913, Issued
- **Mousa SA**, Davis PJ: “Nanoparticle and Polymer Formulations for Thyroid Hormone Analogs, Antagonists, and Formulations and Uses Thereof”, US Application #12/947,389 Pending.
- Lin H, **Mousa SA**, Davis PJ, Davis F: “Combination Treatment of Cancer with Cetuximab and Tetrac”, US Application #12/751,375, Pending
- Davis PJ and **Mousa SA**: “Uses of Formulations of Thyroid Hormone Analogs and Nanoparticulate Forms Thereof to Increase Chemosensitivity and Radiosensitivity in Tumor or Cancer Cells”, US Patent #8802240, Issued 8/12/2014
- Davis PJ and **Mousa SA**: “Uses of Formulations of Thyroid Hormone Analogs and Nanoparticulate Forms Thereof to Increase Chemosensitivity and Radiosensitivity in Tumor or Cancer Cells”, Canadian Application #2771564, Pending.
- Davis PJ and **Mousa SA**: “Uses of Formulations of Thyroid Hormone Analogs and Nanoparticulate Forms Thereof to Increase Chemosensitivity and Radiosensitivity in Tumor or Cancer Cells”, European Patent #12167491.5, Pending.
- Davis PJ and **Mousa SA**: “Method and Composition of Thyroid Hormone Analogues and Nanoformulations Thereof for Treating Anti-Inflammatory Disorders”, US Application #14/242,041, Pending.
- **Mousa SA**, Davis, PJ: “Methods for Screening Patients for Resistance to Angioinhibition, Treatment and Prophylaxis Thereof”, US Application #14/546,440, Issued 05/05/2015.

## Books

- Cell Adhesion Molecules and Matrix Proteins: Role in Health and Diseases (Biotechnology Intelligence Unit), 1998, Edited by **Shaker Mousa**, Springer.
- Angiogenesis Inhibitors and Stimulators: Potential Therapeutic Implications (Medical Intelligence Unit 20), 2000, Edited by **Shaker Mousa**, Landes Bioscience.
- Anticoagulants, Antiplatelets, and Thrombolytics (Methods in Molecular Biology), First Edition, 2003, Edited by **Shaker Mousa**, Humana Press.
- Anticoagulants, Antiplatelets, and Thrombolytics (Methods in Molecular Biology), Second Edition, 2010, Edited by **Shaker Mousa**, Humana Press
- Thrombosis Research and Treatment, Bench to Bedside, 2004, Edited by: Jafar Vossoughi, Jawed Fareed, **Shaker Mousa** and John W. Karanian, Medical and Engineering Publishers, Inc.

- Angiogenesis Modulations in Health and Disease: Practical Applications of Pro- and Anti-angiogenesis Targets, 2013; Edited by **Shaker Mousa** and Paul J. Davis, Springer.