CURRICULUM VITAE

Daniela Salvemini, PhD
William Beaumont Professor and Chair
Department of Pharmacology and Physiology
Saint Louis University School of Medicine
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EDUCATION AND DEGREES AWARDED

UNDERGRADUATE

1983-1987: King's College London, University of London, UK
Bachelor of Science (Pharmacology)

1985-1986: Department of Preclinical Pharmacology, Sandoz AG, Basel, Switzerland
Advisor: Dr John Morley

Dissertation submitted as part of the requirements leading to B.Sc in Pharmacology at Kings College, London "Inhibition of PAF induced pulmonary pathology: A property common to tricyclic compounds and prophylactic anti-asthma drugs"

GRADUATE

1987-1990: London University, The William Harvey Research Institute, St. Bartholomew's Hospital Medical College, Charterhouse Square, London ECIM6BQ, UK
Doctor of Philosophy (Pharmacology)
Advisor: Nobel Laureate, Professor Sir John Vane, FRS

PhD Thesis Title: "Nitric oxide: an intercellular messenger between platelets, white blood cells and the vascular endothelium"

POST DOCTORAL

1992-1994: Department of Molecular Pharmacology, Monsanto Corporate Research, St. Louis
Advisor: Dr Philip Needleman

Investigated the interactions between the nitric oxide synthase and cyclooxygenase pathways in inflammation. Discovered that nitric oxide activated COX-1 and COX-2 enzymes and demonstrated through a series of enzymatic, *in vitro* and *in vivo* models of inflammation that this represented an important pathway through which nitric oxide exerts its physiological and pathological effects.

1990-1992: The William Harvey Research Institute, St. Bartholomew's Hospital Medical College, Charterhouse Square, London ECIM6BQ, UK.
Advisor: Nobel Laureate, Professor Sir John Vane, FRS

Investigated the *in vivo* mechanism(s) of release of nitric oxide from nitrovasodilators and the implication in cardiovascular and inflammatory pharmacology.

PROFESSIONAL EXPERIENCE

Academic Appointments

- **March 2021** William Beaumont Professor and Chair, Department of Pharmacology and Physiology
- **2021** Special Assistant to the VP for Research and Innovation
- **July 2019 – March 2021** Interim Chair, Department of Pharmacology and Physiology
- **2018-:** Director, Henry and Amelia Nasrallah Center for Neuroscience, Saint Louis University School of Medicine, St Louis, MO, USA.
- **2015-2018:** Vice Chair of Research, Department of Pharmacology and Physiology, Saint Louis University School of Medicine, St Louis, MO, USA.
- **2012-:** Tenured Professor, Department of Pharmacological and Physiological Sciences, Saint Louis University School of Medicine, St Louis, MO, USA.
- **2009-2012:** Associate Professor (Tenure Track). Department of Pharmacological and Physiological Sciences, Saint Louis University School of Medicine, St Louis, MO, USA.
- **2005-2009:** Research Professor of Internal Medicine. Department of Internal Medicine, Division of Pulmonary, Critical Care and Sleep Medicine, Saint Louis University, St Louis, MO, USA.
- **2006-2009:** Adjunct Professor of Pharmacological and Physiological Sciences. Department of Pharmacological and Physiological Sciences, Saint Louis University School of Medicine, St Louis, MO, USA.
- **2013-:** Professor, of Internal Medicine. Secondary appointment. Department of Pulmonary, Critical Care and Sleep Medicine.
- **2010-2015.** Adjunct Associate Professor. Department of Pharmaceutical Sciences, School of Pharmacy, Southern Illinois University Edwardsville
- **2007-:** Visiting Professor. Department of Preclinical and Clinical Pharmacology, University of Florence, Florence, Italy.
- **2007-:** Adjunct Professor of Molecular Pharmacology. Department of Pharmacology. Faculty of Pharmacy of Catanzaro, Italy.
- **1996-2006**: Adjunct Professor Department of Pharmacological and Physiological Sciences, St Louis University School of Medicine, St Louis, MO, USA.

Non-Academic Appointments

- **2020-** Scientific Advisor, Avantyxpharma
- **2019-** Chief Scientific Advisor, Board Member and Chair of the Scientific Advisory Board. BioIntervene Inc.
- **2014-.** Founder, BioIntervene Inc. A SLU-based ventured backed start-up company committed to the clinical development of small molecule A3AR agonists for chronic pain treatments and neurodegenerative diseases.
- **2001-2005:** Metaphore Pharmaceuticals, Inc, St. Louis. MO, USA. Preclinical and clinical development of small molecule superoxide dismutase and peroxynitrite decomposition catalysts for pain and cancer treatments.
    - Senior Vice President of Research (2003-2005)
    - Vice President of Biological and Pharmacological Research (2001-2003)
    - Director of Biology (1999-2001)
- **1995-1999:** G.D. Searle (Pfizer) Discovery Research, St. Louis. MO, USA. Preclinical development of novel analgesics and anti-inflammatories.
    - Research Scientist II and Project Leader (1997-1999)

- Research Scientist I (1995-1997)
- Senior Research Investigator (1994-1995**)**

RESEARCH INTERESTS: Over 30 million people in the U.S. alone suffer from chronic neuropathic pain. Treatment for these patients is very difficult and current medications are limited by severe side effects and poor efficacy. Novel non-narcotic analgesics are needed. My lab uses a translational, multidisciplinary approach to unravel molecular pathways required in the transition of acute to chronic neuropathic pain with a particular focus on chemotherapy-induced neuropathic pain. Our goal is to identify novel targets for therapeutic intervention with non-opioid based analgesics for the treatment of neuropathic pain. Our studies examine plasticity in the periphery in primary sensory neurons where painful stimuli are transduced, in the dorsal horn of the spinal cord where the first synaptic relays occurs for pain signals headed to the brain, and in various areas of the brain known to be important in the overall integration of pain outcome. We are interested in exploring interactions between chronic neuropathic pain states and other comorbidities such as cognitive deficits, depression and anxiety. We are also interested in understanding how opioids, cause the development of hyperalgesia (increased pain sensitivity) and tolerance which are known to limit opioid's efficacy contributing to over-prescription and abuse. Translating our discoveries to the clinic- a bench-to-bedside-approach is a key mission of our work.

RESEARCH SUPPORT

Ongoing

Title: Sphingosine-1-Phosphate Receptor Subtype 1: A Novel Target in the Treatment of Chronic Migraine
DOD Award#: W81XWH-21-1-0486 $1,280,232.00 Total
6/1/2021-5/30/2025
PI: Daniela Salvemini, PhD

Title: Discovery and validation of a novel orphan GPCR as a target for therapeutic intervention in neuropathic pain
NIH/NINDS: 1R01NS113992: $2,154,000 Total
01 07/01/2019-08/31/2024
PI: Daniela Salvemini, PhD

Title: A3AR agonists as a novel approach to mitigate chemotherapy-induced neurotoxicity
NIH/NCI: RO1CA230512: $2,814,902 Total
8/9/2018-7/31/2023
PI: Daniela Salvemini, PhD

Title: Role of opioid-induced S1P/S1PR1 axis activation in neuroinflammatory responses
NIH/NIDA: RO1DA043543: $1,722,666 Total
8/1/2018-6/31/2021 (no-cost extension)
PI: Daniela Salvemini, PhD

Title: Novel therapeutic approaches for traumatic brain injury induced cognitive deficits
R01NS111120 $1,493,014 Total
12/01/2019-12/31/2023
PI: Daniela Salvemini, PhD

Title: Targeting Sphingosine-1-Phosphate Axis with FTY720/Fingolimod as a Novel Therapy for Triple Negative Brest Cancer and Chemotherapy-Induced Pain
DOD - $53,353 Total
9/30/20-9/29/23
Daniela Salvemini, PhD (Consultant; 3.6% effort)

NIH/NIGMS : Pharmacological Sciences Training Grant
T32 GM008306-26A1 Salvemini (Faculty mentor)
Burris/Egan/Voigt (Co-PI) 7/1/2016-6/30/2021

Contracts (not listed)

Pending (not listed)

Grants in preparation (not listed)

Completed

Title: Clinical Evaluation of Novel Biomarkers to Select and Treat Chronic Pain
01/16/2017-01/16/2020
The MayDay Fund: $363,000 Total
PI: Daniela Salvemini, PhD

Title: Non-Narcotic Based Therapeutics for Chronic Pain
03/01/18-02/28/2019
Institute of Clinical and Translational Sciences at Washington University: $ 50,000
PI: Daniela Salvemini, PhD

Title: Identification of GPR160 as a novel target for therapeutic intervention in neuropathic pain states
04/02/2018-04/01/2019
President's Research Fund, Saint Louis University: $ 50,000
PI: Daniela Salvemini, PhD

Title: A_3AR agonists to prevent chemotherapy-induced painful peripheral neuropathy
R01 CA169519, NIH/NCI (2013-2018): $1,447,798 Total
PI: Daniela Salvemini, PhD

Title: Preserving opioid analgesia using a novel adenosinergic approach
R21 DA040305, NIH/NIDA (2015-2017): $378.750 Total
PI: Daniela Salvemini, PhD

Title: Blocking bortezomib induced painful peripheral neuropathy with FTY720
Leukemia and Lymphoma Society Translational Research Award
2012-2016: $581,557 Total
PI: Daniela Salvemini, PhD

Title: "Pertinent clues" as a translation for biomarkers in chronic pain research
The MayDay Fund (2012-2015): $126,500 Total
PI: Daniela Salvemini, PhD

Title: Role of peroxynitrite in morphine hyperalgesia and tolerance
R01 DA024074 NIH/NIDA (2008-2013): $2,025,552 Total
PI: Daniela Salvemini, PhD

Title: Use of FTY720 (Fingolimod) in the prevention of platinum induced chemotherapy induced peripheral neuropathy
Saint Louis University President Research Fund (2013-2014): $ 43,000
PI: Daniela Salvemini, PhD and Jack Lionberger, MD.

Title: Targeting the relief of chronic pain with orally active peroxynitrite decomposition catalysts
Challenge Grant: 1RC1AR058231, NIH/NIAMSD (2009-2011) $974.024 Total.
PI: Daniela Salvemini, PhD

Title: Role of ceramide in morphine hyperalgesia and tolerance
R21 DA023056, NIH/NIDA (2008-2011). $ 392,000 Total
PI: Daniela Salvemini, PhD

Title: Role of peroxynitrite in the development of chemotherapy-induced pain
PI: Daniela Salvemini, PhD
President's Research Award
Saint Louis University Seed Funds (2010-2011)

Title: Ceramide- novel target in the development of opiate-induced hyperalgesia and tolerance
PI: Daniela Salvemini, PhD
Saint Louis University Seed Funds (2007-2008)

Title: Ceramide- novel target in the development of opiate-induced hyperalgesia and tolerance
PI: Daniela Salvemini, PhD
Saint Louis University Seed Funds (2006-2007)

Title: Pulmonary Collectins, Hyaluronan and Macrophages
HL073896 4/1/04 - 3/31/09
NIH/NHLBI
PI: Rashmin Savani MD
Salvemini (collaborator)

Title: M40403 and IL-2 Induced Hypotension
1 R43 CA93203-01 8/06/01-7/31/02
NIH/NCI
PI: Daniela Salvemini, PhD

Title: SODm for Management of Ischemic Heart Disease
1 R43 HL68362-01 9/30/01-3/29/02
NIH/NHLBI
PI: Daniela Salvemini, PhD

Title: Superoxide Dismutase Mimetics for Management of Pain
1R43 DA13534-01 7/01/00 -12/31/00
NIH/NIDA
PI: Daniela Salvemini, PhD

Title: Inactivation of Catecholamines in Septic Shock
R43 FD-01585-01 9/30/00-3/31/01
DHHS/FDA
PI: Daniela Salvemini, PhD

Title: Deactivation of catecholamines by nitric oxide, superoxide and peroxynitrite
R01 HL61836-03 3/07/00-2/28/04
NIH/NHLBI
PI: Heather Macarthur, PhD
Role: Consultant

HONORS and AWARDS

- **2021:** h index=77 >22,000 citations (Google Scholar)
- **2020:** Fellow, National Academy of Inventors
- **2020:** Pharmacia-ASPET Award in Experimental Therapeutics
- **2020:** Saint Louis University Faculty Innovation Award
- **2019:** Saint Louis University Senior Faculty Grant winner
- **2018:** Member, External Consultant Board, Preclinical Screening Platform for PAIN (PSPP; NINDS)
- **2018:** Saint Louis University School of Medicine Distinguished Faculty Award in Research
- **2018:** ACTTION-PCC Expert Pain Member Meeting
- **2016:** Elected Faculty Member, Hope Center for Neurological Disorders, Washington University School of Medicine, Saint Louis
- **2014:** Fellows Awards from the Academy of Science – St. Louis Outstanding Scientist Award.
- **2010:** Premio Internazionale Maria Luisa de' Medici Award from Italy. The annual prize is for women whose distinguished work is of international interest. The award was granted for Excellence in Research.
- **2002:** The Oxygen Club of Greater Washington, D.C and the Society for Experimental Biology and Medicine, D.C Award for her research in free radical biology.
- **2000:** Magna Graecia Prize for her contribution of the scientific advancement of research in Southern Italy.
- **1997**: Searle Discovery Research Achievement Award for her achievements and leadership in the Superoxide Dismutase Project.
- **1997**: Novartis Prize In Pharmacology for her research on free radicals, nitric oxide and cyclooxygenases inflammation.
- **1996:** Searle Discovery Research Achievement Award for her achievements and leadership in Nitric Oxide Synthase and Superoxide Dismutase Projects.
- **1991:** The University of London William Julius Mickle Fellowship, For: “An investigator under 35 years of age, who has in the opinion of the Committee, done most to advance medical art or science within the preceding five years”.
- **1989:** The British Society of Thrombosis and Haemostasis Young Investigators Award for the excellence and originality of the work presented on the interactions between nitric oxide, platelets and vascular smooth muscle cells.

OTHER EXPERIENCE and PROFESSIONAL MEMBERSHIP

- 2018 Ad Hoc Reviewer for NIH Study Section (NIDA; NCI; NINDS; NHLBI).
- Reviewer (*Ad hoc*): Nature, Journal of Neuroscience, PAIN, Neuroscience, Molecular Pain, J. Biol.

Chemistry, Journal of Pharmacology and Experimental Therapeutics, Proc. Natl. Acad. Sci. USA, Cannabis and Cannabinoid Research, Free Radical Biology and Medicine, Critical Care Medicine, Molecular and Cell Biology of Lipids, Journal of Cellular and Molecular Medicine, Pharmacological Research, British Journal of Pharmacology, European Journal of Pharmacology, Inflammation Research, American Journal of Physiology, Brain Behavior and Immunity, Experimental Neurology, Acta Neuropathology, J Neurochemistry.

- External reviewer - evaluate promotion dossiers for PIs at other institutions.
- Write letters of recommendations in support of students and PI award (internal and external).
- Write letters of recommendations in support of students and PI job applications (internal and external).
- Member: USAPS; AAAS; ASPET; Society for Neuroscience, International Association for the Study of Pain.
- External Consultant Board, Preclinical Screening Platform for PAIN (PSPP; NINDS).
- Peripheral Neurotoxic Society, Toxic Neuropathy Consortium.
- Editorial Board Member, American Journal of Physiology.
- Study Section Member, Institute of Clinical and Translational Sciences at Washington University.
- Served as Ad Hoc Reviewer for various foundations (i.e., Mayday Fund; Kentucky Science and Engineering Foundation R&D Excellence Awards; Kansas City Area Life Sciences Institute).
- Volunteer, Judge for the Young Investigator Award Program. Society of Free Radical Biology and Medicine.
- Nomination and Leadership Committee Member, Society of Free Radical in Biology and Medicine .
- Volunteer, Women in Science, Society of Free Radical in Biology and Medicine .

ACADEMIC SERVICE

Saint Louis University, St Louis, MO, USA.

School of Medicine and University

- Member, SLU innovation council (2021)
- Member, Search Committee for Dean SOM and VP medical affairs (2021)
- Member, Search Committee for SOM Psychiatry Chair (2020)
- Member, Internal Advisor and Grant Reviewer, SLU Institute for Drug and Biotherapeutic Innovation (2019-)
- Member, Research Planning Committee (2019-)
- Member, SLU Research Institute Fellows Committee Member (2018-)
- Chair, Henry and Amelia Nasrallah Center for Neuroscience Executive Committee (2018-)
- Member, Henry and Amelia Nasrallah Center for Neuroscience (2018-)
- Member, Faculty Senate (2013-2016)
- Member, Promotion and Tenure Committee (2013-2018)
- Member, Dean's Taskforce on Sustainability of Research (2012-2013)
- Member, Transdisciplinary Cancer Pain Study Group Committee (2009)
- Member, Research Planning Committee (2009-2015)
- Judge, 19 Annual Graduate Research Symposium (2012; 2013)
- Reviewer, SOM Internal Study Section Grant (2011)
- Reviewer, President Research Funds (2010)
- Reviewer, Seed Funds (2009)
- Member, Judge, 17 Annual Graduate Research Symposium (2011)

- Member, Cancer Center (2011-present)
- Member, Center of Excellence in Neuroscience Research (2008-2017)
- Member, Department of Internal Medicine Mentoring Program (2006-2007)
- Member, Departmental Analysis and Evaluation Committee (2007)
- Member Center of Excellence in Cardiovascular Research (2010-present)

Department

- Member, Faculty Recruitment Committee (2013-2018)
- Member, Faculty Evaluation Committee (2013-2018)
- Member, Graduate Student Committee (2010-2018)
- Member, Graduate Student Qualifying Exam (2009-2018)

Teaching

- I have/am contributing to PPY511 (Fundamentals of Drug Action; Drug Design and Development), PPY512 (System Physiology and Pharmacology), PPY514 (Fundamentals of Effective Grant Writing Course), M2 Cardiovascular Modules for the 2nd Year Medical Students (Vasoactive Mediators I), BBSG 504 (Special Topic in Basic Biomedical Science). I gave lectures on "Collaborative Research Including Collaboration with Industry" as part of PPY Responsible Conduct of Research Course.
- I have given research updates on specific topics as part of Pulmonary/Critical Care Fellow Clinical Curriculum Conference, Department of Internal Medicine at SLU.
- I have given lectures, tutorials and practical classes in general pharmacology, lectures and tutorials specializing on the pathobiology of inflammation and specialty lectures and tutorials in oxidative and nitroxidative stress in pain and inflammatory diseases to graduate students and postdoctoral fellows at the University of Florence, Rome and Catanzaro throughout the years.

MENTORING and TRAINING

- I trained 13 graduate students and 10 postdoctoral fellows while at SLU and many have moved on to jobs in academia, industry and alternative careers.
- During my tenure in the private sector I mentored and trained over 20 young scientists and trained over 30/40 senior scientists in various aspects related to drug discovery and development.
- I play an active role in mentoring young investigators nationally and internationally, over 11 during the last several years.

BIBLIOGRAPHY

Peer-Reviewed Original Research Papers (manuscripts that are in press, submitted, in review or in preparation are not listed**)**

171. Jung YH, Salmaso V, Wen Z, Bennett JM, Phung NB, Lieberman DI, Gopinatth V, Randle JCR, Chen Z, **Salvemini D**, Karcz TP, Cook DN, Jacobson KA. Structure-Activity Relationship of Heterocyclic P2y14 Receptor Antagonists: Removal of the Zwitterionic Character with Piperidine Bioisosteres. J Med Chem. 2021 Apr 22; 64(8):5099-5122.
170. Leduc-Pessah H, Xu C, Fan CY, Dalgarno R, Kohro Y, Sparanese S, Burke NN, Jacobson KA, Altier C, **Salvemini D**, Trang T. Spinal A3 Adenosine Receptor Activation Acutely Restores Morphine Antinociception in Opioid Tolerant Male Rats. J Neurosci Res. 2021 Jun 1.
169. Durante M, Squillace S, Lauro F, Giancotti LA, Coppi E, Cherchi F, Di Cesare Mannelli L, Ghelardini C, Kolar G, Wahlman C, Opejin A, Xiao C, Reitman ML, Tosh DK, Hawiger D, Jacobson KA,

Salvemini D, Adenosine A3 agonists reverse neuropathic pain via T cell-mediated production of IL-10. *J Clin Invest* 2021. PubMed PMID: 33621215.
168. DAGLα Inhibition as a Non-invasive and Translational Model of Episodic Headache.
Levine A, Liktor-Busa E, Karlage KL, Giancotti L, Salvemini D, Vanderah TW, Largent-Milnes TM.Front Pharmacol. 2021 Jan 12;11:615028. doi: 10.3389/fphar.2020.615028. eCollection 2021.PMID: 33584293
167. Farr SA, Cuzzocrea S, Esposito E, Campolo M, Niehoff ML, Doyle TM, **Salvemini D.** Adenosine A_3 receptor as a novel therapeutic target to reduce secondary events and improve neurocognitive functions following traumatic brain injury. Neuroinflammation. 2020 Nov 12;17(1):339-343.
166. Doyle TM, Hutchinson MR, Braden K, Janes K, Staikopoulos V, Chen Z, Neumann WL, Spiegel S, **Salvemini D**. Sphingosine-1-phosphate receptor subtype 1 activation in the central nervous system contributes to morphine withdrawal in rodents. J Neuroinflammation. 2020 Oct 22;17(1):314.
165. Braden K, Giancotti LA, Chen Z, DeLeon C, Latzo N, Boehm T, D'Cunha N, Thompson BM, Doyle TM, McDonald JG, Walker JK, Kolar GR, Arnatt CK, **Salvemini D**. GPR183-Oxysterol Axis in Spinal Cord Contributes to Neuropathic Pain. J Pharmacol Exp Ther. 2020. 375(2):349-357.
164. Suresh RR, Jain S, Chen Z, Tosh DK, Ma Y, Podszun MC, Rotman Y, **Salvemini D,** Jacobson KA. Design and in vivo activity of A_3 adenosine receptor agonist prodrugs. Purinergic Signal. 2020. 16(3):367-377.
163. Jung YH, Yu J, Wen Z, Salmaso V, Karcz TP, Phung NB, Chen Z, Duca S, Bennett JM, Dudas S, Salvemini D, Gao ZG, Cook DN, Jacobson KA. Exploration of Alternative Scaffolds for $P2Y_{14}$ Receptor Antagonists Containing a Biaryl Core. J Med Chem. 2020. 10;63(17):9563-9589.
162. T.M. Doyle, T.M. Largent-Milnes, Z. Chen, V. Staikopoulos, E. Esposito, R. Dalgarno, C. Fan, D.K. Tosh, S. Cuzzocrea, K.A. Jacobson, T. Trang, M.R Hutchinson, G.J. Bennett[9], T. Vanderah and D. **Salvemini.** Chronic morphine-induced changes in signaling at the A_3 adenosine receptor contribute to morphine-induced hyperalgesia, tolerance and withdrawal. J.Exp.Pharmacol. Ther. 2020. 374(2):331-341.
161. Mufti F, Jung YH, Giancotti LA, Yu J, Chen Z, Phung NB, Jacobson KA, **Salvemini D.** $P2Y_{14}$ Receptor Antagonists Reverse Chronic Neuropathic Pain in a Mouse Model. ACS Med Chem Lett. 2020 A30;11(6):1281-1286.
160. Yosten GL, Harada CM, Haddock CJ, Giancotti LA, Kolar GR, Patel R, Guo C, Chen Z, Zhang J, Doyle TM, Dickenson AH, Samson WK, **Salvemini D.** GPR160 de-orphanization reveals critical roles in neuropathic pain in rodents. J Clin Invest. 2020; 130(5):2587-2592.
159. Mufti F, Jung YH, Giancotti LA, Yu J, Chen Z, Phung N, Jacobson K, **Salvemini D.** P2Y14 Receptor Antagonists Reverse Chronic Neuropathic Pain in a Mouse Model. ACS Medicinal Chemistry Letters. 2020 (In press)
158. Stockstill K, Wahlman C, Braden K, Chen Z, Yosten GL, Tosh DK, Jacobson KA, Doyle TM, Samson WK, **Salvemini D.** Sexually dimorphic therapeutic response in bortezomib-induced neuropathic pain reveals altered pain physiology in female rodents. Pain, 161(1): 177-184 (2020).
157. Acute visceral pain relief mediated by A3AR agonists in rats: involvement of N-type voltage-gated calcium channels. Lucarini E, Coppi E, Micheli L, Parisio C, Vona A, Cherchi F, Pugliese AM, Pedata F, Failli P, Palomino S, Wahl J, Largent-Milnes TM, Vanderah TW, Tosh DK, Jacobson KA, **Salvemini D**, Ghelardini C, Di Cesare Mannelli L.Pain. 2020 May 4. Online ahead of print. PMID: 32379223.
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154. Bergamot Polyphenols Improve Dyslipidemia and Pathophysiological Features in a Mouse Model of Non-Alcoholic Fatty Liver Disease. Musolino V, Gliozzi M, Scarano F, Bosco F, Scicchitano M, Nucera S, Carresi C, Ruga S, Zito MC, Maiuolo J, Macrì R, Amodio N, Juli G, Tassone P, Mollace R, Caffrey R, Marioneaux J, Walker R, Ehrlich J, Palma E, Muscoli C, Bedossa P, **Salvemini D**, Mollace V, Sanyal AJ. Sci Rep. 2020 Feb 13;10(1):2565. doi: 10.1038/s41598-020-59485-3.

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152. Coppi E, Cherchi F, Fusco I, Failli P, Vona A, Dettori I, Gaviano L, Lucarini E, Jacobson KA, Tosh DK, **Salvemini D**., Ghelardini C, Pedata F, Di Cesare Mannelli L, Pugliese AM. Adenosine A3 receptor activation inhibits pronociceptive N-type Ca2+ currents and cell excitability in dorsal root ganglion neurons. Pain. 2019 May;160(5):1103-1118.

151. Gliozzi M, Scicchitano M, Bosco F, Musolino V, Carresi C, Scarano F, Maiuolo J, Nucera S, Maretta A, Paone S, Mollace R, Ruga S, Zito MC, Macrì R, Oppedisano F, Palma E, **Salvemini D**, Muscoli C, Mollace V. Modulation of Nitric Oxide Synthases by Oxidized LDLs: Role in Vascular Inflammation and Atherosclerosis Development. Int J Mol Sci. 2019 Jul 4;20(13):3294. PMID: 31277498.

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15. D. Salvemini and J.L. Masferrer. (1996). Interactions of nitric oxide with cyclooxygenase: in vitro, ex vivo and in vivo studies. Methods in Enzymology. Volume 269, Nitric oxide Part B Physiological and Pathological Processes, Academic Press, Inc, San Diego, CA, 12-26.
14. D. Salvemini. (1995). Nitric oxide and cyclooxygenase. The biology of nitric oxide. Enzymology, Biochemisty and Immunology. S. Moncada, M. Feelish, R. Busse, E.A. Higgs eds. Portland Press, London, UK.
13. P. Isakson, K. Seibert, J. Masferrer, **D. Salvemini,** L. Lee and P. Needleman. (1995). Discovery of a better aspirin. In “Advances in Prostaglandin, Thromboxane and Leukotriene Research” Raven Press, New York, USA, 23, 49-55.
12. D. Salvemini, K. Seibert, J.L. Masferrer, S.L. Settle, T.P. Misko, M.G. Currie and P.Needleman. (1995). Nitric oxide and the cyclooxygenase pathway. In “Advances in Prostaglandin, Thromboxane and Leukotriene Research” Raven Press, New York, USA, 23, 491-493.
11. D. Salvemini and V. Mollace. (1994). Roles of nitric oxide in the cardiovascular system and therapeutic implications of nitric oxide donors. Drug News and Perspectives, Ed. J.R. Prous Science Publisher, 3, 158-166.
10. D. Salvemini and R. Botting. (1993). Pharmacological intervention in pathophysiology of oxidant injury. Drug News and Perspectives, Ed. J. R. Prous Science Publisher. 6, 274-278.
9. D. Salvemini and R. Botting. (1993). Modulation of platelet function by free radicals and free radical scavengers. Trends In Pharmacological Sciences, 14, 36-42.
8. R.J. Gryglewski and **D. Salvemini.** (1992). Modulation of function of polymorphonuclear leukocytes by prostaglandins and nitric oxide. In “Prostacyclin: New Perspectives in Basic Research and Novel therapeutic Indications” Ed G.M. Rubanyi & J.R. Vane. Elsevier Science Publishers B.V., Amsterdam, 59-70.
7. Pistelli, E. Masini, M.G. Di Bello, P. F. Mannaioni, **D. Salvemini** and J. Vane. (1992). Influence of ageing on NO synthesis by rat serosal mast cells. In “Biology of Nitric Oxide”. Ed S. Moncada, M.A. Marletta, J.B. Hibbs, Jr and E.A. Higgs, Portland Press, London, UK. PP 35-38.
6. E. Masini, F. Gambassi, A. Pistelli, P. F. Mannaioni, **D. Salvemini** and J. Vane. (1992) The effects of nitric oxide generators on ischemia-reperfusion injury and histamine release in isolated guinea-pig

hearts. In "The Biology of Nitric Oxide". Ed S. Moncada M.A. Marletta, J.B. Hibbs, Jr and and E.A. Higgs, Portland Press, London, UK. PP 190-192.
5. P. F. Mannaioni, E. Masini, A. Pistelli, **D. Salvemini** and J. R. Vane. (1991). Rat mast cells inhibit platelet aggregation by releasing a nitric oxide-like factor: influence on histamine release. In "New Perspectives in Histamine Research". Eds Timmerman, H. and Van der Goot, H, Birhauser Verlag, Basel. 33, 423-428.
4. D. Salvemini and R. Botting. (1990). EDRF and EDRF-related substances. Drug News and Perspectives, Ed. J.R. Prous Science Publishers. 3, 506-510.
3. D. Salvemini, R. Korbut and J. R. Vane. (1990). NG-Monomethyl-L-Arginine inhibits release of a nitric-oxide like substance induced by E. Coli Lipopolysaccharide in the mouse macrophage cell line, J774. In "Biology of Nitric Oxide" Elsevier Science Publishers Ltd (UK). Ed. S. Moncada. 267-274.
2. D. Salvemini and R. Botting. (1990). The effect of free radical scavengers on platelet adhesion and aggregation. Drug News and Perspectives, Ed. J.R. Prous. J.R. Prous Science Publishers. 3, 202-212.
1. C. P. Page, S. Sanjar and **D. Salvemini**. (1986). Inflammatory mediators of asthma. Eur. J. Respir. Diseases. 168, 163-189.

BOOKS EDITED

- **Therapeutic Application of Superoxide Dismutase (SOD).** (2006) Editors. **Daniela Salvemini** and Salvatore Cuzzocrea. Landes Bioscience, Georgetown, Texas, USA.
- **Nitric Oxide and Inflammation.** (2001). **Salvemini**, Billiar and Vodovotz Editors. Birkauser Publishers Ltd, Basel, Switzerland.

INVITED SPEAKER/SYMPOSIUMS/MODERATOR- <u>Accepted Only</u>

136. University of Kentucky, September 2021
135. American Society of Neuroschemistry, Symposium Chair and Speaker, June 2020
134. John Hopkins University Blaustein Pain Grand Rounds Conferences, May 2021
133. SLU Neurology Grand Rounds, May 2021
132. American Society Pharmacology and Experimental Therapeutics at Experimental Biology, symposium speaker, May, 2021
131. University of Washington, Laura Sherd Graduate Lecture, March 2021
130. Italian Purine Club, Florence, Italy, February 2021,
129. SLU Pediatric Research Grand Rounds, January 2021
128. Next-generation pain therapeutics: from discovery to the clinic, Houston, April 2020 (Organizing Committee)
127. Pannelist Cayman Peptide XIV Conference, St Kitts, October 2020
126. University of Kentucky, September 2020
125. International Association for the Study of Pain, Amsterdam Holland, August 2020
124. Pain Mechanisms and Therapeutics, Sicily Italy, June 2020
123. SLU Grand Rounds Neurosurgery, May 2020
122. World Institute of Pain, Rome Italy, May 2020
121. University of Cincinnati May 2020
120. Next Generation Pain Therapeutics: From Discovery to the Clinic, Houston April 2020
119. Symposium Chair and Speaker, American Neurochemistry Society, St Louis, April 2020
118. GRC Glycolipid and Sphingolipid Biology, Tuscany Italy, March 2020
117. Molecular Pharmacology Gordon Research Conference, February 2020
116. Pannelist- Helping end addiction long term- understanding and addressing pain, DC, January 2020

115. SLU, Grand Rounds, Department of Neurology and Psychiatry, January 2020
114. Peripheral Neurotoxic Society, Genova, Italy May 2019
113. International Congress of Neuropathic Pain, London UK, May 2019
112. Banff Inflammation Workshop, Canada, January 2019.
111. Chair. NIH Workshop: Critical evaluation of animal pain models for therapeutics development. Bethesda. January, 2019
110. American College of Neuropsychopharmacology, December 2018, Florida, USA.
109. Cayman Peptide Conferences, October 2018, Curacao.
108. Non-opioid pain drug development Summit, September 2018, Boston, USA.
107.Pain Mechanism and Therapeutics Conference, June 2018, Taormina, Sicily, Italy.
106. American Chemistry Society. Treatment of chronic neuroapthic pain. Washington August 2017. Symposium organizer and speaker.
105. The Pharmacological Basis of Novel Pain Therapeutics – Florence, Italy, May 2017
104. Canadian Pain Meeting, Montreal May 2017
103. American Pain Society Meeting, Pittsburgh, May 2017
102. 12th World Congress on Brain Injury, New Orleans, March 2017
101. MD Anderson Anesthesiology & Neuroscience Seminar Series lecture – Houston- March 8th2017.
100. National Cancer Institute (NCI) SxQoL Steering Committee Clinical Trials Planning Meeting--- Washington- March 1, 2017
99. SLU, OBJ, Ground Rounds, February 10, 2017
98. SLU, Department of Pathology Seminar Series, December 2016
97. SIUE, October 2016
96. SLU, Department of Pharmacology and Physiology Seminar Series
95. University of Boulder Colorado, September 2016
94. Keynote Speaker. The William Harvey Research Institute, 30 Anniversary Conference, June 2016, London, UK.
93.Pain Mechanism and Therapeutics Conference, June 2016, Taormina, Sicily, Italy.
92. Oxygen Radicals Gordon Research Conference, Ventura, CA, USA. February 2016.
91. Mechanisms and Management of Cancer Treatment-Induced Neurotoxicities: Neuropathy, Fatigue, and Cognitive Impairment, Houston, TX, January 22, 2016.
90. Keynote speaker. American Physician Scientists Association Midwest Regional Meeting, Saint Louis University October 24, 2015.
89. Neuroscience 2015 Minisymposium. October. Pain and poppies: the good, the bad, and the ugly of opioid analgesics
88. World Congress of Inflammation. Symposium. Gaseous Mediators as the Basis for Novel Anti-Inflammatory Drugs. Boston, August 2015.
Advances in Pain Research: Pathophysiology and New Therapeutic Strategies, Naples, Italy. June 2015.
87. 5th International Congress on Neuropathic Pain. Symposium. Chemotherapy-induced painful neuropathy; latest perspectives. Nice, France. May 2015.
86. Hotchkiss Brain Institute, University of Calgary Canada. March 2015.
85. University of Iowa, March 2015.
83. Cancer Center Saint Louis University Lecture. December. 2014.
82. Department of Pulmonary, Critical Care and Sleep Medicine, Saint Louis University. December 2014.
81. Department of Pharmaceutical and Biomedical Sciences, University of Georgia. October 2014.
80. Symposium: The role of mitochondria in chronic pain. Symposium, APS 33rd Annual Scientific Meeting, Tampa, FL, May. 2014.
79. Symposium: Pain control by novel lipid mediators: preclinical studies on pro- and anti-inflammatory mediators. Symposium, APS 33rd Annual Scientific Meeting, Tampa, FL, May. 2014.

78. NIH/NIDDK Chemistry Interest Group Lecture. March 2014.
77. Department of Pharmacology, University of Arizona, Tucson, December 2013.
76. University of Calgary Canada. 2015.
75. Frontiers in Pain Research Lecture. Mc Gill University. 2013.
74. Department of Basic Science and Craniofacial Biology NYU College of Dentistry, May 2013.
73. Department of Anesthesiology, University of California, San Diego, February, 2013.
72. Center for Free Radical Biology and the Department of Anesthesiology, UAB, February, 12, 2013.
71. 14th World Congress on Pain, Milan, Italy, August, 2012.
70. The International Narcotics Research Conference (INRC) 2012, July 2012, Kansas City, Missouri, USA.
69. 31st Annual Scientific Meeting of the American Pain Society, May 2012, Honolulu, HI.
68. Winter Conference on Brain Research, Snowbird, Utah, USA, January, 2012. Workshop on "Glia: A nemesis in opioid use"
67. CCC-2011 NIDA Symposium on "Lipid Ligands, Receptors and TRPs" October 29th, 2011 Durham, NC.
66. Department of Pharmacology and Toxicology, Indiana University School of Medicine Indianapolis, October 11, 2011.
65. Department of Physiology and Medical Physics, Division of Physiology, Innsbruck Medical University, Innsbruck, Austria.September 2011.
64 . Counter-regulation of opioid analgesia by glial-derived bioactive sphingolipids. Workshop on "Sphingosine 1-phosphate: regulator of inflammation and pain. 7th Congress of the European Federation of IASP, Hamburg, Germany, September 2011.
63. Discovery of superoxide sparing peroxynitrite decomposition catalysts and therapeutic applications. XVI European Shock Society. August 2011.
62. Targeting superoxide and peroxynitrite in pain- a novel therapeutic approach. December 6, 2010, Graduate Center for Toxicology, University of Kentucky, College of Medicine.
61. The many faces of superoxide in pain November 8nd, 2010, Department of Pathology, Health Sciences Center School of Medicine, Saint Louis University.
60. Peroxynitrite and Opiate Induced Pain. November 2nd, 2010, Department of Chemistry & Biochemistry, Brigham Young University, Utah.
59. Forty Years of Advances in Pharamcology; A Tribute to Gustav Born and Vincenzo Cuomo. Workshop held in Torello, RC, Italy. June 2010.
58. Role of ceramide in opiate hyperalgesia and antinociceptive tolerance". Gran Cayman Pain Spring Meeting, April 17-24, 2010.
57. Discovery of the role of the ceramide metabolic pathway in central sensitization", The University of Florence, Italy, March 22, 2010.
56. Discovery of the role of superoxide-derived peroxynitite in pain. Symposium on "Reactive Oxygen and Nitrogen Species in Pain Mechanisms: 29th Annual Scientific Meeting of the American Pain Society, May 6-9, 2010, Baltimore, MD.
55. Potential use of sphingo-nitroxidative species as biomarkers in sepsis and inflammation. Symposium on "Biomarkers and risk prediction in Sepsis, Infection and Inflammation". International Pediatric Biomarker Symposium , Insbruck Austria, February 4-6, 2010.
54. Symposium: Oxidative stress and cancer. First International Meeting on "Early Cancer Detection: Environment Biomarkers and Mechanisms", Squillace, Catanzaro, Italy, May 15 to 17, 2010. Co-Chair and speaker.
53. Symposium: Oxidative stress, reactive species and antioxidants. 11th Congress on Amino Acids, Peptides and Proteins, Vienna, Austria, August 3-7th, 2009. Co-Chair and speaker.
52. Peroxynitrite as a signaling molecule in pain and morphine antinociceptive tolerance. Pharmacology & Chemical Biology Seminar Series at the University of Pittsburgh School of Medicine. November 2008, Pittsburgh, PA, USA.

51. Peroxynitrite Mediated Nitroxidative Stress: New Mechanistic Insights To the Problem of Chronic/Severe Pain. Saint Louis University Grand Rounds, September 2008.
50. From Industry to Academia: A Scientific Perspective. Washington University, St Louis, USA. July 20th, 2007.
49. Superoxide Dismutase Mimetics and Peroxynitrite Decomposition Catalysts as Adjuncts to Opiates in Pain. Society of Free Radical in Biology and Medicine Meeting, November 2007, Washington, DC, USA.
48. Reactive oxygen species in inflammatory nociception and opiate-induced tolerance. June 2007, University of Florence, Florence, Italy.
47. In memory of Sir John Vane. June 2007, Rome, Italy.
46. Oxidative and Nitrative Stress: A Painful Combination. UMSL, April, 2007, St Louis, MO. In honor of Dr W. Neuman, recipient of the 2007, St Louis American Chemistry Society Award.
45. Oxidative and nitrative stress in pain. Washington University School of Medicine, Pain Center, April 2007, St Louis, MO.
44. Symposium: Determination of cell fate. American Thoracic Society Meeting, May 2007, San Francisco, CA. Co-Chair and speaker.
43. Nitric Oxide and Nitrosative Stress in the Cardiovascular System. Semmelweis Symposium October 29-31 2006, Budapest, Hungary.
42. Oxidative/Nitrative stress and inflammation. BioScience 2006. Glasgow, Scotland.
41. Symposium: New and old players in airway inflammation to target for innovative therapeutics. ATS 2006, San Diego, May 19-24, 2006. Co-Chair and speaker.
40. The role of superoxide in inflammation and pain. 2004. GCRC (The General Clinical Research Center) seminar at Wake Forest University.
39. Symposium: Novel small molecule anti-inflammatory agents. 6th World congress on trauma, shock, inflammation and sepsis. Munich, Germany, March 2004. Co-Chair and speaker.
38. Symposium: Free Radicals and Pain. Spring Pain Research Conference. Gran Cayman. 2004. Co-Chair and speaker.
37. Oxidative stress and disease. 2003 Gordon Conference, Santa Barbara, CA.
36. Superoxide dismutase mimetics in septic shock. 32nd Critical Care Congress, San Antonio-January 2003-
35. Superoxide: a novel mediator of acute and chronic pain. Clinical trials and drug development in pain therapeutics- DC November 2002.
34. Plenary Lecture: "Therapeutic use of novel superoxide dismutase mimetics for advanced skin and kidney cancers". Oxidative Stress: Molecular Mechanisms, Diseases and Therapeutics. Washington, DC. June 2002.
33. Plenary Lecture: "Use of superoxide dismutase mimetics to attenuate nitric-oxide driven inflammation" (2001). V World Congress of Inflammation. Edimburgh, Scotland. Chair and speaker.
32. Synzymes of superoxide dismutase as anti-inflammatory agents. (2001). XVII ISHR World Congress of the International Society for Heart Research. Banff, Alberta, Canada.
31. Roles of superoxide and peroxynitrite in inflammation (2001). 2001 ASPET short Course. Orlando, FL.
30. Oxidative Stress and Pain (2001). Gordon Conference on Reactive Oxygen Species, Ventura, CA.
29. Synzymes of Superoxide Dismutase as Therapeutics. (2000). The 2nd International Conference on Superoxide Dismutases, Institut Pasteur, Paris, France.
28. Roles of superoxide anions in pain (2000). International Pain Conference, Gran Cayman, Cayman Islands.
27. Peroxynitrite Dismutase as Anti-inflammatory Agents. (2000). Gordon Conference on Reactive Oxygen Species, Ventura, CA.
26. Symposium: Nitric Oxide and Inflammation. Seventh Annual Meeting of The Oxygen Society, San Diego, USA, 2000. Chair.

25. Free radicals and the inflammatory response (1998). Third International Conference on the Biochemistry and Molecular Biology of Nitric Oxide. Los Angeles, USA.
24. Nitric oxide and cyclooxygenase. (1997). The 3rd World Congress On Inflammation, Tokyo, Japan.
23. Peroxynitrite formation and cyclooxygenase activation: key players in iNOS-mediated inflammatory events." (1997). IBC Sixth Annual Conference on Nitric Oxide: Novel Therapeutics For Clinical Application, Philadelphia, USA.
22. The role of nitric oxide and peroxynitrite in inflammation.(1996). St Louis University, St Louis, USA.
21. Nitric oxide and cyclooxygenases. (1996) workshop on: "Nitric oxide, Cytochromes P450 and Sexual Steroids Hormones", San Francisco, USA.
20. Inducible nitric oxide synthase. (1996). Anti-inflammatory Drug Discovery, Pentagon City, Arlington, VA, USA.
19. Nitric Oxide and prostaglandin biosynthesis. (1996). Symposium for the World Microcirculation Congress 96 Meeting in Munich, Germany, entitled Nitric oxide in Microcirculatory Physiology and Pathology.
18. Modulation of prostaglandin production by nitric oxide. (1996). Symposium for the Experimental Biology 96 Meeting in Washington D.C. entitled "Roles of Nitric Oxide in the Physiology and Pathophysiology of the Digestive System".
17. Cytoprotective effects of iNOS inhibitors in disease models. (1996). Anti-inflammatory drug discovery, New Brunswick, NJ, USA.
16. Roles of nitric oxide and free radicals in inflammation. (1995). School of Medicine in New Orleans, Louisiana State University Medical Center, Department of Pediatrics, New Orleans, USA.
15. Role of nitric oxide in inflammation.(1995). Fifth International Conference on Arthritis: Advances in Diagnosis and treatment. New Orleans, LA, USA.
14. Cyclooxygenase enzymes: potential receptor targets for pathophysiological roles of nitric oxide. (1994). St Louis University, St Louis, USA.
13. Prostaglandins and Nitric Oxide: New Concepts of Inflammation and Therapy.(1994). The American College Of Rheumatology, Minneapolis, Minnesota, USA.
12. Possible links between the nitric oxide synthase and cyclooxygenase pathways. (1993). New York Medical College, Valhalla, New York, USA.
11. Role of nitric oxide in the regulation of blood pressure. (1993) Eastern Hypertension Society. New York Athletic Club, New York, USA.
10. Cyclooxygenases as potential receptors for nitric oxide. (1993). University of Florence, Florence, Italy.
9. Regulation of cyclooxygenase activity by nitric oxide."(1993). Washington University, St Louis, USA.
8. Biosynthesis of nitric oxide and its importance in physiology and pathology." (1993). Northeast Missouri State University, USA.
7. Biosynthesis and actions of nitric oxide. (1992). University of Edinburgh, Department of Medicine, Edinburgh, UK.
6. The role of nitric oxide as an intercellular mediator between white blood cells, platelets and the vascular endothelium. (1992). UCLA School of Medicine, Los Angeles, CA, USA.
5. Inter-and intra-cellular roles of nitric oxide. (1992). Baylor College of Medicine, Houston, Texas, USA.
4. The role of nitric oxide in cell communication. (1991). Parke-Davis Pharmaceuticals, Ann Arbor, Michigan,.
3. New perspectives in anti-aggregating drugs. (1991). Laboratories D' Hematologie, Bordeaux Cedex, France.
2. Role of nitric oxide in physiology and pathology. (1991). National Heart and Lung Institute, Dovehouse Street, London, UK.
1.Regulation of platelet reactivity by free radicals". (1989) 3rd Interscience World conference on Inflammation. Antirheumatics, Analgesics, Immunomodulators (15-18 March 1989) Monte Carlo, Principality of Monaco.

Issued US Patents (pending not listed)

- **9,963,450:** A3 adenosine receptor agonists
- **9,150,837:** Polyethyleneglycolated superoxide dismutase mimetics
- **9,132,131:** Use of adenosine A3A receptor agonists for treatment of neuropathic pain
- **8,945,549:** Methods of treating pain
- **8,747,844:** Methods of treating pain
- **8,217,166 :** Polyethyleneglycolated superoxide dismutase mimetics
- **6,395,725:** Analgesic methods using synthetic catalysts for the dismutation of superoxide radicals
- **6,245,758:** Methods of use for peroxynitrite decompositioncatalysts pharmaceutical compositiontherefor
- **6,214,817**: Substituted pyridine pentaazamacrocycle complexes having superoxide dismutase activity
- **6,180,620**: Analgesic methods using synthetic catalysts for the dismutation of superoxide radicals

Poster communications at National and International meetings >400 - Not listed