CURRICULUM VITAE (SUMMARY)

NAME: Louis J. Ignarro **DATE OF BIRTH**: May 31, 1941

SOC. SEC. NO.: 113-34-4308 **PLACE OF BIRTH**: Brooklyn, New York

CITIZENSHIP: U.S. Citizen

MARITAL STATUS: Married to Sharon E. Williams, M.D.

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TRAINING:

Degree of B.S., Pharmacy, 1962, Columbia University, New York
Degree of Ph.D., Pharmacology, major - Physiology, minor, 1966
University of Minnesota, Minneapolis, Minnesota
Postdoctoral Fellowship, Chemical Pharmacology, N.H.I., N.I.H., 1968

POSITIONS:

Jerome J. Belzer, MD, Distinguished Professor of Pharmacology, Department of Molecular and Medical Pharmacology, UCLA School of Medicine, Los Angeles, California 90095	11/93 - present
Professor of Pharmacology and Assistant Dean for Student Research, UCLA School of Medicine, Los Angeles, California 90024	11/90 - 10/93
Professor and Acting Chairman, Department of Pharmacology, UCLA School of Medicine, Los Angeles, California 90024	07/89 - 06/90
Professor, Department of Pharmacology, UCLA School of Medicine, Los Angeles, California 90024	06/85 - present
Professor, Department of Pharmacology, Tulane University School of Medicine, New Orleans, LA 70112	01/79 - 05/85
Associate Professor, Department of Pharmacology, Tulane University School of Medicine, New Orleans, LA 70112	09/73 - 12/78
Assistant Professor, Department of Pharmacology, Tulane University School of Medicine, New Orleans, LA 70112	01/73 - 08/73
Staff Scientist, Research Department, Pharmaceutical Division CIBA-GEIGY Corporation, Ardsley, N.Y.	1968 - 1972

SOCIETY MEMBERSHIPS:

American Society for Pharmacology and Experimental Therapeutics
American Society for Biochemistry and Molecular Biology
American Physiological Society
American Society for Cell Biology
American Rheumatism Association
American Society of Hematology
Society for Experimental Biology and Medicine
American Heart Association

AWARDS:

U.S.P.H.S. CAREER DEVELOPMENT AWARD	1975 - 1980
Pharmaceutical Manufacturers Association Foundation Research Award	1973
Arthritis Foundation Research Award	1975 - 1977
First recipient of the George Clark Memorial Arthritis Fund	1975
First recipient of the James Woodrow Waggoner Arthritis Fund	1976
Tulane Medical School - Outstanding Teacher Award	1983
UCLA School of Medicine - Outstanding Teacher Award	1986
1987 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1988 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1989 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1990 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
Alpha Omega Alpha - Honorary Member - elected in 1990	
1991 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1993 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1993 UCLA School of Medicine *Award for Excellence in Education*	
1994 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1995 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
Wellcome Visiting Professor - Marshall University School of Medicine	1995
1996 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1997 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	
1999 AMSA Golden Apple Award (for teaching) - UCLA School of Medicine	

SPECIAL AWARDS:

ROUSSEL UCLAF PRIZE - 1994 - for Cell Communication and Signaling in recognition of the discovery that *"Nitric Oxide (NO), a Radical Gas, is a Biological Mediator in Mammals".*Shared with Dr. Salvador Moncada and Dr. Robert Furchgott.

CIBA Award for Hypertension Research - 1995 - for Discovery of the Roles of Nitric Oxide and Cyclic GMP in Vascular Function. Shared with Dr. Salvador Moncada.

Basic Research Prize of the American Heart Association - 1998 - in recognition of outstanding contributions to the advancement of cardiovascular science.

NOBEL PRIZE in Physiology or Medicine - 1998 - for "*nitric oxide as a signaling molecule in the cardiovascular system*". Shared with Robert Furchgott and Ferid Murad.

NATIONAL ACADEMY OF SCIENCES - 1999.

AMERICAN ACADEMY OF ARTS AND SCIENCES - 1999.

INSTITUTE OF MEDICINE – 2001.

AMERICAN PHILOSOPHICAL SOCIETY – 2007.

CANADIAN MEDAL OF MERIT – 2008.

RESEARCH RELATED ACTIVITIES:

Founder/President of : **NITRIC OXIDE Society** incorporated 1996.

Founder and Editor-In-Chief of the new scientific journal: ***NITRIC OXIDE* Biology and Chemistry** Academic Press, 1996.

Brief Summary of Research Accomplishments

Louis J. Ignarro, Ph.D.

50-WORD CITATION

Dr. Ignarro discovered that nitric oxide relaxes vascular smooth muscle, inhibits platelet aggregation, is a neurotransmitter mediating erectile function, elicits its physiological actions via cyclic GMP, activates guanylyl cyclase by heme-dependent mechanisms, and is responsible for the biological actions of nitroglycerin and endothelium-derived relaxing factor.

250-WORD STATEMENT

Dr. Ignarro's early research experience with cyclic GMP led him to make the original discovery that nitric oxide (NO) is a vasorelaxant and that its mechanism of action involves cyclic GMP. In concurrent studies, Dr. Ignarro was the first to elucidate the mechanism of vasodilator action of nitroglycerin and related nitrates and nitrites, namely, their metabolism to NO and consequent stimulation of cyclic GMP production in vascular smooth muscle. This led to his discovery that NO also inhibits platelet aggregation, accounts for the antiplatelet actions of nitro compounds and elicits this action via cyclic GMP (Dr. Ignarro directed a graduate student of Dr. Kadowitz). The discovery of the mechanism of action of nitroglycerin led to Dr. Ignarro's original observations that S-nitrosothiols were intermediates in the metabolic activation of nitroglycerin and served as potent and labile NO donors in the process. This was the first study on the biology of S-nitrosothiols, and led to their present day use as NO donor agents. Studies on the mechanism of activation of guanylyl cyclase by NO led to the original finding that NO binds to the heme prosthetic group and activates the enzyme by a protoporphyrin IX-like binding interaction. Dr. Ignarro's laboratory first showed that EDRF activates guanylyl cyclase and possesses the biological and chemical properties of NO. Knowledge of the biology and chemistry of NO led Dr. Ignarro to make the first observation that NO is a neurotransmitter mediating penile erection.

Principal Contributions to Science

1979 CA Gruetter, BK Barry, DB McNamara, DY Gruetter, PJ Kadowitz and **LJ Ignarro.** Relaxation of bovine coronary artery and activation of coronary arterial guanylate cyclase by nitric oxide, nitroprusside and a carcinogenic nitrosoamine. *J. Cyclic Nucl. Res.* 5: 211-224.

1980 **LJ Ignarro** and CA Gruetter. Requirement of thiols for activation of coronary arterial guanylate cyclase by glyceryl trinitrate and sodium nitrite: Possible involvement of S-nitrosothiols. *Biochim. Biophys. Acta* 631: 221-231.

1981 BT Mellion, **LJ Ignarro**, EH Ohlstein, EG Pontecorvo, AL Hyman and PJ Kadowitz. Evidence for the inhibitory role of guanosine 3',5'-monophosphate in ADP-induced human platelet aggregation. *Blood* 57: 946-955.

1981 **LJ Ignarro**, H Lippton, JC Edwards, WH Baricos, AL Hyman, PJ Kadowitz and CA Gruetter. Mechanism of vascular smooth muscle relaxation by organic nitrates, nitrites, nitroprusside and nitric oxide: Evidence for the involvement of S-nitrosothiols as active intermediates. *J. Pharmacol. Exp. Ther*. 218: 739-749.

1982 MS Wolin, KS Wood and **LJ Ignarro**. Guanylate cyclase from bovine lung: a kinetic analysis of the regulation of the purified soluble enzyme by protoporphyrin IX, heme and nitrosyl-heme. *J. Biol. Chem*. 257: 13312-13320.

1984 **LJ Ignarro**, B Ballot and KS Wood. Regulation of guanylate cyclase activity by porphyrins and metalloporphyrins. *J. Biol. Chem*. 259: 6201-6207.

1986 **LJ Ignarro**, RG Harbison, KS Wood and PJ Kadowitz. Activation of purified soluble guanylate cyclase by endothelium-derived relaxing factor from intrapulmonary artery and vein: stimulation by acetylcholine, bradykinin and arachidonic acid. *J. Pharmacol. Exp. Ther*. 237: 893-900.

1987 **LJ Ignarro**, RE Byrns, GM Buga and KS Wood. Endothelium-derived relaxing factor from pulmonary artery and vein possesses pharmacological and chemical properties that are identical to those for nitric oxide radical. *Circ. Res.* 61: 866-879.

1987 **LJ Ignarro**, GM Buga, KS Wood, RE Byrns and G Chaudhuri. Endothelium-derived relaxing factor produced and released from artery and vein is nitric oxide. *Proc. Natl. Acad. Sci. USA* 84: 9265-9269.

1990 **LJ Ignarro**, PA Bush, GM Buga, KS Wood, JM Fukuto and J Rajfer. Nitric oxide and cyclic GMP formation upon electrical field stimulation cause relaxation of corpus cavernosum smooth muscle. *Biochem. Biophys. Res. Commun.* 170: 843-850.

1992 J Rajfer, WJ Aronson, PA Bush, FJ Dorey and **LJ Ignarro**. Nitric oxide as a mediator of relaxation of the corpus cavernosum in response to nonadrenergic, noncholinergic neurotransmission. *N. Engl. J. Med.* 326: 90-94.

1994 JM Griscavage, JM Fukuto, Y Komori and **LJ Ignarro**. Nitric oxide inhibits neuronal nitric oxide synthase by interacting with the heme prosthetic group: role of tetrahydrobiopterin in modulating the inhibitory action of nitric oxide. *J. Biol. Chem*. 269: 21644-21649.

1994 AJ Hobbs, JM Fukuto and **LJ Ignarro**. Formation of free nitric oxide from L-arginine by nitric oxide synthase: direct enhancement of generation by superoxide dismutase. *Proc. Natl. Acad. Sci. USA* 91: 10992-10996.

1996 JM Griscavage, S Wilk and **LJ Ignarro**. Inhibitors of the proteasome pathway interfere with induction of nitric oxide synthase in macrophages by blocking activation of nuclear factor-kappa B. *Proc. Natl. Acad. Sci. USA* 93:3308-3312.

1999 HC Champion, TJ Bivalacqua, AL Hyman, **LJ Ignarro**, WJG Hellstrom and PJ Kadowitz. Gene transfer of endothelial nitric oxide synthase to the penis augments erectile responses in the aged rat. *Proc. Natl. Acad. Sci. USA* 96:11648-11652.

2001 **LJ Ignarro**, GM Buga, LH Wei, PM Bauer, G Wu and P del Soldato. Role of the arginine-nitric oxide pathway in the regulation of vascular smooth muscle cell proliferation. *Proc. Natl. Acad. Sci. USA* 98: 4202-4208.

2001 PM Bauer, GM Buga, JM Fukuto, AE Pegg and **LJ Ignarro**. Nitric oxide inhibits ornithine decarboxylase via S-nitrosylation of cysteine 360 in the active site of the enzyme. *J. Biol. Chem.* 276: 34458-34464.

2001 PM Bauer, GM Buga and **LJ Ignarro**. Role of p42/p44 mitogen-activated protein kinase and $p21^{waf1/cip1}$ in the regulation of vascular smooth muscle cell proliferation by nitric oxide. *Proc. Natl. Acad. Sci. USA* 98: 12802-12807.

2003 F de Nigris, LO Lerman, SW Ignarro, G Sica, A Lerman, W Palinski, **LJ Ignarro** and C Napoli. Beneficial effects of antioxidants and L-arginine on oxidation-sensitive gene expression and endothelial NO synthase activity at sites of disturbed shear stress. *Proc. Natl. Acad. Sci. USA* 100:1420-1425.

2003 D Sumi and **LJ Ignarro**. Estrogen-related receptor alpha 1 up-regulates endothelial nitric oxide synthase expression. *Proc. Natl. Acad. Sci. USA* 100:14451-14456.

2004 T Hayashi, D Sumi, PA Juliet, H Matsui-Hirai, Y Asai-Tanaka, H Kano, A Fukatsu, T Tsunekawa, A Miyazaki, A Iguchi and **LJ Ignarro**. Gene transfer of endothelial NO synthase, but not eNOS plus inducible NOS, regressed atherosclerosis in rabbits. *Cardiovasc. Res.* 61:339-351.

2004 C Napoli, SW Ignarro, F de Nigris, LO Lerman, L Rossi, C Guarino, G Mansueto, F Di Tuoro, O Pignalosa, G De Rosa, V Sica and **LJ Ignarro**. Long-term combined beneficial effects of physical training and metabolic treatment on atherosclerosis in hypercholesterolemic mice. *Proc. Natl. Acad. Sci. USA* 101:8797-8802.

2005 HJ Garban, D Marquez-Garban, R Pietras and **LJ Ignarro**. Rapid nitric oxide-mediated S-nitrosylation of estrogen receptor: Regulation of estrogen-dependent gene transcription. *Proc. Natl. Acad. Sci. USA* 102:2632-2636.