

Curriculum Vitae of Dr. Manoj Kumar Barthwal

Name: Dr. Manoj Kumar Barthwal
Date of Birth: 05-03-1973 (mm/dd/yyyy)
Designation: Senior Principal Scientist & Sci-in-charge
Address: Division of Pharmacology
CSIR-Central Drug Research Institute [C.D.R.I.]
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Academic Qualification: M.Sc & Ph.D (Biochemistry), Lucknow University & CDRI
Positions Held: 1. Post Doctoral Research Associate: Molecular Cardiology
Dept., Texas A&M Univ. Texas: 2000-2005
2. Scientist-Principal Scientist: CSIR-CDRI: 2006-Present
3. Visiting Scientist: Experimental Atherosclerosis Section,
NHLBI, NIH, USA: Nov 2010- Oct.2011

Area of Research: Cardiovascular, biochemical and molecular pharmacology.

Full Length Research Articles (Peer Reviewed Journals): 107

Top 50 Research Publications in the applied award area:

1. Gupta P, Sharma G, Lahiri A, Barthwal MK. FOXO3a acetylation regulates PINK1, mitophagy, inflammasome activation in murine palmitate-conditioned and diabetic macrophages. *J Leukoc Biol.* 2022 Mar;111(3):611-627.
2. Maurya M, Jaiswal A, Gupta S, Ali W, Gaikwad AN, Dikshit M, Barthwal MK. Galectin-3 S-glutathionylation regulates its effect on adipocyte insulin signaling. *Biochim Biophys Acta Mol Cell Res.* 2022 Jun;1869(6):119234.
3. Agarwal H, Sukka SR, Singh V, Dikshit M, Barthwal MK. Standardized fraction of *Xylocarpus moluccensis* inhibits inflammation by modulating MAPK-NF κ B and ROS-HIF1 α -PKM2 activation. *Inflamm Res.* 2022 Apr;71(4):423-437.
4. Maurya M, Barthwal MK. MicroRNA-99a: a potential double-edged sword targeting macrophage inflammation and metabolism. *Cell Mol Immunol.* 2021 Sep;18(9):2290-2292. doi: 10.1038/s41423-021-00745-1. Epub 2021 Aug 11.
5. Khan AA, Sundar P, Natarajan B, Gupta V, Arige V, Reddy SS, Barthwal MK, Mahapatra NR. An evolutionarily-conserved promoter allele governs HMG-CoA reductase expression in spontaneously hypertensive rat. *J Mol Cell Cardiol.* 2021 Sep;158:140-152. doi: 10.1016/j.yjmcc.2021.05.017. Epub 2021 May 31.
6. Reddy SS, Agarwal H, Jaiswal A, Jagavelu K, Dikshit M, Barthwal MK. Macrophage p47phox regulates pressure overload-induced left ventricular remodeling by modulating IL-4/STAT6/PPAR γ signaling. *Free Radic Biol Med.* 2021 May 20;168:168-179. doi: 10.1016/j.freeradbiomed.2021.03.007. Epub 2021 Mar 15.
7. Sadaf S, Nagarkoti S, Awasthi D, Singh AK, Srivastava RN, Kumar S, Barthwal MK, Dikshit M. nNOS induction and NOSIP interaction impact granulopoiesis and

- neutrophil differentiation by modulating nitric oxide generation. *Biochim Biophys Acta Mol Cell Res.* 2021 Jun;1868(7):119018. doi: 10.1016/j.bbamcr.2021.119018. Epub 2021 Mar 24.
8. Singh AK, Awasthi D, Dubey M, Nagarkoti S, Chandra T, Barthwal MK, Tripathi AK, Dikshit M. Expression of inducible NOS is indispensable for the antiproliferative and proapoptotic effect of imatinib in BCR-ABL positive cells. *J Leukoc Biol.* 2021 Nov;110(5):853-866. doi: 10.1002/JLB.1A0820-514R. Epub 2021 Feb 2.
 9. Khan AA, Agarwal H, Reddy SS, Arige V, Natarajan B, Gupta V, Kalyani A, Barthwal MK, Mahapatra NR. MicroRNA 27a Is a Key Modulator of Cholesterol Biosynthesis. *Mol Cell Biol.* 2020 Apr 13;40(9):e00470-19. doi: 10.1128/MCB.00470-19. Print 2020 Apr 13.
 10. Natarajan B, Arige V, Khan AA, Reddy SS, Barthwal MK, Mahapatra NR. Hypoxia-mediated regulation of mitochondrial transcription factors in renal epithelial cells: implications for hypertensive renal physiology. *Hypertens Res.* 2021 Feb;44(2):154-167. doi: 10.1038/s41440-020-00539-4. Epub 2020 Sep 11.
 11. Kumar A, Gupta P, Rana M, Chandra T, Dikshit M, Barthwal MK. Role of pyruvate kinase M2 in oxidized LDL-induced macrophage foam cell formation and inflammation. *J Lipid Res.* 2020 Mar;61(3):351-364. doi: 10.1194/jlr.RA119000382. Epub 2020 Jan 27.
 12. Jaiswal A, Maurya M, Maurya P, Barthwal MK. Lin28B Regulates Angiotensin II-Mediated Let-7c/miR-99a MicroRNA Formation Consequently Affecting Macrophage Polarization and Allergic Inflammation. *Inflammation.* 2020 Oct;43(5):1846-1861. doi: 10.1007/s10753-020-01258-1.
 13. Gupta P, Kumar A, Pal S, Kumar S, Lahiri A, Kumaravelu J, Chattopadhyay N, Dikshit M, Barthwal MK. Standardized *Xylocarpus moluccensis* fruit fraction mitigates collagen-induced arthritis in mice by regulating immune response. *J Pharm Pharmacol.* 2020 Apr;72(4):619-632. doi: 10.1111/jphp.13231. Epub 2020 Feb 9.
 14. Sadaf S, Awasthi D, Singh AK, Nagarkoti S, Kumar S, Barthwal MK, Dikshit M. Pyroptotic and apoptotic cell death in iNOS and nNOS overexpressing K562 cells: A mechanistic insight. *Biochem Pharmacol.* 2020 Jun;176:113779. doi: 10.1016/j.bcp.2019.113779. Epub 2019 Dec 25.
 15. Gupta P, Barthwal MK. IL-1 β genesis: the art of regulating the regulator. *Cell Mol Immunol.* 2018 Nov;15(11):998-1000. doi: 10.1038/s41423-018-0054-7. Epub 2018 Jun 19.
 16. Sadaf S, Singh AK, Awasthi D, Nagarkoti S, Agrahari AK, Srivastava RN, Jagavelu K, Kumar S, Barthwal MK, Dikshit M. Augmentation of iNOS expression in myeloid progenitor cells expedites neutrophil differentiation. *J Leukoc Biol.* 2019 Aug;106(2):397-412. doi: 10.1002/JLB.1A0918-349RR. Epub 2019 Mar 12.
 17. Jaiswal A, Reddy SS, Maurya M, Maurya P, Barthwal MK. MicroRNA-99a mimics inhibit M1 macrophage phenotype and adipose tissue inflammation by targeting TNF α . *Cell Mol Immunol.* 2019 May;16(5):495-507. doi: 10.1038/s41423-018-0038-7. Epub 2018 May 30.
 18. Misra A, Prakash P, Aggarwal H, Dhankani P, Kumar S, Pandey CP, Pugh N, Bihan D, Barthwal MK, Farndale RW, Dikshit DK, Dikshit M. Anti-thrombotic efficacy

- of S007-867: Pre-clinical evaluation in experimental models of thrombosis in vivo and in vitro. *Biochem Pharmacol.* 2018 Feb;148:288-297. doi: 10.1016/j.bcp.2018.01.013. Epub 2018 Jan 5.
19. Jachak GR, Athawale PR, Agarwal H, Barthwal MK, Lauro G, Bifulco G, Reddy DS. Total synthesis of the potent anti-inflammatory natural product solomonamide A along with structural revision and biological activity evaluation. *Org Biomol Chem.* 2018 Dec 5;16(47):9138-9142. doi: 10.1039/c8ob02713g.
 20. Reddy SS, Agarwal H, Barthwal MK. Cilostazol ameliorates heart failure with preserved ejection fraction and diastolic dysfunction in obese and non-obese hypertensive mice. *J Mol Cell Cardiol.* 2018 Oct;123:46-57. doi: 10.1016/j.yjmcc.2018.08.017. Epub 2018
 21. Anzinger JJ, Jin X, Palmer CS, Dagur P, Barthwal MK, Kruth HS. Measurement of Aortic Cell Fluid-Phase Pinocytosis in vivo by Flow Cytometry. *J Vasc Res.* 2017;54(4):195-199. doi: 10.1159/000475934. Epub 2017 Jun 16.
 22. Misra A, Anil Kumar KS, Jain M, Bajaj K, Shandilya S, Srivastava S, Shukla P, Barthwal MK, Dikshit M, Dikshit DK. Synthesis and evaluation of dual antiplatelet activity of bispidine derivatives of N-substituted pyroglutamic acids. *Eur J Med Chem.* 2016 Mar 3;110:1-12. doi: 10.1016/j.ejmech.2016.01.019. Epub 2016 Jan 18.
 23. Jain M, Surin WR, Misra A, Prakash P, Singh V, Khanna V, Kumar S, Siddiqui HH, Raj K, Barthwal MK, Dikshit M. Antithrombotic activity of a newly synthesized coumarin derivative 3-(5-hydroxy-2,2-dimethyl-chroman-6-yl)-N-{2-[3-(5-hydroxy-2,2-dimethyl-chroman-6-yl)-propionylamino]-ethyl}-propionamide. *Chem Biol Drug Des.* 2013 Apr;81(4):499-508. doi: 10.1111/cbdd.12000.
 24. Tiwari RL, Singh V, Singh A, Rana M, Verma A, Kothari N, Kohli M, Bogra J, Dikshit M, Barthwal MK. PKC δ -IRAK1 axis regulates oxidized LDL-induced IL-1 β production in monocytes. *J Lipid Res.* 2014 Jul;55(7):1226-44. doi: 10.1194/jlr.M045658. Epub 2014 May 2.
 25. Kanshana JS, Rebello SC, Pathak P, Kanuri BN, Aggarwal H, Srivastava V, Khanna V, Singh V, Jagavelu K, Barthwal MK, Dikshit M. Standardized fraction of *Xylocarpus moluccensis* fruits improve vascular relaxation and plaque stability in dyslipidemic models of atherosclerosis. *J Ethnopharmacol.* 2018 Mar 1;213:81-91. doi: 10.1016/j.jep.2017.11.004. Epub 2017 Nov 10.
 26. Dubey M, Singh AK, Awasthi D, Nagarkoti S, Kumar S, Ali W, Chandra T, Kumar V, Barthwal MK, Jagavelu K, Sánchez-Gómez FJ, Lamas S, Dikshit M. L-Plastin S-glutathionylation promotes reduced binding to β -actin and affects neutrophil functions. *Free Radic Biol Med.* 2015 Sep;86:1-15. doi: 10.1016/j.freeradbiomed.2015.04.008. Epub 2015 Apr 14.
 27. Awasthi D, Nagarkoti S, Kumar A, Dubey M, Singh AK, Pathak P, Chandra T, Barthwal MK, Dikshit M. Oxidized LDL induced extracellular trap formation in human neutrophils via TLR-PKC-IRAK-MAPK and NADPH-oxidase activation. *Free Radic Biol Med.* 2016 Apr;93:190-203. doi: 10.1016/j.freeradbiomed.2016.01.004. Epub 2016 Jan 14.
 28. Reddy SS, Chauhan P, Maurya P, Saini D, Yadav PP, Barthwal MK. Coagulin-L ameliorates TLR4 induced oxidative damage and immune response by regulating

- mitochondria and NOX-derived ROS. *Toxicol Appl Pharmacol*. 2016 Oct 15;309:87-100. doi: 10.1016/j.taap.2016.08.022. Epub 2016 Aug 26.
29. Singh A, Singh V, Tiwari RL, Chandra T, Kumar A, Dikshit M, Barthwal MK. The IRAK-ERK-p67phox-Nox-2 axis mediates TLR4, 2-induced ROS production for IL-1 β transcription and processing in monocytes. *Cell Mol Immunol*. 2016 Nov;13(6):745-763. doi: 10.1038/cmi.2015.62. Epub 2015 Aug 31.
 30. Singh V, Jain M, Misra A, Khanna V, Prakash P, Malasoni R, Dwivedi AK, Dikshit M, Barthwal MK. Curcuma oil ameliorates insulin resistance & associated thrombotic complications in hamster & rat. *Indian J Med Res*. 2015 Jun;141(6):823-32. doi: 10.4103/0971-5916.160719.
 31. Rana M, Maurya P, Reddy SS, Singh V, Ahmad H, Dwivedi AK, Dikshit M, Barthwal MK. A Standardized Chemically Modified Curcuma longa Extract Modulates IRAK-MAPK Signaling in Inflammation and Potentiates Cytotoxicity. *Front Pharmacol*. 2016 Jul 25;7:223. doi: 10.3389/fphar.2016.00223. eCollection 2016. PMID: 27504095 Free PMC article.
 32. Rana M, Kumar A, Tiwari RL, Singh V, Chandra T, Dikshit M, Barthwal MK. IRAK regulates macrophage foam cell formation by modulating genes involved in cholesterol uptake and efflux. *Bioessays*. 2016 Jul;38(7):591-604. doi: 10.1002/bies.201600085. Epub 2016 Jun 8. PMID: 27270491
 33. Singh V, Jain M, Misra A, Khanna V, Rana M, Prakash P, Malasoni R, Dwivedi AK, Dikshit M, Barthwal MK. Curcuma oil ameliorates hyperlipidaemia and associated deleterious effects in golden Syrian hamsters. *Br J Nutr*. 2013 Aug 28;110(3):437-46. doi: 10.1017/S0007114512005363. Epub 2013 May 15.
 34. Jain M, Singh A, Singh V, Maurya P, Barthwal MK. Gingerol Inhibits Serum-Induced Vascular Smooth Muscle Cell Proliferation and Injury-Induced Neointimal Hyperplasia by Suppressing p38 MAPK Activation. *J Cardiovasc Pharmacol Ther*. 2016 Mar;21(2):187-200. doi: 10.1177/1074248415598003. Epub 2015 Aug 3.
 35. Barthwal MK, Anzinger JJ, Xu Q, Bohnacker T, Wymann MP, Kruth HS. Fluid-phase pinocytosis of native low density lipoprotein promotes murine M-CSF differentiated macrophage foam cell formation. *PLoS One*. 2013;8(3):e58054. doi: 10.1371/journal.pone.0058054. Epub 2013 Mar 11.
 36. Jain M, Singh A, Singh V, Barthwal MK. Involvement of interleukin-1 receptor-associated kinase-1 in vascular smooth muscle cell proliferation and neointimal formation after rat carotid injury. *Arterioscler Thromb Vasc Biol*. 2015 Jun;35(6):1445-55. doi: 10.1161/ATVBAHA.114.305028. Epub 2015 Apr 23.
 37. Rana M, Reddy SS, Maurya P, Singh V, Chaturvedi S, Kaur K, Agarwal H, Ahmad H, Naqvi A, Dwivedi AK, Dikshit M, Barthwal MK. Turmerone enriched standardized Curcuma longa extract alleviates LPS induced inflammation and cytokine production by regulating TLR4-IRAK1-ROS-MAPK-NF κ B axis. *Journal of Functional Foods* 2015, (16), 152-163.
 38. Singh V, Rana M, Jain M, Singh N, Naqvi A, Malasoni R, Dwivedi AK, Dikshit M, Barthwal MK. Curcuma oil attenuates accelerated atherosclerosis and macrophage foam-cell formation by modulating genes involved in plaque stability, lipid homeostasis and inflammation. *Br J Nutr*. 2015 Jan 14;113(1):100-13. doi: 10.1017/S0007114514003195. Epub 2014 Nov 13.

39. Jyoti A, Singh AK, Dubey M, Kumar S, Saluja R, Keshari RS, Verma A, Chandra T, Kumar A, Bajpai VK, Barthwal MK, Dikshit M. Interaction of inducible nitric oxide synthase with rac2 regulates reactive oxygen and nitrogen species generation in the human neutrophil phagosomes: implication in microbial killing. *Antioxid Redox Signal*. 2014 Jan 20;20(3):417-31. doi: 10.1089/ars.2012.4970. Epub 2013 Sep 17.
40. Singh V, Tiwari RL, Dikshit M, Barthwal MK. Models to study atherosclerosis: a mechanistic insight. *Curr Vasc Pharmacol*. 2009 Jan;7(1):75-109. doi: 10.2174/157016109787354097.
41. Tiwari RL, Singh V, Barthwal MK. Macrophages: an elusive yet emerging therapeutic target of atherosclerosis. *Med Res Rev*. 2008 Jul;28(4):483-544. doi: 10.1002/med.20118.
42. Tiwari RL, Singh V, Singh A, Barthwal MK. IL-1R-associated kinase-1 mediates protein kinase C δ -induced IL-1 β production in monocytes. *J Immunol*. 2011 Sep 1;187(5):2632-45. doi: 10.4049/jimmunol.1002526. Epub 2011 Jul 29.
43. Kothari N, Keshari RS, Bogra J, Kohli M, Abbas H, Malik A, Dikshit M, Barthwal MK. Increased myeloperoxidase enzyme activity in plasma is an indicator of inflammation and onset of sepsis. *J Crit Care*. 2011 Aug;26(4):435.e1-7. doi: 10.1016/j.jcrc.2010.09.001. Epub 2010 Oct 30.
44. Singh V, Jain M, Prakash P, Misra A, Khanna V, Tiwari RL, Keshari RS, Singh S, Dikshit M, Barthwal MK. A time course study on prothrombotic parameters and their modulation by anti-platelet drugs in hyperlipidemic hamsters. *J Physiol Biochem*. 2011 Jun;67(2):205-16. doi: 10.1007/s13105-010-0065-z. Epub 2011 Feb 1.
45. Mishra R, Barthwal MK, Sondarva G, Rana B, Wong L, Chatterjee M, Woodgett JR, Rana A. Glycogen synthase kinase-3 β induces neuronal cell death via direct phosphorylation of mixed lineage kinase 3. *J Biol Chem*. 2007 Oct 19;282(42):30393-405. doi: 10.1074/jbc.M705895200. Epub 2007 Aug 21.
46. Barthwal MK, Srivastava N, Dikshit M. Role of nitric oxide in a progressive neurodegeneration model of Parkinson's disease in the rat. *Redox Rep*. 2001;6(5):297-302. doi: 10.1179/135100001101536436.
47. Sathyanarayana P, Barthwal MK, Kundu CN, Lane ME, Bergmann A, Tzivion G, Rana A. Activation of the Drosophila MLK by ceramide reveals TNF- α and ceramide as agonists of mammalian MLK3. *Mol Cell*. 2002 Dec;10(6):1527-33. doi: 10.1016/s1097-2765(02)00734-7.
48. Barthwal MK, Sathyanarayana P, Kundu CN, Rana B, Pradeep A, Sharma C, Woodgett JR, Rana A. Negative regulation of mixed lineage kinase 3 by protein kinase B/AKT leads to cell survival. *J Biol Chem*. 2003 Feb 7;278(6):3897-902. doi: 10.1074/jbc.M211598200. Epub 2002 Nov 27.
49. Barthwal MK, Srivastava N, Shukla R, Nag D, Seth PK, Srimal RC, Dikshit M. Polymorphonuclear leukocyte nitrite content and antioxidant enzymes in Parkinson's disease patients. *Acta Neurol Scand*. 1999 Nov;100(5):300-4. doi: 10.1111/j.1600-0404.1999.tb00400.x.
50. Barthwal MK, Srivastava N, Nag D, Seth PK, Srimal RC, Dikshit M. Antioxidant levels in the rat brain after nitric oxide synthase inhibition: a preliminary report. *Redox Rep*. 2000;5(2-3):75-80. doi: 10.1179/135100000101535456.

Patents:**Patents Granted:**

Title: Chiral 3-aminomethylpiperidine derivative as inhibitors of collagen induced platelet activation and adhesion.

Inventors: Dikshit DK, Dikshit MD, , Irshad T, Siddiqui, Kumar A, Bhatta R, Jain GK, Barthwal MK, Misra A, Khanna V, Prakash P, Jain M, Singh V, Gupta V & Dwivedi AK.

US Patent Granted: US9206155B2/Dec8, 2015

Patents Filed:

Title: A novel chemically modified bioactive fraction from *Curcuma longa* [NCCL] for management of CVS and CNS disorders.

Inventors: Dwivedi AK, Naqvi A, Malasoni R, Rana M, Pandey RR, Srivastava A, Manhas A, Jagavelu K, Barthwal MK and Ram Pratap. 1940/DEL/2014

2) Title: Pyranone fused Aza-heterocyclic fluorescent dyes useful fluorescent probes.

Inventors: Goel A, Raghuvanshi A, Jha AK, Dogra S, Yadav PN, Jaiswal A, Barthwal MK, 23/Dec/2015, 4242DEL2015.

Technology developed and transferred:

1) A novel small molecule antiplatelet compound S007-867 (2021-2022): Transferred to MARC Laboratories Pvt. Ltd., Lucknow.

Role: Involved in the pre-clinical development of the technology. Animal pre-clinical model studies and safety studies.

2) Technology development team member for technology entitled: "Development of synthetic endoperoxide antimalarials as substitute to artemisinin derivatives".

Role: Contributed by doing regulatory respiratory pharmacology work. Team CDRI also received the award for the technology (Technology Award for Innovation 2009) from Council of scientific and industrial research. The technology was transferred to Ipca Laboratories Ltd Mumbai.

3) Technology development team member for the technology entitled: standardized fraction 219C002 for treatment of Glucocorticoid Induced Osteoporosis.

Role: Contributed by doing regulatory respiratory pharmacology work. The technology was transferred to Pharmanza Herbal in 2020.

Books:

Sl. No	Editors	Title of the chapter	Year of Pub.	Title of Book	Country	Edition No.	Publisher
	Dr. Madhu Dikshit Contributor: Dr. Manoj K Barthwal	Modern Drug Discovery and Development: Diabetes and lifestyle disorders. Part IV Indian Academia Tryst with Cardio-metabolic Drug Discovery and Development	2021	Drug Discovery and Drug Development - The Indian Narrative	India	1	Springer
1	Dr. A Ray and Dr. K. Gulati	Advancements in the New Anti-thrombotic Drug Development (130-183) by Prakash, P., Surin, W.R., Barthwal, M.K. , Dikshit, M	2010	Recent Advances in Herbal Drug Research and Development	India	1	I.K. International Publishing House Pvt. Ltd, pp

Completed & ongoing major extramural research projects:

S.No	Name of Project	Funding agency	Role	Year
1	Identification and elucidation of novel signaling pathways involved in monocyte/macrophage activation, migration, differentiation, proliferation and death during dyslipidemia and atherosclerosis	DST	PI	2007-10
2	THUNDER (Towards holistic understanding of cardiometabolic diseases)	CSIR	PI	2012-15
3	Exploration of Interleukin 1 Receptor Associated Kinase (IRAK) family of kinases during macrophage foam cell formation and inflammation	DBT	PI	2015-18

4	Role of Autophagy in Vascular Smooth Muscle Cell Remodelling and Phenotype	DST	PI	2017-20
5	Biological Evaluations, Discovery of novel bioactive compounds: Development of potential drugs from the sea	MOES	PI	2017-20
6	Development of Small Molecule Inhibitor of PCSK-9, a new target for LDL receptor and atherosclerotic cardiovascular disease	BIRAC PACE	PI	2020-21
7	Apelin-ACE2 axis fate in hypertension and macrophage syndrome as complications in COVID-19: focus on gender, age and comorbidities.	DBT Indo-Swiss	PI	2021-25

Invited Reviews/Commentaries:

1. Maurya M, Barthwal MK. MicroRNA-99a: a potential double-edged sword targeting macrophage inflammation and metabolism. Cell Mol Immunol. 2021 Sep;18(9):2290-2292. doi: 10.1038/s41423-021-00745-1. Epub 2021 Aug 11.

2. Gupta P, Barthwal MK. IL-1 β genesis: the art of regulating the regulator. Cell Mol Immunol. 2018 Jun 19. Doi: 10.1038/s41423-018-0054-7

3. Singh V and Barthwal MK. Beyond Curcumin: Anti-atherosclerotic Effect of Turmeric Jan 2016. Invited commentary at official website of international atherosclerosis society – <http://www.athero.org/>.

4. Macrophage Foam Cell Formation in Atherosclerosis: The Road Ahead (by M.K. Barthwal), April 29, 2009. Invited commentary at official website of international atherosclerosis society – <http://www.athero.org/>.

Awards, Recognition & Membership:

2007- DST-Fast Track Young Investigator Grant Award – Identification and elucidation of novel signaling pathways involved in monocyte/macrophage activation, migration, differentiation, proliferation and death during dyslipidemia and atherosclerosis

2009 – Travel Award for Attending “XV International Symposium on Atherosclerosis at Boston, USA, June 14-18, 2009. Awarding Agency – DST, India

2009- International Atherosclerosis Society Visiting Fellowship award. Award given by International Atherosclerosis Society

2009- Technology Award for Innovation 2009. Team Member of the ‘Team CDRI’ that received the award for “Development of synthetic endoperoxide antimalarials as

substitute to artemisinin derivatives” given by Council of scientific and industrial research

2010 – Indo US Science and Technology Forum (IUSSTF) Fellowship Award Research Fellowship award given by Indo-US Science and Technology Forum for NHLBI,NIH,USA

2008, 2010, 2012, 2015, 2018 – CDRI Paper Incentive award: For publishing a paper in high impact factor of around 6.

2020- International Fellowship: Fellow of International Academy of Cardiovascular Sciences (FIACS) by International Academy of Cardiovascular Sciences 2020.

2021- Indo-Swiss international grant by DBT: Sanctioned project (Swiss National Science Foundation (SNSF) and the Department of Biotechnology (DBT)) with Dr. Marie-noelle Giraud, Cardiology, Department of Medicine, University of Fribourg, under the Indo-Swiss Joint Research Programme (ISJRP) (2021-2025). Project entitled: Apelin-ACE2 axis fate in hypertension and macrophage syndrome as complications in COVID-19: focus on gender, age and comorbidities.

Fellowship:

International Fellowship: Fellow of International Academy of Cardiovascular Sciences (FIACS) by International Academy of Cardiovascular Sciences 2020.

Editorial board by invitation:

On Editorial board of nature publishing journal Cellular and Molecular Immunology (IF 24), which achieved the #6 rank among 161 journals in the immunology field globally in 2022.