

Name : AKSHAY ANAND, *PhD, D.Sc, FIAN*

Designation : *Professor (since 2016)*
Prof. Incharge, CCRYN Collaborative Center
for Mind Body Intervention through Yoga
PGIMER, Chandigarh
Editor in Chief, Annals of Neurosciences,
Editor in Chief, Intgr Med Case Rep
Former EIC, Integr Med Int
Visiting Prof, KPUM, Japan
Visiting Distinguished Prof, S-VYASA
Adjunct Professor, Philosophy, Panjab Univ
Former Visiting Prof, LUEENU, Lutsk
Former Scientist, SSIAR, Bangalore
Former Scientist, Univ of Kentucky



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Educational Qualification : MSc (Biotechnology); BCCYE, PhD, D.Sc (Yoga)

Age etc : 50+, QCI Level 1 Yoga Instructor

General Temperament : Students before 'self'

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All research claims, publications, patents, editorial assignments, awards, lab resources, mentoring activities, academic social activities and Quality Assurance programs are either linked to extramural grants or are voluntary

Awards & Honors: DSc (Yoga) from SVYASA Bengaluru (2022), Advisory Board Member, Centre for Consciousness, Cognition and Compassion, Harvard University, Boston, USA, Padma Nomination by UT administration (2020), Honour by UT Police (2019) for exemplary work in advancement of Yoga research, Awarded by Panjab University Alumni Association for Stellar contribution to the field of Neuroscience-2019, Dr. Keshav Baliram Hedgewar Healing Award (2021), ICMR Amrut Modi Unichem Award (2012), 9th International Prestigious Sardar Patel Award (2014), Quality Council of India Award (2014, 2016), DAE Young Scientist Award (2005), ICMR Shakuntala Amir Chand Award (2010), NASI Scopus Award Runner up (2012) and Retina Research Foundation / Joseph M. and Eula C. Lawrence Award (2003), Skoch Order-of Merit award for *Swachh Bharat Abhiyan-2016*, *Bharat Nirman Award* (2017) for Clean India campaign from Ministry of Science and Technology.

Area of interest: CELL SURVIVAL MECHANISMS, using Integrated approach like Animal models, Biomarker Analysis, Mind-Body Techniques (Yoga) Biotherapeutics (by employing Quality Assurance Tools)

Highlights : Implementation of GLP, establishment of liberally funded, equipped NRL lab, EIC of 2 major Journals, on educational, research, editorial and policy programs in more than **30** countries,

supervised **15** PhD thesis, **28** grants and **231** publications (**203** as corresponding), **34** publications in the field of Policy Research, **4** patents filed, most alumni well settled globally, **14** National Awards, mentored **20** National Educational programs/workshops, QCI Level 1 Yoga certification

Profile

23 years of post-doctoral experience; strong track record of understanding research and neuroscience communication drivers, grant dynamics, quality research management and teaching; capacity to exploit *invitro*, *invivo*, electrophysiological Integrative and behavioral approaches; replete with entrepreneurial skills and **student centric approach**.

Overview

Akshay Anand graduated from Post Graduate Institute of Medical Education and Research (PGIMER). After obtaining his post-doctoral training at the same Institute, **he joined the University of Kentucky as Scientist II**. After serving there for two years, he returned to join faculty of Department of Neurology PGIMER. He was instrumental in setting up the Neuroscience Research Lab which is compliant to GLP principles. He is a strong advocate of science entrepreneurship and integrative health programs. Dr Anand is a research improvement specialist who is interested in understanding the molecular mechanisms of neurodegeneration utilizing *invitro*, *invivo*, alternative and biotherapeutic approaches. His other research interests range from analysing the role of genetic and other risk factors that modify ALS and AMD to screening of novel drugs and Yoga modules for memory enhancement and wellness. He has also been involved in the discovery of animal model of AMD published in **Nature Medicine**. Dr Anand was nominated for prestigious Padma Award, 2020, DSc (Yoga) by SVYASA, Bengaluru (2022) besides being honoured by UT Police for exemplary work in advancement of Yoga research. He has been awarded for *ICMR Amrut Mody Unichem Prize-2012*, *Annual PGI faculty award-2013, 2014*, *Sardar Vallabhbhai Patel Foundation 9th International Prestigious Sardar Patel Award, 2014*, *ICMR Shankuntla Amir Chand Award (2010)*, *Dr. Keshav Baliram Hedgewar Healing Award (2021)*, *Young Scientist Award from DAE (2005)*, *Retina Research Foundation / Joseph M. and Eula C. Lawrence Award (2003)*, *Runners up for NASI Scopus Award for Biological Sciences (2012)*, *served as Judge at ISEF, USA (2002-3)*, *obtained over 2 dozen International travel awards besides mentoring his PhD students to lead the Swacch Bharat campaign for which the team was awarded the Bharat Nirman Award in the Behavioral change category by Ministry of Science and Technology (IISF, 2017)*. He is the **Editor in Chief** of *Annals of Neurosciences* the official journal of Indian Academy of Neurosciences and *Journal of Integrative Medicine Case Reports (IMCR)*, the official Journal of *Swami Paramhansa Samsthana*, former EIC of Integrative Medicine International, the official journal of Karger besides serving on Editorial board of *Nature Scientific Reports* and *Neuroepidemiology*. He is also Reviews Editor of *Frontiers in Behavioral Neurosciences* and on Editorial Advisory Board, *User-Driven Healthcare and Narrative Medicine: Utilizing Collaborative Social Networks and Technologies* and other International Journals. Dr Anand is the guest faculty in the Human genomics program of Panjab University and former advisor to the local chapter of Indian Muscular Dystrophy Association. **He has over 231 publications (203 as corresponding author)** in International peer reviewed Journals besides filing 4 patent applications. He was also designated Expert on Mission by ICGEB, Trieste for Intellectual property and is the resource faculty for various national and International forums and academic and regulatory committees. He serves as **Visiting Professor** of Kyoto University of Medicine and Visiting Distinguished Professor in *Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA)* and earlier served with Lesya Ukrainian Eastern European National University, Lutsk and Sri Sri Institute of Advanced Research, Bengaluru as its Visiting Scientist. He has continued to remain funded for research since he joined as faculty with an average availability of 2-3 grants at any time.

Inside Resume

Animal Model of AMD and Human validation: Dr Anand *et al* described the transgenic animal model of Age Related Macular Degeneration (AMD) in CCl2^{-/-} and CCr2^{-/-} mice (***Nature Medicine* 2003 and 2004**) {**citation 716**}. This set him to develop understanding of the mechanisms of cell survival and related markers in degenerative disorders after he returned home (Home coming, ***Ann Neuro* 2017**). For this, he set up a Quality Assurance based Research Lab in PGIMER (GLP compliant) which he developed in 5-6 years, exclusively from extramural funds, including Member of Parliament Local Area Development Scheme (**MPLADS**) (<https://www.youtube.com/watch?v=FJatmJM8Ktl>)-**ASK FOR PASSWORDS**

As a logical follow up, Dr. Anand collaborated with Ophthalmologists to screen Ccl2 and CCr2 SNPs/biomarkers by recruiting Indian AMD patients. This data supported the macrophage scavenging impairment theory in AMD (**DAE YRSA Award, DST grant**), earlier postulated in above said **Nature Medicine** paper (***PLoS One, 2012 {citation 33}, 2013(Cited in PUBLIC HEALTH) Curr Neuro Res {citation 25}, 2012, DNA cell Biology, 2012{citation 28, 1 cited in NATURE} and Gene, 2013{citation 21}***}), paving way for investigating additional missing links in Genetics of AMD from India (SLC 16A8, IER 3 etc) (***Front Ageing Neurosci 2016***){**DBT funded**} including gene networks (**Genomics 2020**) in association with sleep and response to anti VEGF therapy (***PLoS One, Sci Reports***). A POC device and several patent applications have been filed related to these studies. The 27 MLPA based Neurogenetic tests launched by him for poor patients, with implications for female carriers (***Ann Neuros 2016***), included AMD, with a mission to Internationalize the services.

He is also on a research mission to examine the efficacy of lifestyle intervention (Yoga and Naturopathy) in the conversion of pre-disease states into fully blown disease using the leads from his molecular investigations (**ask for another version of CV**)

Degeneration and Neurovascular network? Dr Anand and his team has been actively searching for new biomarkers of disease prediction, cell survival and burden, utilizing statistical (***PLOS one, 2018***) and molecular tools, analyzing CSF and blood from various Neurodegenerative disorders like PD, ALS and AMD phenotypes (***J Neurol Sci 2012***). The **ICMR funded project** revealed elevated levels of VEGF, sflt and CCl2 (and SNPs) in ALS patients postulating these to be involved in extending their mean survival time (***Muscle Nerve 2020, PLoS One, 2012, Curr Neuro Res, 2012, J of Neuro, 2011***) and might predict survival through patient CSF based *invitro* assay (**ICMR funded**). This discovery was also featured in **ALSTD** <https://www.youtube.com/watch?v=KQ4cwq7qEU>

A frontline JNNP (Journal of Neurology Neurosurgery and Psychiatry) editorial has profiled Dr Anand's work on PARK 2 mutations (***JNNP 2010***). Another recently completed human study examined the effect of dystrophin gene in cognitive deficits among DMD/BMD patients using computational modelling (**DAE funded**) (***Curr Genomics, 2019 Scientific Reports 2020***)

Can Stem Cells be useful in Retinal/CNS regeneration and function: Dr Anand and his team established animal models of neuronal/retinal injury so that the herbal extracts and various sources of stem cells could be compared with current therapies to describe the molecular and neurobehavioral changes based on comparative effectiveness (***Psychopharmacology 2008, {citation 61}***). These animal models can be used by Indian and SAARC industries for drug development, biotherapeutic screening, skill development and toxicity testing, acting **as an International resource**, exploiting its Quality assurance program.

Following the leads, Dr. Anand, therefore, tested the role of enriched lineage negative BMSCs in the laser injured mouse retina and described its migration to the damaged site in a dose dependent manner with superior mobilization by Intravenous (IV) route. This was also tested in the PPA & NMDA induced RGC injury mouse model (**DST, ICMR funded, *Mol Cell Biochem, 2017, J Cell Biochem 2016***). Dr Anand and his team have demonstrated that BMSCs survive upto 21 days post IV transplantation by

the intravenous route (**Stem cell Dev (PGI faculty award), 2012 {citation 20}**) and those derived from human cord derived lineage stem cells rescue memory deficits by upregulation of BDNF and CREB (**Behav Brain Res 2015**){DBT funded}. A patent application claiming to be a novel biological agent, has been recently published in 2021. Some of these discoveries are being followed up and being examined via Yoga based intervention in healthy volunteers by intervention of Common AYUSH Yoga protocol (**SATYAM-DST funded, Explore 2020, Frontiers in Public Health 2022**). The effects appear to be mediated by angiogenic and neurogenic pathway. A patent application claims to develop an electronic device which will broadcast unique customized Yoga protocol using augmented reality based on user interface, compensating for deficiency of trainers.

Parallel cell culture analysis has revealed that the *Jagged, Notch and Wnt* are directly involved in formation of neurospheres at 6 days after culture of CE cells (derived from aborted fetuses) (**ICMR funded study; Curr Neuro Res 2013, in collaboration with Iqbal Ahmad, UNMC, Omaha**). Dr Anand has reported the regeneration promoting effects of these cells as superior to hUCB derived Lineage neg cells which were sub-retinally delivered in laser injured retina by analyzing ERG changes (**DST funded, Cell Trans 2020**) as well in animal model of *Abeta* induced memory loss (**DBT funded, Molecular Neurobiology 2019**)

Multinational Thought Leadership: Continuing his focus on Neurodegenerative Disorders, a frontline international review of multinational authors was published in **Journal of Alzheimer's Disease (AD)** highlighting the roadblocks and solutions to Alzheimer's Disease and advocating a multidisciplinary approach by use of Quality Assurance approach (**J Alzheimers Dis.**) because most of the Phase 3 AD clinical trials have failed. Several other multinational author publications have been profiled below as evidence of the capacity for interdisciplinary team work and writing projects.

Modern evidence for Traditional Medicine: In absence of success of clinical trials for Neurological disorders, Dr. Anand and his team experimented with **Brahmi** (*B. monniera*) showing that it reversed memory loss via CREB pathway using a series of amnesic agents, Morris water maze and neurochemical analysis (**ICMR Award, editorial Mint June 2, 2015 'Memory and Ageing Brain'**) (**Psychopharmacology 2008, Neuroscience 2009, Behavioral Brain Research 2008, Pharmacol Biochem Behav 2010**). He guided the development of **Nano-Bacopa** formulation for overcoming blood brain barrier (in collaboration **under Institute MOU, CSIR fellow**). The results from dose dependent effect of *Allium Cepa* in recovery of mouse PPA injury showed encouraging results (**AYUSH funded, Institute MOU, J-AIM**) in an effort to understand the efficacy of alternative therapies for untreatable retinal diseases. The mission to establish research based Integrated healthcare system is underway where comparative data between treatment outcomes between various pathies can be analysed for patient centered cost-effective translation (**Ministry of AYUSH & Director PGIMER**). (<http://www.tribuneindia.com/news/comment/should-pivot-of-nmc-be-patients-or-doctors/536261.html>)

An AI based electronic device to manage cholesterol and glucose in blood has been filed as a **patent** application.

Quality First: In 2014 & 2016 Dr Anand's Lab became the first research facility in the country to be recognized by **Quality Council of India** for broadening the purview of GLP for basic research investigations, digitization and community outreach.

Next 15 Years: A series of longitudinal Yoga based research projects are underway, including recent completion of **NMB** (*Niyantrit Madhumeah Bharat*), utilizing the knowledge, skills and expertise gained from animal models discussed above (**Int Med Int 2016, 2017, Ann Neuros 2016**). These are being implemented in order to test whether various markers and genes, which have been found to be involved in cell survival mechanisms are associated by Mind body techniques (**SATYAM, DST funded, EXPLORE 2020**). This is being developed in collaboration with S-VYASA, SSIAR, Patanjali Yogpeeth, Isha Foundation and patient organizations like IAMD, Solan and MDCRC, Coimbatore for effective communication and translation. (https://www.youtube.com/watch?v=HMbF_FQkjDs),

(www.facebook.com/yogascholarsPGIMER). Such high risk studies include the effect of Yoga protocols in prisoners and its efficacy in high altitude related acclimatization serving to examine the mechanisms using established animal models. An ambitious research project aiming to study the effect of breathing techniques on COVID positive, HCWs and convalescent subjects, is underway.

The recently launched Yoga project examines the markers of stem cell mobilization in Yoga practitioners, sampling blood at various time points. Preliminary and unpublished data at 1 month, from recruitment of IYD 2016 Yoga volunteers, at the time of PM's visit to Chandigarh, shows remarkable reduction in LDL and BMI with concomitant increase in HDL and cognitive processing, analysed by Trail A and B test (*Frontiers in Public Health 2022, EXPLORE 2020*). The results which also describe the alteration in various neurogenesis and angiogenesis related markers, are under communication (*EXPLORE 2020*). Similarly, as Convener of North Zone of NMB program, the results of benefits of Yoga intervention in conversion of Prediabetes into Diabetes (and related cognitive and perceived stress improvement) are being communicated. A state of art CCRYN Centre for Mind Body Interventions through Yoga is being established in PGI with funding from Ministry of AYUSH. This will fund various Yoga research projects in PGI (www.mindbodymind.org)

Transforming policy and Scientific Communication through *Annals of Neurosciences & Integrative Medicine International*

After taking over as the Editor of Annals of Neurosciences (the official Journal of Indian Academy of Neurosciences) in Feb 2009, the Journal was revamped with continuous efforts. This has resulted in increased readership, annual subscriptions catalyzing the partnership of Indian Academy of Neurosciences (IAN) with Karger, Switzerland who published it worldwide until 2018, followed by SAGE. The Journal is now indexed in **PUBMED** and also being tracked for impact factor. A colleague from PGI, **Dr Krishan Kumar** is being mentored to take up the Journal's editorial work at Deputy Editor. Dr Anand has also shaped the development of Integrative Medicine International for advocating Integrative healthcare by global advocacy. He has recently been invited to head a Journal, Integrative Medicine Case reports. This Journal seeks to publish the results of AYUSH interventions alongwith modern medicine. **Dr Aruna Rakha** is being guided to manage it as its Deputy Editor.

Societal impact of community outreach: Dr Anand and his team have released two special supplements of 'Magical Broom'(www.annalsofneurosciences.org) and "Magical Broom returns' for health promotion among kids by use of public health initiatives, profiling the completion of **230 weeks or 460 hours of continuous Clean India** activities voluntarily carried out by his Research lab in Chandigarh @ **2 hrs every week** (<https://swachhbharat.mygov.in/user/907433>). These activities have instilled teammanship in research groups, inducing a spirit of community service and earning an appreciation by Prime Minister, Sh Narendra Modi (https://www.youtube.com/results?search_query=neuroscience+research+lab+chandigarh) and also by Ministry of Science and Technology (at IISF, 2017). Dr Anand has also been a resource person for scientific conceptualization and analysis of data generated from Joshi Foundation's Mega health checkup camps, advocating the concept of Integrated healthcare. He continuously organizes health promotive activities like Yoga workshops in the city and regularly ideates for several Yoga schools and national educational policy frameworks including hypertension and COVID.

Positions Held

Professor in Charge (Jan 2021-till date): CCRYN Collaborative Centre for Mind Body Interventions through Yoga, PGIMER

Professor (July 2016- till date): Neuroscience Research Lab, Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Additional Professor (July 2012- June 2016): Neuroscience Research Lab, Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Associate Professor (July 2009 –June 2012): Neuroscience Research Lab, Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Assistant Professor (November 2003-June2009): Neuroscience Research Lab, Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Visitor Scientist (July 2003- November 2003): Neuroscience Research Lab, Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Scientist II (July 2001-June 2003): Angiogenesis Research Laboratory, Chandler Medical Centre, University of Kentucky, Lexington, Kentucky, USA

Senior Demonstrator (July 1999-June 2001): Department of Immunopathology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Research Associate (April 1999-July 1999)-Department of Neurology, Post Graduate Institute of Medical Education & Research, Chandigarh, INDIA

Technical Capacity

Microarrays, DNA Sequencing, conventional and real time PCR, Reporter gene assays, Labeling and detection of nucleic acids, dot blots, Western blotting, Nucleic acid (DNA/RNA) purification, RNA differential display, cell culture (cell lines and primary cell culture), protein assays, Immunocyto/histochemistry, Transfection of Mammalian cells, sub cloning, Southern and Northern blots, *in-situ* hybridization, EMSA, migration assays, Bone Marrow Transplantation in mice, Flow cytometry, Behavioral, Electrophysiological and Biochemical Assays.

Handling, breeding and weaning of transgenic mouse colonies, genotyping, corneal/retinal extraction, enucleation.

Instruments: Laser photocoagulator, Luminometer, Thermal cycler, Phosphor-image, Real time PCR, Spectrophotometer, Fluorangiogram, Laser, Confocal microscopy / Digital Imaging, Cryostat, Morris Water Maze, Electroretinogram, laser Doppler, Digital Stereotaxis, Laser Doppler.

Microcytotoxicity assays for cross match and B-27 determination, CIEP and other routine immunology diagnostics.

Research in Progress

Grants (2006 - Present)

A	Name	Funding Agency	Amount
1	Molecular, Cell survival and Neuro-cognitive effects of Yoga intervention in stress induced Cognitive Impairment in Prisoners	SATYAM	39,00,000
2	Effect of Yoga on pregnancy outcome and on Umbilical Cord Blood derived stem cells.	CCRYN, Min of AYUSH	10,00,000
3	CCRYN Collaborative Centre for Mind Body Intervention through Yoga	CCRYN	2,50,00000/-
4	Impact of Yoga and Cognitive Social Moderators on stress and Quality of Life in Covid-19 Essential service Providers (as co PI)	SATYAM	5,00000/-
5	The role of macroautophagy in pathophysiology of dry and wet age-related muscular degeneration	The role of macroautophagy in pathophysiology of dry and wet age-related muscular degeneration	20,22,720/-
6	The role of Yogic breathing techniques among quarantined HCWs, COVID-19 positive and COVID 19 convalescent patients: A randomized clinical trial	AYUSH	8,29,950/-
7	Role of Diabetic Yoga Protocol in Biochemical and Molecular Profile of Pre-Diabetic Population	ICSSR	10,00,000/-
8	Comprehensive analysis and statistical modeling candidate genes and biomarkers in age related macular degeneration in North-west Indian cohort and their clinical correlation	DBT	3500779/-
9.	Investigating stem cell related markers and their neuro-cognitive correlation after practice of common AYUSH yoga protocol	DST	3536968/-
10.	Biomarker analysis and statistical modeling of ALS risk alleles	ICMR	5862456/-
11.	Investigating the molecular mechanism governing reversal of Amyloid β induced memory loss in mice by transplantation of human umbilical cord blood derived lineage negative stem cells	DBT	2353500/-
12.	Comparative analysis of the efficacy of human umbilical cord blood derived lineage negative stem cells and human fetal pigmented ciliary epithelium derived neurospheres in laser injured mouse retina model	DST	49,86,000/-
13.	Investigating the Genotype-Phenotype association among patients with Muscular	DAE	23,66,597/-

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1	Molecular, Cell survival and Neuro-cognitive effects of Yoga intervention in stress induced Cognitive Impairment in Prisoners	SATYAM	39,00,000
2	Effect of Yoga on pregnancy outcome and on Umbilical Cord Blood derived stem cells.	CCRYN, Min of AYUSH	10,00,000
3	CCRYN Collaborative Centre for Mind Body Intervention through Yoga	CCRYN	2,50,00000/-
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7	Role of Diabetic Yoga Protocol in Biochemical and Molecular Profile of Pre-Diabetic Population	ICSSR	10,00,000/-
	Dystrophy and their correlation with Cognitive Deterioration		
14.	The neuroprotective effect of herbal extracts derived from <i>Allium cepa</i> in mouse of retinal ganglion cells (RGC) damage	AYUSH	29,20,050/-
15.	The effect of amyloid-beta peptide induced memory loss in recruitment of stem cells	ICMR	8,36,600/-
16.	Comprehensive analysis of the candidate genes: CCR3, CFH, VEGFR2, chemokine ligand 2 and chemokine receptor 2 in age related macular degeneration patients in North India	ICMR	8,06,400/-
17.	Nanodelivery of <i>Bacopa monnieri</i> to examine the alleviation of artificially induced Amnesia	CSIR	8,06,400/-
18.	Neuroprotective effects of <i>Bacopa monniera</i> extract on ischemia-reperfusion induced brain injury	ICMR	12,42,000/-
19.	Molecular characterization of fetal and adult ciliary epithelium gene expression profiles upon induction by epidermal growth factor (EGF)and fibroblast growth factor(EGF)	CSIR	16,72,000/-

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1	Molecular, Cell survival and Neuro-cognitive effects of Yoga intervention in stress induced Cognitive Impairment in Prisoners	SATYAM	39,00,000
2	Effect of Yoga on pregnancy outcome and on Umbilical Cord Blood derived stem cells.	CCRYN, Min of AYUSH	10,00,000
3	CCRYN Collaborative Centre for Mind Body Intervention through Yoga	CCRYN	2,50,00000/-
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6	The role of Yogic breathing techniques among quarantined HCWs, COVID-19 positive and COVID 19 convalescent patients: A randomized clinical trial	AYUSH	8,29,950/-
7	Role of Diabetic Yoga Protocol in Biochemical and Molecular Profile of Pre-Diabetic Population	ICSSR	10,00,000/-
20.	The role of bone marrow derived Lin-ve cells in recovery of experimentally induced stroke related retinal ischemia	DST	54,86,689/-
21.	Investigating the role of vascular endothelial growth factor on proliferation and differentiation of fetal ciliary epithelial cells.	ICMR	25,75,000/-
22.	The contribution of soluble <i>fms</i> like tyrosine kinase 1 Receptor (sflt-1), vascular endothelial growth factor (VEGF) and monocyte chemoattractant protein-1(MCP-1) levels to symptomatic atherosclerotic carotid plaque	CSIR	9,20,000/-
22.	The diagnostic efficacy complement factor H gene polymorphism among patients of Age Related Macular Degeneration (AMD) in North India and its role in pathogenesis of Alzheimer's Disease.	DAE	7,53,200/-
24.	Genetic screening of Ccl2, Ccr2 polymorphism in AMD and Alzheimer's Patients.	DST	24,00,000/-
25.	A comparative analysis of intravitally injected CD34+ and VEGFR+ stem cells in rescue of	ICMR	30,71,800/-

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1	Molecular, Cell survival and Neuro-cognitive effects of Yoga intervention in stress induced Cognitive Impairment in Prisoners	SATYAM	39,00,000
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7	Role of Diabetic Yoga Protocol in Biochemical and Molecular Profile of Pre-Diabetic Population	ICSSR	10,00,000/-
	NMDA induced apoptosis in retinal neuron In mouse.		
26.	Study of molecular and genetic basis of traditional cognition enhancing drugs	DBT	34,80,000/-
27.	Assessment of marrow derived stem cell implantation in experimentally induced brain stroke mouse model.	DBT	24,72,000/-
28.	Genetic analysis of VEGF-A, CCL-2 and sflt-1 expression in patients of amyotrophic lateral sclerosis and their clinical correlation.	ICMR	23,93,000/-
	Total	<u>US\$ 135411</u>	8,86,94109/-

MPLADS (Member of Parliament Local Area Development Funds)

B	Name	Funding Agency	Amount
1	Gradient Thermal cyclers	MPLADS	6,00,000
2	Cryotome	MPLADS	10,00,000
3.	Establishment of Yoga Center at PGI, Chandigarh	MPLADS	1,00,000,00
	Total	<u>US \$ 154,666.6</u>	Rs 1,16,00,000

Institutional grant (among 8 investigators)

	Name	Funding Agency	Amount
	Establishment of stem cells research facility at PGI, Chandigarh	DBT	Rs 6,79,76,000/-
		<u>US\$ 10,62,125</u>	
	Grand Total	US\$ 22,43,601.45	Rs. 16,827,0109/-

- 1) **Project title:** Genetic analysis of VEGF-A, CCL-2 and sflt-1 expression in patients of Amyotrophic Lateral Sclerosis and their clinical correlation.

Status: Completed

Funding Agency: ICMR

Total Cost: 23,93,000 INR

Project Summary: We have earlier shown that protein levels of vascular endothelial growth factor-A (VEGF-A) and chemokine ligand-2 (CCL2) were elevated in Indian Amyotrophic Lateral Sclerosis (ALS) patients. VEGF-A and CCL2 mRNA levels were measured in peripheral blood mononuclear cells (PBMCs) of 50 sporadic Indian ALS patients using Real Time Polymerase Chain Reaction (PCR) and compared with normal controls (n = 50). Their levels were adjusted for possible confounders like cigarette smoking, alcohol and meat consumption. VEGF-A and CCL2 mRNA levels were found to be significantly elevated in PBMCs in ALS patients as compared to controls. PBMCs from definite ALS revealed higher VEGF-A mRNA expression as compared to probable and possible ALS. CCL2 mRNA levels were found to be unaltered when definite, probable and possible ALS were compared. PBMCs from patients with respiratory dysfunction showed much higher VEGF-A and CCL2 elevation when compared to patients without respiratory dysfunction. No association of smoking, alcohol and meat consumption with VEGF-A and CCL2 was observed after analyzing the data with univariate and multivariate analysis. VEGF-A and CCL2 mRNA upregulation in PBMCs may have a clinico-pathological/etiological/ epidemiological association with ALS pathogenesis. The cross-cultural and cross-ethnic investigations of these molecules could determine if they have any role in enhancing the mean survival time unique to Indian ALS patients.

Selected Publications:

- i) Gupta PK, Prabhakar S, Abburi C, Sharma NK, **Anand A***. Vascular endothelial growth factor -A and chemokine ligand (CCL2) genes are upregulated in peripheral blood mononuclear cells in Indian amyotrophic lateral sclerosis patients. *J Neuroinflammation*. 2011 Sep 9;8:114.
- ii) Gupta PK, Prabhakar S, Sharma NK, **Anand A*** Possible association between expression of chemokine receptor-2 (CCR2) and amyotrophic lateral sclerosis (ALS) patients of North India. *PLoS One*. 2012;7(6):e38382.
- iii) Gupta PK, Prabhakar S, Sharma S, **Anand A*** A predictive model for amyotrophic lateral sclerosis (ALS) diagnosis. *J Neurol Sci*. 2012 Jan 15;312(1-2):68-72.
- iv) **Anand A***, Gupta PK, Sharma NK, Prabhakar S. Soluble VEGFR1 (sVEGFR1) as a novel marker of amyotrophic lateral sclerosis (ALS) in the North Indian ALS patients. *Eur J Neurol*. 2012 May;19(5):788-92.
- v) Gupta PK, Prabhakar S, Sharma S, **Anand A*** Vascular endothelial growth factor-A (VEGF-A) and chemokine ligand-2 (CCL2) in amyotrophic lateral sclerosis (ALS) patients. *J Neuroinflammation*. 2011 May 13;8:47.
- vi) **Anand A***, Thakur K, Gupta PK."ALS and Oxidative Stress: The Neurovascular Scenario", *Oxid Med Cell Longev*. 2013;635831.Epub 2013 Dec

- 2) **Project title:** Assessment of marrow derived stem cell implantation in experimentally induced brain stroke mouse model.

Status: Completed

Funding Agency: DBT

Total Cost: 24,72,000 INR

Project Summary: The middle cerebral artery occlusion (MCAO) mouse model was established and behavioral and histological analysis was performed, subsequently the carboxyfluorescein diacetate (CFDA)-labelled MNCs were transplanted through the tail vein immediately after 23 hours of reperfusion. The fluorescence microscopic analysis of the brain sections was analysed in both acute and sub-acute phases of transplantation. The neurological deficit was confirmed by TTC staining and contra lateral turning behavior. After 2 and 7 days of transplantation, the CFDA-labelled MNCs were observed in the infarcted regions along the line of cortex. The presence of the CFDA-labelled cells in the ischaemic injured brain lesions proved homing of the implanted MNCs in the infarcted regions of the brain. The successful homing of MNCs may pave way for future clinical trials using MNC in stroke.

Selected Publication:

- i) Prabhakar S, Muthaian R, Chabbra R, **Anand A*** Analysis of homing potential of marrow-derived mononuclear cells in an experimentally induced brain stroke mouse model. *Brain Inj.* 2010; 24(12): 1485-90

- 3) **Project title:** Study of molecular and genetic basis of traditional cognition enhancing drugs.

Status: Completed.

Funding Agency: DBT.

Total Cost: 34,80,000 INR

Project Summary: The enhancement of memory of healthy individuals has been lacking due to limited knowledge about mechanism of action of anti amnesic drugs derived from herbal origin. The study addressed the problem of the lack of knowledge of the molecular action of these drugs (*Bacopa monniera*- Brahmi) on the short term and long term memory using Morris Water Maze model. For molecular study, the effect of these drugs were investigated on various second messenger systems like cAMP, PKC, PKA, Ca/CaMK and MAPK and also estimated the level of various retrograde messengers in hippocampus. Therefore, the level of CREB protein in Brain was estimated by IHC and Western blotting. Reports below show the leads established in this project. Briefly, studies revealed involvement of CREB and MAPK in rescue of memory deficits.

Selected Publications:

- i) **Anand A***, Saraf MK, Prabhakar S. Antiamnesic effect of *B. monniera* on L- NNA induced amnesia involves calmodulin. *Neurochem Res.* 2010 Aug;35(8):1172-81.
- ii) Saraf MK, Prabhakar S, **Anand A***. *Bacopa monniera* alleviates N(omega)-nitro-L-arginine arginine-induced but not MK-801-induced amnesia: a mouse Morris water maze study. *Neuroscience.* 2009 Apr 21;160(1):149-55.
- iii) Saraf MK, Prabhakar S, Khanduja KL, **Anand A*** *Bacopa monniera* Attenuates Scopolamine Induced Impairment of Spatial Memory in Mice. *Evid Based Complement Alternat Med.* 2011;2011:236186.
- iv) Saraf MK, **Anand A***, Prabhakar S. Scopolamine induced amnesia is reversed by *Bacopa monniera* through participation of kinase-CREB pathway. *Neurochem Res.* 2010 Feb;35(2):279-87

- 4) **Project title:** A comparative analysis of intravitreally injected CD34+ and VEGFR+ stem cells in rescue of NMDA induced apoptosis in retinal neuron in mouse.

Status: Completed

Funding Agency: ICMR

Total Cost: 30,71,800 INR

Project Summary: This project aimed to establish the retinal degeneration model by injecting NMDA intravitreally into the mouse eye. This induces Ganglion cell layer death and their loss because of excitotoxicity. This model partly mimics Glaucoma in humans. The disease condition was rescued by transplantation of Bone Marrow derived VEGFR expressing stem cells as well as CD34+ cells. The transplantation and incorporation efficacy was evaluated. This revealed the rescue of RGC damage by transplantation of both these stem cell populations. Although a review was published from this project, the detailed report has been communicated to a high impact factor Journal. This was also part of PhD thesis of a student

Selected Publications:

- i) Jindal N, Mukhopadhyay A, **Anand A.*** The emerging role of stem cells in ocular neurodegeneration: hype or hope? *Mol Cell Biochem.* 2012 Jun;365(1-2):65-76.
- ii) Jindal N, Minhas G, Prabhakar S, **Anand A.*** Characterization of Lin-veCD34 and CD117 Cell Population Reveals an Increased Expression in Bone Marrow Derived Stem Cells, *Curr Neurovasc Res.* 2014 Feb;11(1):68-74
- iii) Jindal N, Banik A, Prabhakar S, Vaiphie K, **Anand A.*** Alteration of Neurotrophic Factors After Transplantation of Bone Marrow Derived Lin-ve Stem Cell in NMDA-Induced Mouse Model of Retinal Degeneration. *J Cell Biochem.* 2017 Jul;118(7):1699-171

- 5) **Project title:** Genetic screening of Ccl2, Ccr2 polymorphism in AMD Patients

Status: Completed

Funding Agency: DST

Total Cost: 24,00,000 INR

Project Summary: The study and treatment of AMD, a leading cause of blindness had been hampered by lack of animal models. Our work with mice deficient either in monocyte chemo attractant protein-1 (Ccl-2 also known as MCP-1) or its cognate C-C chemokine receptor-2 (Ccr-2) showed development of cardinal features of AMD, including accumulation of lipofuscin and CNV in mouse eyes and senile plaques in mouse brains. Complement and IgG deposition in RPE and choroid accompanied senescence in this model, as in human AMD, RPE or choroidal endothelial production of Ccl-2 induced by complement C5a and IgG mediated choroidal macrophage infiltration into aged wild type choroids. Impaired macrophage recruitment may allow accumulation of C5a and IgG, which induces VEGF production by RPE, possibly mediating development of CNV. The pathogenesis of AMD progresses with involvement of Ccl-2, Ccr-2 and CFH. As a natural consequence such work, the study was designed to screen the AMD patients for expected mutations in Ccl-2, Ccr-2 and CFH gene. Positive association was reported evident from following publications.

Selected Publications:

- i) **Anand A.***, Sharma NK, Gupta A, Prabhakar S, Sharma S, Ramandeep Singh, Pawan Kumar Gupta. Single nucleotide polymorphisms in MCP-1 and its receptor are associated with the risk of Age Related Macular Degeneration. *PLoS One.* 2012; 7(11)
- ii) Sharma NK, Gupta A, Prabhakar S, Singh R, Sharma S, **Anand A.*** Single nucleotide polymorphism and serum levels of VEGFR2 are associated with Age Related Macular Degeneration. *Curr Neurovasc Res.* 2012;9(4):256-65.

- 6) **Project title:** The diagnostic efficacy complement factor H gene polymorphism among patients of age related macular degeneration (AMD) in North India and its role in pathogenesis of Alzheimer's Disease.

Status: Completed

Funding Agency: DAE

Total Cost: 7,53,200 INR

Project Summary: There is no molecular diagnostic or prognostic marker for AMD and most of the patients are diagnosed at an advanced stage. Current treatment modalities include photodynamic therapy and photocoagulation. However, their efficiency is limited. Our characterization of Ccl-2 and Ccr-2 knockout mice with features of AMD along with the previously reported association of CFH gene among North Americans strongly suggests the importance of Macrophages and complement in the pathogenesis of this disease. This provides insight for preventive and restorative approaches in AMD but also makes it imperative to study polymorphism in tyrosine-histidine residue of CFH gene among Indian patients. This study revealed association between CFH polymorphism and AMD, the first time from North India.

Selected Publications:

- i) Sharma NK, Prabhakar S, **Anand A***. Age Related Macular Degeneration: Advances and Trends. *Annals of Neurosciences*. 2009; 16(2):62-71.
- ii) Sharma NK, Gupta A, Prabhakar S, Singh R, Sharma SK, Chen W, **Anand A***. Association between CFH Y402H polymorphism and Age Related Macular Degeneration in North Indian cohort *PLoS One*. 2013 Jul 29;8(7):e70193.

- 7) **Project title:** The contribution of soluble fms like tyrosine kinase 1 Receptor (sflt-1), Vascular Endothelial Growth Factor (VEGF) and Monocyte Chemoattractant Protein-1 (MCP-1) levels to symptomatic atherosclerotic carotid plaques

Status: Completed

Funding Agency: CSIR

Total Cost: 9,20,000 INR

Project Summary: Stroke patients presenting with carotid plaques were recruited along with the controls. Patients were selected after examining and screening properly by Doppler ultrasound. The levels of sFlt-1, VEGF and MCP-1 was measured in stroke patients and controls. No association was reported which was surprising and following publication emerged from this study.

Selected Publications:

- i) Khurana D, Mathur D, Prabhakar S, **Anand A***. Vascular endothelial growth factor (VEGF) and monocyte chemoattractant protein-1 (MCP-1) levels unaltered in symptomatic atherosclerotic carotid plaque patients from North India. *Frontiers in Neurology* 2013; 4:27

- 8) **Project title:** Investigating the role of Vascular Endothelial growth factor on proliferation and differentiation of fetal ciliary epithelial cells.

Status: Completed

Funding Agency: ICMR

Total Cost: 25,75,000 INR

Project Summary: The pigmented ciliary epithelium (PCE) of mammalian eye harbors resident population of stem cells that lie in apposition with endothelial cells which release vascular endothelial growth factor (VEGF) that may influence the fate and function of these stem cells in ways that remain unclear. We examined the role of VEGF in proliferation of PCE stem cells and expression of Notch, Jagged, N-Cadherin and β -Catenin which are known to maintain proliferation

state of neural stem cells. We cultured human PCE cells obtained from 12-20 weeks old fetal eyes. The neurospheres were analyzed for the proliferation capacity of PCE stem cells in presence of VEGF on 3,6 and 9 day. Real time PCR was used to quantitate the mRNA expression of above mentioned genes on PCE derived neurospheres on 3,6 and 9 day. We found increased number of neurospheres when PCE stem cells were stimulated with VEGF alongwith epidermal growth factor (EGF) and basic fibroblast growth factor (bFGF) than EGF and bFGF. BrdU immunostaining was done to analyze the proliferation of CE cells and presence of neural and retinal progenitor markers such as *Nestin* and *Pax6* were also investigated. An increased *Notch* and *Jagged* mRNA was observed on 6th day in VEGF, EGF and bFGF treated PCE cells as compared to 0,3 and 9 day. A similar pattern was noticed with N-cadherin and β -catenin mRNA levels. These findings may clarify the role of VEGF on PCE stem cell proliferation with possible involvement of Notch, Jagged, N19 cadherin and β -Catenin. The data may suggest importance of harvesting 6th day neurospheres for transplantation purposes in preclinical investigations pertaining to retinal degenerative diseases, however, additional studies are needed to substantiate the findings.

Selected Publications:

- i) Abburi C, Prabhakar S, Kalra J, Huria A, **Anand A***. Vascular endothelial growth factor (VEGF) induced proliferation of human fetal derived ciliary epithelium stem cells is mediated by Jagged, N-Cadherin pathway. ***Curr Neurovasc Res.*** 2013 Mar 4.

- 9) **Project title:** The role of bone marrow derived Lin-ve cell in recovery of experimentally induced stroke related retinal ischemia

Status: Completed

Funding Agency: DST

Total Cost: 54,86,689 INR

Project Summary: We aimed at creating the stroke model in mice by the Middle cerebral artery occlusion surgery. The model captures the induction of stroke by occlusion and reperfusion at 60 minutes. The surgery induces ischemia in the brain simultaneously occluding blood supply to the retina. The animal was further sacrificed to examine the expression of disease cytokines and the apoptotic markers. Once the model is established, Lin-ve stem cells, derived from the mouse bone marrow, were transplanted after 24 hrs post surgery through intravenous route at different doses of 50,000 and 1,00,000 cells per dose and the incorporation was assessed at 10 and 60 days post transplantation. The animals were further sacrificed, eyes were sectioned and both the ischemia as well as transplantation is studied under different groups. The present status of the project shows the establishment and characterization of the stroke model and the study of the changes in retinal morphology. Ongoing research project is part of PhD student who was sent to Japan for acquiring specialized surgical skills. The results revealed efficient mobilization of stem cells at the site of injury.

Selected Publications:

- i) Minhas G, Morishita R, **Anand A***. Preclinical models to investigate retinal ischemia: advances and drawbacks. ***Front Neurol.*** 2012;3:75.
- ii) Jindal N, Minhas G, Prabhakar S, **Anand A***. Characterization of Lin-veCD34 and CD117 Cell Population reveals an Increased Expression in Bone Marrow Derived Stem Cells, ***Curr Neurovasc Res.*** 2014 Feb;11(1):68-74

- 10) **Project title:** Molecular characterization of fetal and adult ciliary epithelium gene expression profiles upon induction by epidermal growth factor (EGF) and fibroblast growth factor (EGF)

Status: Completed

Funding Agency: CSIR

Total Cost: 16,72,000 INR

Project Summary: Pigmented ciliary epithelium has been recognized to have innate stem cell properties, which give rise to neurospheres when cultured under the influence of growth factors. Ciliary epithelium derived from aborted human fetuses and cadavers were cultured under the growth medium containing Fibroblast growth factor (FGF) and Epidermal Growth Factor (EGF) and the size and number of neurospheres were analyzed. The gene expression levels of molecules involved in different pathways like *Notch*, *jagged*, *β-Catenin* and *N-cadherin* were analyzed and their levels were analyzed at different time intervals of 0,3,6 and 9 days. The experiments have shown the temporal increase in number and size with concomitant increase in the expression of the markers until day 6.

Selected Publications:

- i. Abburi C and **Anand A***. Ciliary epithelium: an under evaluated target for therapeutic regeneration. *Crit Rev Eukaryot Gene Expr*. 2012; 22:2 :87-95.
- ii. Abburi C, Prabhakar S, Kalra J, Huria A, **Anand A***. Vascular Endothelial Growth Factor (VEGF) induced proliferation of human fetal derived ciliary epithelium stem cells is mediated by Jagged - N Cadherin pathway *Curr Neurovascular Res* 2013 May 1;10(2):93-102.2.5

11) Project title: Neuroprotective effects of *Bacopa Monniera* extract on ischemia-reperfusion induced brain injury.

Status: Completed

Funding Agency: ICMR

Total Cost: 12,42,000 INR

Project Summary: Brain stroke is a leading cause of death without effective treatment. *B. monniera*, an Indian herbal medicine, exerts antioxidant and anti-stress activity by modulating the antioxidative defense system. We wanted to test if *B.monniera* could alleviate the ischemia induced brain injury and cognitive dysfunction in Wistar rats. We studied the effect of *B.monniera* (120 mg kg⁻¹, 160 mg kg⁻¹ and 240 mg kg⁻¹ P.O.) on transient intracarotid artery (ICA) occlusion induced ischemia by testing the neurobehavioral and biochemical parameters on treated and control rats. *B. monniera* attenuated the reduced transfer latency in ischemic rats in a step through test and showed a protective effect on ischemia induced memory impairment in the plus maze task. It also showed a marginal improvement in neurodeficit score and fore limb muscle grip strength. *B. monniera* reduced the infarct size in the ischemic brain. It also decreased nitrite, nitrate and lipid peroxidation and significantly improved catalase activity. These observations suggest the neuroprotective and antioxidant activity of *B. monniera* on ischemia induced brain injury and paves the way for future investigations.

Selected Publications:

- i. Saraf MK, Prabhakar S, **Anand A***. Neuroprotective effect of *Bacopa monniera* on ischemia induced brain injury. *Pharmacol Biochem Behav*. 2010 Dec;97(2):192-7.

12) Project title: The effect of amyloid-beta peptide induced memory loss in recruitment of stem cells.

Status: Completed

Funding Agency: ICMR

Total Cost: 8,36,600 INR

Project Summary: This study sought to determine the fate of cells when transplanted at the site of mice brain injury and their role in neurogenesis. We investigated if lin-ve cells derived from UCB might offer therapeutic effect, when transplanted at the site of injury. The efficacy of these cells in β-amyloid induced memory-impaired mice model were examined by combination behavioral and

molecular analysis. The outcome of this study might lead to the understanding of the trafficking of stem cells for future clinical applications. The data from this study has been communicated to a high impact factor Journal.

Selected Publications:

- i) Banik A, Prabhakar S, Kalra J, **Anand A***. Effect of human umbilical cord blood derived lineage negative stem cells transplanted in amyloid- β induced cognitive impaired mice. **Behav Brain Res.** 2015;291:46-59

13) Project title: Comprehensive analysis of the candidate genes CCR3, CFH, VEGFR2, chemokine ligand 2 and chemokine receptor 2 in Age Related Macular Degeneration patients in North India

Status: Completed

Funding Agency: ICMR

Total Cost: 8,06,400 INR

Project Summary: There are recent association studies with CFH gene that have been reported among 50% European, American and South Indian AMD patients. We believe that polymorphism in CCR3 and CFH could be related independently or in conjunction with Ccl-2, Ccr-2 axis. It is speculated that pathogenesis of AMD progresses with involvement of CCR3, VEGFR2, CCL2, CCR2 and CFH. As a natural consequence, the present study was executed to screen the AMD patients for expected mutations in CCR3, VEGFR2, CCL2, CCR2 and CFH gene that could be the leading cause in the pathogenesis of AMD. This study dissected the role of these genes as well as help in its evaluation as diagnostic marker. We have shown the association of AMD with VEGFR2, Eotaxin and CCR3 reported in various publications.

Selected Publications:

- i) Sharma NK, Gupta A, Prabhakar S, Singh R, Bhatt AK, **Anand A***. CC Chemokine receptor-3 as new target for age related macular degeneration. **Gene.** 523 (2013) 106–111. doi: 10.1016/j.gene.2013.03.052
- ii) **Anand A***, Sharma NK, Prabhakar S, Sharma S, Gupta A, Singh R, Gupta PK. Single Nucleotide Polymorphisms in MCP-1 and its Receptor are associated with the risk of Age Related Macular Degeneration. **PLoS One** 2012; 7(11)
- iii) Sharma NK, Gupta A, Prabhakar S, Singh R, Sharma S, **Anand A***. Single Nucleotide Polymorphism and Serum Levels of VEGFR2 are associated With Age Related Macular Degeneration. **Curr Neurovasc Res.** 2012; 9(4):256-65.
- iv) Sharma NK, Prabhakar S, Gupta A, Singh R, Gupta PK, Gupta PK, **Anand A***. New Biomarker for Neovascular Age Related Macular Degeneration: Eotaxin-2. **DNA and Cell Biology.** November 2012: 1618-1627. doi: 10.1089/dna.2012.1786.
- v) Sharma NK, Sharma K, Gupta A, Prabhakar S, Singh R, Gupta PK, **Anand A***. Does toll like receptor-3 have any role in Indian AMD phenotype, **Molecular and Cell Biochem.** 2014 Aug;393(1-2):1-8
- vi) **Anand A***, Sharma NK, Singh R, Gupta A, Prabhakar S, Jindal N, Bhatt AK, Sharma SK Gupta PK. Does DcR1 (TNF-related apoptosis-inducing-ligand Receptor 3) have any role in human AMD pathogenesis? **Scientific Reports** 2014 Feb 18; 4: 4114
- vii) Sharma NK, Sharma SK, Gupta A, Prabhakar S, Singh R, **Anand A***. Predictive model for earlier diagnosis of suspected AMD patients **DNA Cell Biol.** 2013 Sep;32(9):549-55

14) Project title: Nanodelivery of *Bacopa monniera* to examine the alleviation of artificially induced Amnesia

Status: Completed

Funding Agency: CSIR

Total Cost: 8,06,400 INR

Project Summary: Herbal extracts like Brahmi (*Bacopa Monniera*) derived from ancient Indian system of Ayurveda have been extensively documented in both traditional and modern literature for their memory enhancing effects but enough data does not exist that proves their ability to cross blood brain barrier. Despite our previous published data showing the anti-amnesic effects of *Bacopa Monniera* using variety of amnesic drugs, in animal models, we could not demonstrate bioavailability of bacosides, the chief constituent of *Bacopa monniera*, in brain mouse homogenates by HPLC. In order to enhance the bioavailability of bacosides in brain and alleviate the adverse effects, the SRF employed in the project administered Bacopa monneira aided by nanoparticles. The delivery of *Bacopa monneira* with nanopartices increased its bioavailability in the brain by overcoming the blood brain barrier thus amplifying the anti amensic effects of this herb mediated by various growth factors analyzed through IHC and real time PCR.

Selected Publication:

- i) **Goyal K**, Konar A, Kumar BSH, Koul V Lactoferrin-conjugated pH and redox-sensitive polymersomes based on PEG-S-S-PLA-PCL-OH boost delivery of bacosides to the brain. *Nanoscale*. 2018 Sep 27;10(37):17781-17798
- ii) Goyal K, Koul V, Singh Y, **Anand A***. Targeted Drug Delivery to Central Nervous System (CNS) for the Treatment of Neurodegenerative Disorders: Trends and Advances. *Cent Nerv Syst Agents Med Chem*. 2014;14(1):43-59.

15) Project Title: The neuroprotective effect of herbal extracts derived from *Allium cepa* in mouse of retinal ganglion cells (RGC) damage.

Status: Completed.

Funding Agency: AYUSH

Total Cost: 29,20,050/-

Project Summary: Onion or *Allium Cepa* has been previously shown to be protective in mouse model of Stroke. We tested the effect of varying dose of *Allium Cepa* in mouse model of PPA (which selectively depletes ischemia induced damage of RGC). Our results showed that various growth factors, apoptotic and inflammatory molecules were found altered when consumed orally.

Selected Publication:-

- i) **Anand A***, Modgil S, Sharma VL, Shri R, Kaushik S. Preserving Neural Retina through Re-emerging Herbal Interventions. *J Cell Biochem*. 2014 Oct;115(10):1659-68
- ii) Kumar S, Modgil S, Bammidi S Minhas G, Shri R, Kaushik S, **Anand A***, Varinder Singh. Allium cepa exerts neuroprotective effect on retinal ganglion cells of pterygopalatine artery (PPA) ligated mice. *J Ayurveda Integr Med*, 2019, <https://doi.org/10.1016/j.jaim.2019.08.002>
- iii) Kumar S, Shri R, Kaushik S, Singh V, **Anand A***. Electrophysiological assessment of retinal functions by Electroretinogram (ERG) in Ischemia/Reperfusion (I/R) *Allium cepa* pre-treated mice. *Integrative Medicine Case Reports*. 2020. doi: 10.38205/imcr.010118

16) Project Title: Investigating the Genotype-Phenotype association among patients with Muscular Dystrophy and their correlation with Cognitive Deterioration

Status: Completed

Funding Agency: DAE

Total Cost: 23,66,597/-

Project Summary: This project aimed to repurpose the utility of genetic screening of DMD and BMD patients so that the genotype analysed by MLPA could be useful for gene therapy trials. Besides, the various iso forms of dystrophin were correlated to certain neuropsychology domains

and it was found that the severity of mutations in dystrophin gene was associated with impaired cognition analyzed by Neuropsychology scoring

Selected Publications:

- i) Tyagi R, Kumar S, Dalal A, Mohammed F, Mohanty M, Kaur P, **Anand A***. Repurposing Pathogenic Variants of *DMD* Gene and its Isoforms for DMD Exon Skipping Intervention. **Current Genomics**, Volume 20, Number 7, 2019, pp. 519-530(12)
- ii) Tyagi R, Aggarwal P, Mohanty M, Dutt V **Anand A*** Computational cognitive modeling and validation of Dp140 induced alteration of working memory in Duchenne Muscular Dystrophy. **Sci Rep.** 2020 Jul 20;10(1):11989
- iii) Tyagi R, Podder V, Arvind H, Mohanty M, **Anand A***. The role of dystrophin gene mutations in neuropsychological domains of DMD boys: a Longitudinal Study. **Ann Neurosci**, 2019, doi.org/10.1177/0972753120912913
- iv) Tyagi R, Arvind H, Goyal MK, Mohanty M, **Anand A***. Working Memory Alterations Plays an Essential Role in Developing Global Neuropsychological Impairment in Duchenne Muscular Dystrophy. **Brain and Behavior** 2020 (Accepted)

17) Project Title: Comparative analysis of the efficacy of human umbilical cord blood derived lineage negative stem cells and human fetal pigmented ciliary epithelium derived neurospheres in laser injured mouse retina

Status: Completed

Funding Agency: DST

Total Cost: 49,86,000

Project Summary:- This project sought to compare the efficacy of human umbilical cord blood derived lineage negative stem cells and human fetal pigmented ciliary epithelium derived neurospheres in laser injured mouse retina and the results showed that CE cells have regenerative capacity in the murine retinal degeneration model of laser injury.

Selected Publications:

- i) Bammidi S, Modgil S, Kalra J, **Anand A***, Human fetal pigmented ciliary epithelium stem cells have regenerative capacity in the murine retinal degeneration model of laser injury, **Curr Neurovasc Res.** 2019 Jun 18. doi:10.2174/1567202616666190618123931
- ii) Bammidi S, Bali P, Kalra J, **Anand A***, Transplantation efficacy of human fetal pigmented ciliary epithelium and undifferentiated stem cells in the murine retinal degeneration model of laser injury. **Cell Transplant.** Jan-Dec 2020;29:963689720946031.

18) Project Summary: Investigating the molecular mechanism governing reversal of Amyloid Beta induced memory losing mice by transplantation of human umbilical cord blood derived lineage negative stem cells

Status: Completed

Funding Agency: DBT

Total Cost: 2353500

Project Summary: In the present study, we evaluated the efficacy of Lineage negative stem cells derived from the human Umbilical cord blood and investigated the underlying molecular mechanism. We have tried to develop a better understanding of the pathways involved, in order to develop more avenues for stem cell therapy in AD. The characterization of Lin-ve stem cells showed increased in stemness marked by CD34 and CD117, when compared to MNCs and Lin+ve cells. Lin-ve SC depicts homogenous morphology and size when visualized under scanning electron microscope, making them a suitable source for transplantation. Next, we established memory loss in the mice using 1µM concentration of Aβ42, validated by their behavior in the Morris water Maze.

The loss in memory was found reversed through the transplantation of Lin-ve stem cells from the human Umbilical Cord Blood. Our results showed improved spatial, long as well as short-term memory. We could also demonstrate dose dependent response of A β 42 in inducing rescue of memory loss. Furthermore, our molecular results could be classified into the following outcomes. First, Lin-ve stem cells rescue memory loss in A β induced memory loss by a possible involvement of astrocytic phagocytosis and clearance of the A β 42 load in the demented brain. Second, transplantation of Lin-ve stem cells exerts possible intra-hippocampal paracrine effects marked by increase of neurotrophic factors. Third, stem cell transplantation exerts an anti-apoptotic response possibly mediated by the up-regulated neurotrophic factors. Fourth, Lin-ve stem cell rescues memory loss by the involvement of BDNF-TrkB pathway, which may initiate RET pathway as a result of their cross-talk.

Selected Publications:

- i) Bali P, Bammidi S, Banik A, Nehru B, **Anand A***. CD34 and CD117 Stemness of Lineage-Negative Cells Reverses Memory Loss Induced by Amyloid Beta in Mouse Model. *Front Behav Neurosci*. 2018 Nov 1;12:222.
- ii) Bali.P, Banik.A, Nehru.B, **Anand A***. Neurotrophic Factors Mediated Activation of Astrocytes Ameliorate Memory Loss by Amyloid Clearance after Transplantation of Lineage Negative Stem Cells. *Mol Neurobiol*. 2019 Jun 27. doi: 10.1007/s12035-019-01680-z

Patent: 1- Biological agent for reversing memory loss and method thereof. Application no Temp/E-1/40726/2019-DEL

19) Project title: Biomarker analysis and statistical modelling of ALS risk alleles

Status: Completed

Funding Agency: ICMR

Total Cost: 5862456

Project Summary: Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease characterized by degeneration of motor neurons. It remains incurable because its complex etiology is insufficiently understood. Historically, it took quite some time to assign a hereditary basis to the disease. Currently, it is believed that 90% of ALS cases are of sporadic nature but 10% have a familial occurrence out of which about 20% are attributed to toxic gain-of-function mutations in the CuZn-superoxide dismutase gene (SOD). It has been suggested that vascular abnormalities may have a “causal” association with neurodegenerative diseases like Alzheimer’s disease and ALS since they occur at a pre-symptomatic stage. Protein aggregation is a regular feature of not only Alzheimer’s disease (AD), Parkinson’s disease (PD) but also ALS. The cell survival mechanisms generally converge around certain common pathways which are speculated to be shared by angiogenin, sVEGFR2, TDP-43 and optineurin apparently driven by the transcription factor NF- κ B (nuclear factor kappa-light-chain-enhancer of activated B cells) and the serine threonine kinase Akt. The present study will, therefore, help to investigate proportional expression of different molecular markers as a potential candidate in disease pathogenesis and provide a new avenue for timely reversal of the pathogenesis by modifying the expression of these markers through various pharmacological agents. The objective of the study was To quantify the levels of Transactive response DNA-binding protein 43 (TDP-43), Angiogenin, Optineurin and soluble. Vascular Endothelial Growth Factor Receptor (sVEGFR2) antigens in plasma as well as CSF and to analyze their mRNA expression in Peripheral Blood Mononuclear Cells (PBMCs) of ALS patients and controls. Blood samples and CSF samples were taken from patients. Plasma isolation was done from blood samples. ELISA was used for determining the levels of TDP-43, Angiogenin, Optineurin and soluble Vascular Endothelial Growth Factor Receptor 2 (sVEGFR2), VEGF and CCL2 in plasma and CSF of patients. Results from the study so far have suggested that all the proteins were

found to be significantly downregulated in patient population. Correlation analysis was also done for all the molecules. All molecules were found to be significantly correlated. A statistical predictive model was also proposed.

Selected Publications:

- I. Thakur K, Sharma K, Modgil S, Tiwari A, Khoshla R, **Anand A***. Angiogenesis centered molecular cross-talk in Amyotrophic Lateral Sclerosis survival: Mechanistic insights. **Critical Reviews™ in Eukaryotic Gene Expression**, 2020, 30(2):137 – 151.
- II. Modgil S, Khosla R, Tiwari A, Sharma K, **Anand A***. Association of Plasma biomarkers for angiogenesis and proteinopathy in Indian Amyotrophic Lateral Sclerosis patients. **Journal of Neuroscience in Rural Practice**. 2020, DOI: 10.1055/s-0040-1714314
- III. Khosla R, Rain M, Chawathey S, Modgil S, Tyagi R, Thakur K, Pannu V, Sharma SK, **Anand A***. Identifying putative cerebrospinal fluid biomarkers of amyotrophic lateral sclerosis in a north Indian population. **Muscle Nerve**, 2020 Jul 21.doi: 10.1002/mus.27026.
- IV. **Anand A***, Prabhakar S, Thakur K, Tyagi R, Shastri V, Tripathi DP, Sharma S. Can Cheiromancy Predict Mean Survival or Fatality of a Patient with Amyotrophic Lateral Sclerosis? **J Neurosci Rural Pract**. 2020 Apr;11(2):256-260.

Patent – Plasma bio-markers for diagnosis and prediction of ALS (amyotrophic lateral sclerosis) TEMP/E-1/17033/2020-DEL

20) Project title: Investigating stem cell related markers and their neuro-cognitive correlation after practice of Common AYUSH Yoga protocol.

Status: Completed

Funding Agency: DST

Total Cost: 3536968

Project Summary: Several studies have defined the role of Yoga by physiological, cognitive, imaging and biochemical analysis. However, this study examines the effects of the Common Yoga Protocol on various parameters. The effect of Common Yoga Protocol is being investigated in healthy adult population between the ages of 18-55 years. The samples are being analysed for lipid profile and Fasting sugar including molecular estimation of serum levels of BDNF, VEGF, Angiogenin and Amyloid beta besides *Nestin*, *Nanog*, *BCI 2*, *BCI XL* at mRNA levels. Hematopoietic stem cell markers i.e. CD45, CD117 and CD34 are being analysed after the practice of 3 months of Common Yoga Protocol. Yoga trainers will be similarly analysed to understand the long term effects of Yoga. Till now BDNF, VEGF, Angiogenin and Amyloid beta have been analysed after one month of Yoga practice among 64 participants. The results reveal an increased levels of Angiogenin followed by elevation in VEGF and BDNF after 1 month of Yoga practice, revealing possible involvement of Angiogenesis and Neurogenesis pathways. There was also an improvement in the biochemical profile of the participants.

Selected Publications:

- i) Wellness effect of common AYUSH yoga protocol in naïve volunteers: Physiological, Neurocognitive and Biochemical assessments after PM's role modeling- status (**In revision EXPLORE 2020**)

- ii) Sharma K, Pannu V, Sayal N, Bhalla A, **Anand A*** Effects of one month of Common Yoga Protocol practice appear to be mediated by the angiogenic and neurogenic pathway: A pilot study. *Explore* (NY)2020 Sep 25;S1550-8307(20)30307-4.

Patent- Artificial intelligence based portable electronic device for the management of Diabetes and high cholesterol without medication: application number TEMP/E-1/10836/2020-DEL

21) Project Title: Comprehensive analysis and statistical modelling candidate genes and biomarkers in age related macular degeneration in North West Indian cohort and their clinical correlation

Status: Completed

Funding Agency: DST

Total Cost: 3500779

Summary: For 280 ARMD patients and 150 controls TIMP3, LIPC, IER3/DDR1, SLC16A8, ADAMTS9/MIR548A2, B3GALTL, HTRA1, APOE, ELISA and SNP analysis has been carried out. The Socio-demographic data has been collected and analyzed. Additionally, 80 new ARMD patients have been collected for which TGFBR1, RAD51B, TNFRSF10A, COL10A1, COL8A1/FILIP1L, VEGF, ARMS2, ELISA for 42 new and a few previously collected samples has been carried out. The socio-demographic data is being collected for new patients simultaneously.

Selected Publications:

- i) Battu P, Sharma K, Thangavel R, Singh R, Sharma S, **Anand A***, Genotyping of Clinical parameters in Age Related Macular Degeneration 2022, (*Clinical Opthal* 2022 Feb 25; 16: 517-29)
- ii) Sharma K, Sharma NK, Singh R, Sharma SK. **Anand A***. Gene networks determine predisposition to AMD. *Genomics* 2020, S0888-7543(20)30387-6.
- iii) **Anand A***, Sharma K, Sharma SK, Singh R, Sharma NK, Prasad K. AMD Genetics in India: The Missing Links, *Front Aging Neurosci* 2016 May 23;8:115

Patent: 1. Diagnostic Serum Bio-Marker to improve the Clinical Outcome of AMD Treatment and Method Thereof.

22) Project Title: Role of Diabetic Yoga Protocol in Biochemical and Molecular Profile of Pre-Diabetic Population

Status: Completed

Funding Agency: ICSSR

Total Cost: 10,00,00

Summary:

Diabetes is a metabolic illness caused by insulin deficiency, insulin activity in the body or both, and disturbed carbohydrate, protein, or fat metabolism. Pre-diabetes is elevated glucose level that is more than normal and lower than diabetes patients. Different psychological factors such as anxiety, depression and stress are closely associated with early-onset of diabetes and diabetes progression. These factors also increase the conversion rate from pre-diabetes to diabetes. Studies have shown that physical activity can improve insulin sensitivity and reduce blood glucose level and also prevent the progression of diabetes. Yoga has also re-emerged as a new intervention for risk reduction. The result of the present study revealed that three months of specifically designed Diabetic Yoga Protocol (DYP) for prediabetics exerted positive effect on Glycemic parameters, Neuropsychological parameters, Anthropometric parameters, Prakriti (improves Tridosha) and total Quality of Life in prediabetic individuals was assessed. Moreover, the Yoga and meditative practices also improved molecular biomarkers of angiogenesis (VEGF and angiogenin) and neurogenesis (BDNF). Therefore, Yoga practices may have rejuvenating and adjunct effects on halting the conversion from prediabetes and diabetes and believed to be mediated by molecular pathways like angiogenesis and neurogenesis.

Selected Publications:

- 23) **Project Title:** The role of Yogic breathing techniques among quarantined HCWs, COVID-19 positive and COVID 19 convalescent patients: A randomized clinical trial

Status: Completed

Funding Agency: AYUSH

Total Cost: 8,29,950/-

Comorbidities and low immunity increase susceptibility and severity of COVID-19. Increased stress and anxiety during the pandemic affect immunity and increase risk of COVID-19. Yoga and meditation reduce risk of infectious and non-infectious diseases associated with respiratory distress. Yogic breathing also facilitates ventilation and reduces breathlessness. However, the effect of Yogic breathing on COVID-patients during and after the infection remains unclear. COVID-positive practiced a 5-min routine and COVID-recovered and health care workers (HCWs) practiced 5-min and 18-min routines for 15 days. Among 18 biomarkers, the breathing intervention maintained WBC count and improved D-dimer, a predictor of COVID-19 severity, in such subjects ($p < 0.01$). We also report lower D-dimer levels in susceptible HCWs practicing Yoga ($p < 0.01$). Distance covered in 6-min walk test increased after intervention in COVID-positive ($p = 0.01$) and HCW ($p < 0.01$). We show that stamina and exercise capacity improved in COVID-patients, recovered subjects and HCWs after the intervention. None of the nine neuropsychological scales showed significant difference. Yogic breathing is capable of improving health in mild and moderate cases of COVID-19. Intervention lowered D-dimer, thus reducing thrombosis, venous thromboembolism and vaccine-induced thrombotic thrombocytopenia in vaccinated individuals. Thus, lowering of D-dimer is also beneficial in high-altitude induced venous thromboembolism. Yogic breathing may be considered before and during high-altitude travel as high-altitude exposure leads to hypercoagulable state. We suggest that Yogic breathing may be considered as an integrative approach for management of COVID-patients and is also beneficial for HCWs. Yogic breathing may also be practiced as a precautionary measure.

Selected Publications: *Communicated*

- 24). **Project Title:** Effect of Yoga on pregnancy outcome and on Umbilical Cord Blood derived stem cells.

Status: ongoing

Funding Agency: AYUSH

Total Cost: 8,29,950/-

Patent Applications:

- 1) Biological Agent for reversing memory loss and method thereof; Application no Temp/E-1/40726/2019-DEL
- 2) Artificial intelligence based portable electronic device for the management of Diabetes and high cholesterol without medication: application number TEMP/E-1/10836/2020-DEL
- 3) Plasma bio-markers for diagnosis and prediction of ALS (Amyotrophic Lateral Sclerosis) application number TEMP/E-1/17033/2020-DEL
- 4) Diagnostic Serum Bio-Marker to improve the Clinical Outcome of AMD Treatment and Method Thereof.

*Equal First or corresponding or co-corresponding author or all=**199**; Total citations=**4334**

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2. Kumar S, Avti P K, Anand A, Soni K K*. Role of yoga in Adolscnt Mental Health: A Mini Review *Current Psychiatry Research and Review* 2024 (under review)

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2. Kumari S, Rain M, Gautam M, Kumar KK, **Anand A**, Maity K. Yoga and Meditation for Adolescents. In Puri S, Duggal M, Singh A (2023) (Eds.), *Interdisciplinary Approach For Adolescent Health*. **Mohindra Publishing House**. ISBN: 978-93-90758-99-9
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206. English D, **Anand A**, Veram S.R, Stefan Gluck. Neural Stem Cells: New Hope for successful therapy. *Stem Cell and Regenerative Medicine*, 2010,100-2.
207. Denis English, **Anand A**, Rama Verma and Stephan Gluck. Neural stem cells. In: HS Cheung, editor. Stem Cell Biology: An update, 2010, **Bentham Publishers**;

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208. **Anand A***. Vinish M, Prabhakar S, A Case of manifesting Carrier with DMD Phenotype. *Acta Medica*2009;52(4):167-70 1
209. Lenka N, and **Anand A**. Advancements in Stem Cell Research-An Indian perspective. *Annals of Neurosciences* 2009;16(3):97.
210. **Anand A***. The long and short of it. Editorial. *Annals of Neurosciences* 2009;16(2):45.
211. **Anand A***. Science entrepreneurship: Challenges and opportunities in India. *Journal of Public Administration and Policy Research*. 2009;1(1):1–3.
212. **Anand A***. Journal needs aggressive policy. Editorial. *Annals of Neurosciences*. 2009;16(1):1.
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222. Ambati J, **Anand A**, Fernandez S, Sakurai E, Lynn BC, Kuziel WA, Rollins BJ, Ambati BK. An animal model of age-related macular degeneration in senescent Ccl-2- or Ccr-2-deficient mice. *Nature Medicine* 2003; 9:1390-1397.
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2002

224. Prabhakar S, **Anand A**. Detection of 1583 bp gene transcript in lymphocytes of muscular dystrophy patients. *Neurology India* 2002; 50(4):537-8.1

2001

225. **Anand A*** In: Manufacturing of Gene Therapeutics: Gene Delivery: **Ed G Subramanian**, 2001:245-272 (*Kluwer/Plenum Academic Press*).
226. **Anand A*** and Arora SK. In Manufacturing of Gene therapeutics: Risk assessment in Gene therapy: Ed G Subramanian, 2001:331-338 (*Kluwer/Plenum Academic Press*).
227. KaurJ, Mukesh M and **Anand A*** In: Manufacturing of Gene Therapeutics: Gene Expression: Ed G Subramanian, 2001:45-58 (*Kluwer/Plenum Academic Press*).

2000

228. **Anand A***. Hijacking regulation of metabolism: Is gene therapy risky? 2000 Editorial *The Tribune*

1999

229. **Anand A***, Prabhakar S, Kaul D. Genetic polymorphism in muscle biopsies of Duchenne and Becker muscular dystrophy patients. *Neurology India* 1999; 47(3):218-223.

1998

230. **Anand A***, Prabhakar S, Kaul D. Molecular diagnosis of DMD/BMD. *Neurology India* 1998; 46(4):256-260.

Book Editor

1. Anand A. (Ed) Quality Assurance Implementation in Clinical Research Labs. 2021, **Springer Nature**. SBIN 978-981-16-3074-3.
2. Invited for write a Book "Neuroscience of Yoga- Theory and Practice" 2021, **Springer Nature**

New Services Introduced (in 2014)

MLPA based genetic analysis of Recessive Ataxias, Retinitis Pigmentosa, Alzheimer's Disease, Parkinson's Disease, Leukodystrophy, spinomuscular atrophy, DMD, Dystonia, Segawa Disease, AMD, Migraine, Frontotemporal Dementia, Corticobasal degeneration, progressive supranuclear palsy

Future Plans

- Evaluation of Indian herbal drugs and biotherapeutics using animal models
- Establishment of Integrative health research center

Achievements, Awards and Honors

INTERNATIONAL

Fellowships

1. Travel Fellowship, 41st Annual Meeting of the Japan Neuroscience Society at Kobe, JAPAN from July 25-29, 2018
2. Min of Health Travel Fellowship (SL), International Conference on Traditional Medicine at Colombo, SRI LANKA from November 23-25, 2017.
3. Travel Award, Symposium on "Brain Ageing and Dementia in LMICS" at Nairobi from December 06-09, 2016
4. Travel Award, XXII Biennial Meeting of the International Society for Eye Research (ICER) at Tokyo, JAPAN from September 25-29, 2016
5. Travel Fellowship, 1st National Festival and international Congress of Stem Cell and Regenerative Medicine" at Tehran, IRAN from May 19-21, 2016
6. IBRO-ARC Fellowship for Conference on Epigenetics and Neurological Disorders: from bench side to bedside at Mansura, EGYPT Oct 19-25, 2014.
7. WOC Fellowship for World Ophthalmology Congress 2014 at Tokyo, JAPAN, April 02-06, 2014.
8. ICGEB Fellowship for Application of Neural Stem Cells and Mouse Models in Neuroscience" at Zagreb, CROATIA, Oct 02-05, 2013.
9. India Network Awards Travel Grant for Annual Meeting of Society for Neurosciences in San Diego, USA in November 2013.
10. Royan International Twin Congress Travel award, on "Reproductive Biomedicine and Stem Cells Biology & Technology" at Tehran, IRAN, September 04-06, 2013.
11. ICGEB Fellowship for Bioethics and Ethical Aspects of Biosafety, Teheran IRAN, Nov 20- 22, 2011.
12. WFN Fellowship for 20th World Congress of Neurology Marrakesh, MOROCCO, Nov 12-17, 2011.
13. IBRO Fellowship for IBRO 8th World Congress of Neurosciences Florence, ITALY, July 14-18, 2011.
14. IBRO fellowship for School of Neuroinfection and Worldwide Impact held in St Denis Reunion Island, France Dec 2nd - 6th 2010
15. WFN Fellowship for World Stroke Congress, Seoul, KOREA, Oct 13th-16th 2010.
16. Travel Award: 32nd Japanese Neuroscience Society Conference. Nagoya, JAPAN, September 16-18, 2009
17. Fellowship to attend IBRO School on Neural Degeneration & Regeneration. Vancouver, B.C. CANADA. May 24 to June 4, 2009
18. WFN Fellowship to attend XVII World Congress on Parkinson's disease and related disorders at Amsterdam, NETHERLANDS, in 9-13, Dec 2007.
19. Movement Disorder Society (MDS) Travel award, 11th Congress on movement Disorders, Istanbul, TURKEY, June 3-7, 2007.
20. World Federation of Neurology (WFN) Travel Award, WFN meeting, Sydney, AUSTRALIA, Nov 5-11, 2006.
21. Japanese Neurosciences Society Travel fellowship, 29th Annual meeting of JNS, Kyoto, JAPAN, July 18- 21, 2006.
22. Pro retina fellowship to deliver a talk at Potsdam retina meeting in Potsdam from April 7-8, 2006 Potsdam, GERMANY
23. International Award by American Academy of Neurology, at 58th Annual meeting of AAN, San Diego, USA from April 1-7, 2006.
24. International Brain Research Organization International Travel Award American Academy of Neurology meeting, San Diego, USA, Oct 2006.

25. World Federation of Neurology-GlaxoSmithKline Junior Travelling Fellowship to attend World Congress of Neurology, Sydney, Australia, June 2005.
26. Bausch and Lomb Travelling fellowship for 2nd SERI-ARVO meeting in SINGAPORE, Feb 16-21, 2005.
27. Young Investigator Travel Grant Award, Vanderbilt University, Nashville, USA Oct 2004.

INTERNATIONAL

Honors

- Best Paper Award: Role of early life exposure and environment on neurodegeneration: implications on brain disorders. *Transl Neurodegener.* 2014 Apr 29;3:9
- Chairman of a session at Symposium for Yoga Research Online, International Association of Yoga Therapists, Boston, USA Nov 15-16, 2021
- Program Director, American Academy of Yoga and Meditation (AAYM) June 2021.
- Member of the scientific program committee International Association of Yoga Therapists annual Symposium on Yoga Research for the 2021 and 2022, USA.
- Scientific Advisory Board Member, Center for Consciousness, Cognition and Compassion, Beth Israel Deaconess Medical Center, Harvard University, Boston, USA
- Advisory Board Member, American Academy of Yoga and Meditation (AAYM)- 2020.
- Concluding Remarks, Webinar on “Role of Ayurveda and COVID-19 Management” organizing by Embassy of India, Tokyo on 28 September, 2020.
- Panel Moderator, International Conference in Integrative Medicine (ICIM) at Singapore from 4-6 September, 2020
- Chairperson, “*Social and Cultural Factors in Learning* International Science of Learning Conference, to be at Brisbane, Australia, September 18 to 20, 2017.
- Visiting Professor, Kyoto Prefectural University of Medicine, Japan-2017-2020.
- Visiting Professor, Lesya Ukrainika Eastern European National University, Lutsk-2018.
- Co-Chairman Plenary Session- International Conference on “System organization psychophysiological and autonomic functions (medical-biological aspects)” at Lutsk, Ukraine, from June 8-10, 2016.
- Panel Discussion Member, IBRO-APRC Neuroscience School at Sri Lanka, December 14th – 20th, 2015.
- Advocacy and Outreach Committee (AOC) Member, Association for Research in Vision and Ophthalmology (ARVO)- 2015
- Advisor, Royal University of Bhutan.
- Chairperson, Indo- Bhutan International Seminar on Advances in Environment Sciences BHUTAN, May 10-14, 2012.
- Chairperson, 2nd International Conference on Environment and Biotechnology MALDIVES, Nov 25-26, 2011
- Chairperson, 10th South East Asia Regional Scientific Meeting of the International Epidemiological Association, Colombo, SRI LANKA, 23rd- 26th May, 2010.
- Chairperson, Bangladesh Society for Biochemistry and Molecular Biology, Dhaka, BANGLADESH Jan 29- 31, 2010
- Designated as “*Expert on Mission*” by International Centre of Genetic Engineering and Biotechnology, ITALY, 2006.
- Grand Awards Judge, Intel International Science and Engineering Fair, May 11-17, 2003, Cleveland, USA.
- Special Awards Judge, Intel International Science and Engineering Fair, May 12-18, 2002, Louisville, USA.
- **Adhoc Reviewer:** Advisory on Tele Yoga Services, Medical Science Monitor, Clinical Genetics, Current Drug Discovery Technologies, Translational Epigenetics” (book series),

Journal of Herbal Medicine, Hematology & Transfusion International Journal, International Journal of Brain Disorders Therapy, Survey of Ophthalmology, Environmental geochemistry and Health, Arquivos Brasileiros de Oftalmologia, Current Traditional Medicine, Research proposal Department of Biotechnology Government of West Bengal. British Journal of Pharmaceutical Research, Indian Journal of Medical Research, Biomarkers in Medicine, Neural Regeneration Research, Electronic Journal of Biotechnology, Journal of autoimmunity and Research, International journal of Psychology and psychoanalysis, Dove Medical Press: Journal of Pharmacogenomics and Personalized Medicine, Journal of Ethnopharmacology, Journal of Folia Medica, Journal of Neural Regeneration Research, Journal of Drug Design Development and Therapy, Journal of Brain Research, Neurology India, International Journal of Stroke, Journal of Cellular Physiology, Biomarker Insights, ECAM, Aging and Disease, Tissue and Cell, Pathophysiology, World Journal of Stem Cells, Cell Proliferation, British Journal of Medicine and Medical Research, Journal of BMJ Case Reports, IOVS, Journal of Metabolic Brain Disease, The European Journal of Pharmacology, Ophthalmology, Review for Eye, Expert Opinion on Therapeutic Targets Referee Guidelines, Current Alzheimer's Research, Pathophysiology, Muscle and Nerve, Amyotrophic lateral Sclerosis, Ophthalmology, European Journal of Pharmacology, Frontiers in Neuroscience, Journal of Genetics, Experimental Neurology, Stem Cells and Development, Neurobiology of Disease, Review of Policy Research, Journal of Chinese Integrative Medicine, Frontiers in Behavioral Neurosciences, PLoS One, Pharmacology Brain and Behavior, Gene, Medicine, Principles and Practices

Awards

- International Award by American Academy of Neurology, at 58th Annual meeting of AAN, San Diego, USA from April 1-7, 2006
- Retina Research Foundation / Joseph M. and Eula C. Lawrence Award, USA, 2003.

NATIONAL

Travel Fellowship

1. Indian Council of Medical Research (ICMR) Travel Fellowship.(2015)
2. Department of Biotechnology (DBT) Fellowship (2013)
3. Tilok Tirath Vidyawati Chhuttani Charitable Trust and Chhuttani Medical Centre (TTVCCT) Travel Fellowship.
4. Indian Council of Medical Research (ICMR) Travel Fellowship.
5. Indian National Science Academy (INSA) Travel Fellowship.
6. Department of Science & Technology (DST) Travel Fellowship.
7. Centre for Cooperation in Science and Technology among Developing Societies(CCSTDS) Fellowship.
8. Department of Science and Technology (DST) Fellowship.
9. Department of Biotechnology (DBT) Fellowship.
10. Council of Scientific and Industrial Research (CSIR) Fellowship.

NATIONAL

Honors

- Chairperson, Socially impactful and value-laden approach to Healthcare at AIIMS, Delhi from August 23 to 25, 2023
- DSc (Yoga) SVYASA, Bengaluru, 2022
- Member, Inter-University Centre for Yogic Sciences (IUC-YS), Bengaluru.
- Chairperson, 5th National Conference on Tobacco or Health (NCTOH) at Department of Community Medicine & School of Public Health, PGIMER, Chandigarh from 25th – 27th September 2021
- Adjunct Professor, Panjab University, Centre for Cognitive Sciences and Phenomenology, Department of Philosophy, Chandigarh
- Advisor of Research Sivananda Yoga Vedanta Academy, Bhubaneswar.
- Member of Academic and Administrative Committee, Center of Phenomenology and Cognitive Sciences- 2021
- Panel Member, YANTRA-2020 at Bangalore on 10th October,2020.
- Fellow, Indian Academy of Neurosciences-2020
- Panel Member, Global Summit of Indian Overseas Researchers and Academicians Vaishvik Bhartiya Vaigyanik (VAIBHAV) at AIIMS, Rishikesh on 2 October 2020.
- Visiting Distinguished Professor, Vivekananda Yoga Anusandhana Samsthana (S-VYASA)-2020.
- Guest of Honour, Webinar on Yoga for world health at Shri Krishna AYUSH university, Kurukshetra on 19 June, 2020.
- Judge as Oral/Poster presentation in 23rd International Conference on frontiers in Yoga Research and Its Applications at SVYASA, Bengaluru from 03-06 Jan, 2020.
- Chairperson, 23rd International Conference on frontiers in Yoga Research and Its Applications at SVYASA, Bengaluru from 03-06 Jan, 2020.
- Invited as a Chief Speaker: National Education Policy-2019, All India Education Institute at Seva Dhaam Sector 29, Chandigarh, on 27 July, 2019.
- Jury Members, CBME MedTech Workshop (CMTW'19) at IIT Ropar from 07-10 March, 2019.
- Chairperson, “Golden Jubilee Celebration of the Insecticides Act 1968 (Promoting Food Safety and Security)” organized by IIBAT at Faridabad, Haryana on 22nd February, 2019.
- Chief Guest, Celebrating Darwin week between at IISER Mohali from 11-16 February,2019.
- Visiting Senior Scientist, Sri Sri Institute of Advanced Research, Bengaluru 2018
- Jury Member, National Biomedical Research Competition (NBRCom-2018) at AIIMS, Rishikesh.
- Chairperson& Panelist, Symposium on “Advances in Genetic Diagnosis of Neurological Disorders” at Chennai from 07th – 9th September 2018.
- Chairperson, “Brain storming session on *Panchagavya* Ayurved at Deolapar, Nagpur from 18th –19th August, 2018.
- Panel Member, “Digital Revolution in Business: Convergence and Integration” at Panjab University, Chandigarh 27thand September, 27th2017.
- Zonal Coordinator- *Niyantrita Madhumeha Bharata* (NMB) Abhiyaan a project of Indian Yoga Association, funded by Central Council for Research in Yoga and Naturopathy (CCRYN).
- Member, Scientific advisory committee *Niyantrita Madhumeha Bharata Abhiyaan*.
- Chairperson, “Yoga for Good Life” Organised by Chandigarh Administration at Chandigarh, June 09-12, 2016
- Guest Speaker, Nationwide Evidence Based Program of Patanjali Research Foundation at Patanjali Yogpeeth, Haridwar, April 15, 2016
- Chair, International Conference on Recent trends in Information Technology-2016(ICRTIT) at Chennai, April 08-09,2016.
- Chair, 41st ISHG Conference-2016 at Chennai, March 3-5, 2016.

- Panel Member, Introspection on Borderless Neuroscience Research in India Indian Academy of Neurosciences, Chandigarh, October 31st – November 2, 2015.
- Member, Expert Group Meeting for Stem Cell in Neurology, Delhi- 2015
- Member, Expert Group Meeting for Stem cell Research in ICMR, Delhi-2014
- Member, National Advisory Committee, Institute of Holistic Medical Sciences (IHMS), Kottayam, Kerala-2014
- Chairperson, XXXII Annual Conference of Indian Academy of Neurosciences (IAN) at Bangalore November 01-03, 2014.
- Chair, 11th PG Convention of Indian Society of Pedodontics & Preventive Dentistry, at PGIMER, Chandigarh, Feb 9-11, 2014.
- Member, National Advisory Committee, Institute of Holistic Medical Sciences (IHMS), Kottayam, Kerala-2013
- Chairperson, National Seminar on “Intelligent Computing In Biological Sciences” (ICIBS) in Mumbai March, 20-25, 2012
- Chairperson, CME in Regenerative and Transplantation Medicine in Ophthalmology in Bengaluru, Nov 12-15, 2011
- Chairperson, XXIX Annual Conference of Indian Academy of Neurosciences, New Delhi, 30th Oct-1st Nov, 2011.
- Chairperson, International Conference of Holistic Medicine (ICHM), Kottayam, Kerala, Sep 11-13, 2011.
- Awards Judge, National Brain & Behavior Awareness Program, 2011
- Member, IC-SCRT, Unistem Inc
- Chairperson, Recent “Advances in Herbal Technology” organized by Lakshmi Narain College of Technology, Bhopal. March 26th-27th 2010.
- Chairperson, Young Scientist Forum, National Symposium on Genetics and Family Welfare, Thrissur, Kerala, Oct. 2008
- Fellow, Summer school on ‘Working of Mind’ June 3-24th 2000, Organized by Indian Institute of Advanced Studies, Rashtrapati Niwas, Shimla.
- Faculty, National Centre of Human Genomics, Panjab University, Chandigarh, Sep 2005-
- Advisor, Indian Muscular Dystrophy Association, Chandigarh-2001-
- Member, Board of Conveners, HNB Garhwal University, Srinagar, Uttrakhand

Awards

- Honorary DSc (Yoga) by SVYASA, Bengaluru, 2022
- Dr. Keshav Baliram Hegdewar Healing Award (2021) contribution to the Integrative & Preventive Healthcare.
- Awarded by Panjab University Alumni Association for Stellar contribution to the field of Neuroscience-2019.
- UT honor for exemplary work for advancement of Yoga Research-2019
- Bharat Nirman Award- 2017, India International Science festival- 2017 (represented by Student)
- Skoch Order-of –Merit awarded Annals of Neurosciences Top 100 Projects in India for Swachh Bhatat abhiyan-2016
- Quality Council of India (QCI) -D.L. Shah Quality Award – 2016.
- Indian Council of Medical Research (ICMR) Amrut Mody Unichem Prize- 2012
- Annual PGI faculty award-2014
- Sardar Vallabhabhi Patel Foundation, 9th International Prestigious Sardar Patel Award, July 2014
- Quality Council of India (QCI) -D.L. Shah Quality Award – 2014.

- Annual PGI faculty award-2013
- Scopus Young Scientist Award Runner up, National Academy of Sciences India, New Delhi, April 2012
- Indian Council of Medical Research (ICMR) Shakuntla Amir Chand Award (2010)
- Young Scientist Research Award, Department of Atomic Energy documents, Bhabha Atomic Research Centre, Mumbai, Dec 2005

Grant Reviewer

- AFM Grant Reviewer, France
- The Stroke Foundation's, Melbourne, Australia.
- Department of Biotechnology Government of West Bengal
- Fight for Sight Pioneering eye research.
- Indian Council of Medical Research (ICMR)
- Department of Biotechnology(DBT)
- Portuguese Foundation for Science and Technology (FCT) - FTO
- ICMR Stem Cell Task Force.
- Kerala State Council for Science, Technology & Environment.
- SATYAM Task Force, DST, New Delhi

Editorship

- Editor-in-Chief, Annals of Neurosciences, INDIA, 2009-2020
- Editor-in-Chief, Integrative Medicine International, 2017-18
- Editor-in-Chief, Integrative Medicine Case Reports, 2019-
- Member EIC, Publication Integrity & Ethics-2013.
- Editorial Board Member, Journal of Chinese Integrative Medicine.
- Editorial Board Member, Neuroepidemiology, KARGER, 2009-
- Reviews Editor, Frontiers of Behavioral Neuroscience, 2009-
- Editorial Board Member, Kyung Hee University Seoul, South Korea, 2010-
- Editorial Board Member, Journal of KIMSU, 2011.
- Editorial Board Member, World Journal of Psychiatry-2016
- Editorial Board Member, Scientific Reports Nature Publishing Group USA, 2012-
- Associate Editor: The Journal of Alzheimer's Disease until 31 December 2016
- Editorial Board Member: Lesya Ukrainka Eastern European National University Scientific Bulletin.
- Editorial Board Member: Medicina
- Editorial Board Member: Indian Journal of Psychological Science- 2020

Invited

- Editorial Advisory Board, User-Driven Healthcare and Narrative Medicine: Utilizing Collaborative Social Networks and Technologies. 2013-
- Editor in Chief, Integrative Medicine Case Reports
- Guest Editor: Current Neuropharmacology, CNS & Neurological Disorders-Drug Targets, Special Issue for BioMed Research International. 2013-
- Book Editor: Bentham Science Publishers- 2013.

- Editorial Board Member, Evidence-Based Complementary and Alternative Medicine.2013-
- Editorial Board Member, Global Journal of Human Anatomy and Physiology Research-2013.
- Editorial Board Member, International Journal of Ophthalmology & Eye Science (IJOES)-2013.
- Editorial Board Member, Journal of Bone Marrow Biology-2014.
- Book Editor: SM Group: Open Access eBooks-2014.
- Editorial Board Member: Austin Alzheimer's and Parkinson's Disease-2014.
- Guest Editor : Special Issue for Parkinson's Disease-2014.
- Editorial Board Member: Journal of Therapeutic Targets for Neurological Diseases-2014.
- Editorial Board Member: Stem Cell & Research-2014.
- Editorial Board Member: Global Journal of Pathology and Microbiology-2014.
- Editorial Board Member International Journal of Hematology Research-2014.
- Guest Editor: Biomaterials and Tissue Engineering Bulletin (BTEB)- 2015.
- Guest Editor: Special Issue for "Neurodegenerative disease in Elderly" for Annals of Gerontology and Geriatric Research.-2015
- Editorial Board Member: Global Journal of Immunology and Allergic Diseases-2015
- Guest Editor: Special Issue for "Cell based therapies for blindness: challenges and applications" for Journal of Ophthalmology -2015
- Managing Editor: Frontiers in Bioscience
- Editorial Board Member: SRL Alzheimer's & Parkinson's Disease-2015
- Editorial Board Member: Journal of Austin Neurology-2015
- Editorial Board Member:Austin-Psychiatry-2016
- Editorial Board Member: International journal of Brain Disorders Therapy-2016
- Editorial Board Member: The Scientific Pages of Translational Neuroscience.-2016
- Editorial Board Member: The Scientific Pages of Psychiatry-2016
- Guest Editor: Neurology and Neuroscience special topic " Modeling Traumatic Brain Injury".

Member of Professional Bodies

- Advisory Board Member, IIT Mandi, HP-2023
- Member, Standing Selection Committee (SSC), AIIMS Bhopal - 2023
- Member, Space Allowment Committee, PGIMER, Chandigarh -2023
- Member Task force, Himanchal Government One Nation One Health- 2023
- Member Task force, Model Jail, Chandigarh 2021.
- Member Task force, Science and Technology of Yoga and Meditation (SATYAM) DST, 2021.
- Member of Academic and Administrative Committee, Center of Phenomenology and Cognitive Sciences, Panjab University- 2021
- Member of the scientific program committee International Association of Yoga Therapists annual Symposium on Yoga Research for the 2021 and 2022, USA.
- Member, Arogya Bharti
- Life Member, Indian Yoga Association
- Vice Chairman, India Yoga Association, (Chandigarh Chapter).
- Member, Inter-University Center for Yogic Sciences(IUC-YS), Bengaluru
- Scientific Advisory Board Member, Center for Consciousness, Cognition and Compassion, Beth Israel Deaconess Medical Center, Harvard University, Boston, USA
- Advisory Board Member, American Academy of Yoga and Meditation (AAYM)- 2020.
- Member Task force, Science and Technology of Yoga and Meditation (SATYAM) DST, 2020.

- Member, Institutional Ethics Committee, Haryana Yog Council- 2020
- Advisory Board Member, Sardar Vallabhbhai Patel Foundation Trust, New Delhi-2020
- Member, Research Degree Committee Centre for System Biology and Bioinformatics, Punjab University (2016-19)
- Member, Institutional (Human) Ethics Committee Indian Institute of Technology (IIT) Ropar (2015)
- Member, Research Degree Committee Punjab University (2013)
- Panel Member, 'Neuroscience Education and Training' Indian Academy of Neurosciences, Amritsar- 2012
- Executive member, Indian Academy of Neurosciences, 2009-18
- Young Scientist Membership, Humboldt Academy, January 17, 2005 Chandigarh
- Indian Immunology Society
- Neurology Society of India
- Association for Research in Vision and Ophthalmology
- Society for Neurosciences, USA
- International Bayesian Society, Australia.
- Japanese Neurosciences Society.

Scientific Enterprises

1. **Convener**- International Yoga Day -2023 at PGIMER, Chandigarh on 21 June, 2023.
2. **Convener**- International Yoga Day -2022 at PGIMER, Chandigarh on 21 June, 2022.
3. **Member, Scientific Committee**, Symposium for Yoga Research Online, International Association of Yoga Therapists, Boston, USA Oct 17-20, 2022
4. **Member, Scientific Committee**, Symposium for Yoga Research Online, International Association of Yoga Therapists, Boston, USA Nov 15-16, 2021
5. **Convener**- International Yoga Day -2021 at PGIMER, Chandigarh on 21 June, 2021.
6. **Co-Program Director** - International Yoga Con June 2021 - Yoga for Prevention of Disease and Promotion of Health at American Academy of Yoga & Meditation (AAYM) on June 12-13th, 2021.
7. **Convener**- Symposia on The role of Yoga in thyroid problems– a Lifespan perspective at ASSOCHAM AYUSH Mela on 1st November, 2020.
8. **Convener**- International Yoga Day -2020 at PGIMER, Chandigarh on 21 June, 2020.
9. **Organizing Secretary**: International Webinar on A roadmap to sustainable development thorough Sports, Yoga, Art, Music and culture during Covid-19 Pandemic, on 30 April ,2020.
10. **Convener**- Symposium on Mind Body Medicine, XXXVIII Annual meeting of Indian Academy of Neurosciences at Hyderabad, October 04-7, 2020.
11. **Convener**- "Yoga scholars PGIMER" 225 day continuous lockdown series for wellness and science of yoga.
12. **Resource Person**- 4th Mega Health Camp with Joshi Foundation-2019.
13. **Co-Convener**: Workshop on Scientific Communication and submitting manuscript for publication, XXXVII Annual meeting of Indian Academy of Neurosciences at AIIMS New Delhi on Nov 18, 2019
14. **Convener**- Workshop on Yoga and yoga Therapy: The Science and Science and Research-II at PGIMER on March 25, 2019
15. **Co- Director**- Symposium and Workshop on the role of meditation in cardiovascular diseases at AIIMS Rishikesh on 09th- 10th Mar 2019.
16. **Resource Person**- 3rd Mega Health Camp with Joshi Foundation-2018 on 25, Nov, 2018.

17. **Convener**- Symposium on *Panchagavya*: Ayurvedic and modern perspectives, XXXVI Annual meeting of Indian Academy of Neurosciences at Varanasi, October 30, 2018.
18. **Organizer**-Yoga workshop in PGIMER, Chandigarh March 17/03/2018.
19. **Convener**- Symposium on Art of imperfect brain, XXXV Annual Conference of Indian Academy of Neurosciences at Ravenshaw University, Cuttack October 28, 2017.
20. **Convener**- Niyantrita Madhumeha Bharata (NMB) Abhiyan a project of Indian Yoga Association, funded by Central Council for Research in Yoga and Naturopathy (CCRYN)- 2017.
21. **Convener**-Symposium on Neuroscience of Re-emerging Breathing Exercises, XXXIV Annual Conference of Indian Academy of Neurosciences at NBRC, Manesar, New Delhi October 19, 2016
22. **Co- Convener**- "Yoga for Good Life" Organised by Chandigarh Administration and Annals of Neuroscience at Chandigarh, June 09-12, 2016.
23. **Co- organizer**- Symposium on Borderless Neuroscience, XXXIII Annual Conference of Indian Academy of Neurosciences at Panjab university, Chandigarh October 31- November 02, 2015
24. **Co-organizer**- Blood Donation and Health Camp with Joshi Foundation-2015.
25. **Organizer** - Preconference workshop on molecular tools for stem cell biology, 10thFeb, 2014, PGIMER, Chandigarh.
26. **Convener**- 11thIndian Society of Pedodontics & Preventive Dentistry (ISPPD) PG Convention, February 9-11,2014, PGIMER, Chandigarh.
27. **Organizer** - Introduction to Noble Prize Winners-2013, PGI, Chandigarh.
28. **Convener**-Mini symposium "Implementing Research and Training Audits in Academic Research Institutions", October 24, 2013. Allahabad, INDIA
29. **Organizer** - Introduction to Noble Prize Winners-2012, PGI, Chandigarh.
30. **Convener**- Program committee 'Third International Conference on Holistic Medicine SRILANKA.
31. **Convener**- Neuroscience Communication in Emerging Economies: The Challenge of Change, October 27th, 2012. Guru Nanak Dev University, Amritsar, INDIA.
32. **Convener**-National Seminar on "Technology Advances in Molecular Diagnosis": Bedside to Bench, September 5th 2012. PGIMER, Chandigarh, INDIA.
33. **Co-organizer** - Technology Advances in Molecular Biology: From Gene cloning to Expression Profiling, July 23, 2002, University of Kentucky, USA.

Employment Generation

Neuroscience Research Lab is exclusively funded by extra mural agencies and has pioneered employment opportunities through its intellectual capital. About 22 individuals have found job opportunities which included JRFs, SRFs, RAs etc. Editorial office of Annals of Neurosciences and Integrative Medicine Case Reports which is part and parcel of this facility also provides similar opportunities.

Policy Research

Neuroscience Research Lab has pioneered over 30 publications in the field of Policy Research that have ranged from Quality Assurance, Integrative Medicine, National Medical Commission, Patient Cost audit and Academician Social Responsibility. This has laid the foundation of several national policies in the country and led to launch of many innovative research projects. The volunteers have also partnered with several non profit organisations for social and entrepreneurial projects.

ONLINE Continuous Yoga Education series was organised under the aegis of Journal of Integrative Medicine Case Reports wherein several prominent Yoga academics took yoga sessions, many trainers performed live Facebook live sessions evoking excellent response. This continued to a period of one month without interruption"

Resource Faculty

International

1. Invited Talk, Consciousness: Science, Spirituality and Social Impact. Beth Israel Deaconess Medical Center, Harvard University. 330 Brookline Ave, Boston, Oct 20th to 27th , 2023
2. Invited Speaker, Symposium on Yoga Research (SYR) at Kripalu Center for Yoga & Health, Stockbridge, MA, USA Oct 16th- 18th , 2023
1. Poster Presenter: ARVO- 2023. San Diego , CA, USA,21th to 27th April, 2023.
2. Poster Presenter: Neuroscience 2022. San Diego , CA, USA,12th to 16th November, 2022.
3. Invited Talk, Society for Integrative Oncology (SIO)19th International Conference, Scottsdale, Arizona, USA. 20-22 Oct 2022
4. Invited Talk, Fellowship Program in Integrative Medicine. Harvard Medical School 1309 Beacon Street Brookline Massachusetts, 26 OCT 2022
5. Invited Speaker, Workshop on Yoga for faculty and staff. Beth Israel Deaconess Medical Center, Harvard University. 330 Brookline Ave, Boston, MA 02215, 21-24 OCT 2022
6. Invited Speaker, Symposium on Yoga Research. Kripalu Center for Yoga & Health in Stockbridge, MA, USA, 17th to 19th Oct 2022
7. Invited Speaker, Annual meeting Neuro 2022 connecting Brain Science. Okinawa Convention Center Japan 30th June to 3rd Jul 2022
8. Sadhguru Center's Scientific Advisory Board Meeting: Summer Convening. 16th June 2022
9. Guest Speaker: 5th International Conference of Asian Yoga Therapy Association at Singapore on 25th-26th September, 2021
10. Invited Talk, 2021 Hauora Yoga Conference, Christchurch, New Zealand, Nov 7, 2021 ONLINE
11. Guest Speaker: 5th International Conference of Asian Yoga Therapy Association at Singapore on 25th-26th September 2021
12. Invited Talk: II World Summit on Traditional and Complementary Medicine towards an Integrative Medicine at Peru on 3rd July, 2021.
13. Invited Talk: Virtual IRAGO Conference 2020 at Japan on 11 December, 2020
14. Invited Talk: World Ayurvedic Day Program on Diabetes Mellitus at Embassy of Saudi Arabia on 13 November, 2020.
15. Guest Speaker: Webinar on Depression and Yoga at Japan on 20 September,2020.
16. Invited Talk: Webinar on 6th International Yoga Day at Saudi Arabia on 22 June, 2020
17. Poster Presenter: 2nd Neurogenesis Conference at Nassau BAHAMAS from March 05- 08, 2019.
18. Poster Presenter: 41st Annual Meeting of the Japan Neuroscience Society at Kobe, JAPAN from July 25-29,2018
19. Invited as a guest faculty National Institute of Advanced Industrial Science and Technology (AIST) at JAPAN on July 29, 2018.
20. Invited as Visiting Professor Kyoto Prefectural University at JAPAN on July 30, 2018.
21. Invited Speaker: *International Conference on Traditional Medicine* at Colombo, SRI LANKA from November 23-25, 2017.
22. Invited Speaker: International Science of Learning Conference, to be at Brisbane, AUSTRALIA, September 18 to 20, 2017.
23. Invited Speaker: Symposium on "Brain Ageing and Dementia in LMICS" at NAIROBI from December 06-09, 2016
24. Guest Speaker:5th Biennial South Asian Association of Physiologist conference (SAAPCON2016, at Nepal from November 10-13,2016
25. Invited Speaker: XXII Biennial Meeting of the International Society for Eye Research (ICER) at Tokyo, JAPAN from September 25-29, 2016.

26. Invited Talk: Kyoto Prefectural University of Medicine, at Kyoto, JAPAN on 30 September-2016
27. Invited Talk: National Institute of Advanced industrial Science & Technology Biomedical Research Institute, at Ibaraki, JAPAN from September 28-29, 2016
28. Invited Talk: International Conference on “System organization psychophysiological and autonomic functions (medical-biological aspects)” at Lutsk, UKRAINE, from June 8-10, 2016.
29. Invited Speaker: 1st National Festival and international Congress of Stem Cell and Regenerative Medicine” at Tehran, Iran from May 19-21, 2016
30. Invited Speaker: IBRO-APRC Associate School at NEPAL, February 09-13,2016.
31. Invited Talk:IBRO-APRC Neuroscience School at SRI LANKA, December 14th– 20th,2015.
32. Poster Presentation: 9th World Congress International Brain Research Organization (IBRO) at Rio de Janeiro, BRAZIL, July 7-11,2015.
33. Invited Speaker: 5th World Congress on Cell & Stem Cell Research, at CHICAGO, USA, March 23-25,2015.
34. Invited Talk: Asia-ARVO 2015,Yokohama, JAPAN, Feb 16-19, 2015,
35. Invited Speaker: Conference on Epigenetics and Neurological Disorders: from bench side to bedside at Mansura, EGYPT Oct 19-25,2014.
36. Invited Talk: World Ophthalmology Congress 2014 at Tokyo,JAPAN, April 02-06, 2014
37. Invited Talk: 43rd Annual meeting of Society for Neurosciences at San Diego, USA, Nov 9-13, 2013.
38. Invited Talk: Application of Neural Stem Cells and Mouse Models in Neuroscience” at Zagreb, CROATIA, Oct 02-05, 2013
39. Invited Talk: Royan International Twin Congress on “Reproductive Biomedicine and Stem Cells Biology & Technology” at Tehran, IRAN, September 04-06, 2013
40. Invited Talk: “Emerging Concepts on Neuronal Cytoskeleton” at Marbella, Maitencillo, CHILE. May 26-30,2013.
41. Invited Talk: “Brain Ageing and Dementia in Developing Countries” at Nairobi, KENYA. December 4-7, 2012.
42. Invited Talk: 3rd NeuroMalaysia Society Symposium at Monash University, MALAYSIA November 29-30,2012.
43. Invited Talk: 2nd New Zealand Conference on Applied Neurosciences, Auckland, New ZEALAND, September 14-16th, 2012.
28. Invited Talk: Indo-Bhutan International Seminar on Advances in Environment Sciences, BHUTAN, May 10-14,2012.
29. Invited Talk: International Visiting Lecture Team Programme (IBRO), SRI LANKA, April 18-25,2012.
30. Invited Talk: ICGEB Advanced Summer School on Nutrition and Disease: Biochemical and Molecular insights, Capetown, SOUTH AFRICA, March 24-31, 2012.
31. Invited Talk: International Conference on Statistical Concepts and Methods for the Modern World, Colombo, SRILANKA 28-30,Dec,2011
32. Invited Talk: 2nd International Conference on Environment and Biotechnology,MALDIVES, Nov 25-26, 2011
33. Invited Talk: 1st International Workshop on Bioethics and Ethical Aspects of Biosafety, Teheran,IRAN, Nov 20- 22, 2011.
34. Invited Talk: International Conference in UN sponsored by Technology and Productive Innovation of Argentina (ICGEB), Buenos Aires, ARGENTINA, Oct 5-7, 2011.
35. Invited Talk: 10th South East Asia Regional Scientific Meeting of the International Epidemiological Association, Colombo, SRI LANKA May, 23- 26, 2010.

36. Invited Talk: Cancer and Developmental Biology: Latest Biochemical Advances organized by Bangladesh Society of Biochemistry and Molecular Biology at BANGLADESH, January 29-31, 2010.
37. Invited Talk: 2nd International Conference on Drug Discovery and Therapy in Dubai, UAE Feb 1-4, 2010.
38. Invited Talk: 1st International Congress on Clinical Neuroepidemiology, Munich, GERMANY. August 27-30, 2009.
39. Invited Talk: 1st International Conference on Wealth Creation from knowledge in India; Challenges and Opportunities, at Georgia Institute of Technology, Georgia, Atlanta, USA, October 19-20, 2007.
40. Invited Talk: 'AMD animal models' at Potsdam retina meeting in Potsdam, GERMANY, April 7-8, 2006.
41. Invited Talk: Engelberg Forum, Engleberg, SWITZERLAND, 28th-30th March, 2001
42. Invited Talk: Telemedicine and Bioinformatics 'Science and Society in the information age', 12th Engelberg Forum, ENGLEBERG, SWITZERLAND, 2000

Resource Faculty

National

1. Invited Talk, 25th INCOFYRA an International Conference on Integrative Sports Medicine and Rehabilitation, at Prashanti Kutiram Bengaluru from 3rd to 6th Jan 2024. Prashanti Kutiram Bengaluru-560105, KA, India
2. Invited Talk: International Conference on Biological Sciences for Sustainable Future (1CBSSF-2023) at D Y PATIL University Navi Mumbai, 15th and 16th Dec 2023.
3. Invited Talk: International Conference on Integrative Medicine YANTRA 2023 (second in the series after YANTRA- 2020, at SVYASA, from 23 - 25 November 2023
4. XLI Annual Meeting of Indian Academy on Neurosciences, at Jiwaji University, Gwalior, 04th -06th Oct, 2023.
5. Invited Lectures, Perspective to Prospective, at Hyderabad, 28-29, July, 2023.
6. Invited Lectures, G20 and S20 Event at IIT Mandi, 21st – 30th, July, 2023
7. Invited Talk, Health Benefits of Yoga Scientific Evidence at Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow on 28th June 2023
8. Guest Speaker, Captain Srinivasa Murthy Central Ayurveda Research Institute, Central Council for Research in Ayurvedic Science, Ministry of AYUSH, Chennai, 17th to 19th June 2023
9. Resource Faculty, 8th Foundation Day International CME on "Reversal of Noncommunicable Diseases: Fact or Myth? at PGIMER, Chandigarh on 7th March 2023.
10. Invited Talk: Human Genomics- National Centre of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, Jan,27, 2023
11. Invited Speaker, Webinar on Networking of Medical Colleges/Scientists/ faculty Members in Academic Activities of National Academy of Medical Sciences(NAMS) 13th December, 2022
12. Invited Speaker, Evidence based Traditional Medicine for Integrative Health care DY Patil, University, Pune, 26th November, 2022.
13. XL Annual Meeting of Indian Academy of Neurosciences Neurosciences. North-Eastern Hill University Shillong, India Dec 8-10, 2022
14. Invited Talk, IBRO-APRC BHU-2022, Banaras Hindu University at Varanasi, 12th -16th September, 2022.
15. Invited Talk, IDY program with engagement of about 700 kids, Chandigarh Police. 21st June 2022
16. Invited Talk, CRIKC in LeaP (Life Sciences & Pharmacy).NIPER S.A.S. Nagar 1st June 2022
17. Invited Speaker, 24th International conference on Frontiers in Yoga Research & its Application. Bengaluru, 26th to 29th May 2022
18. Invited Speaker, 6th international Leh Symposium. Leh, Ladakh, 23rd to 27th may 2022
19. Invited Speaker ,Faculty Development Program. Meenakshi academy of higher education and research Chennai 17 th May 2022

20. Invited Speaker, 5 Days workshop on “Yoga and Wellness” Yogic Art and Science, Visva-bharati, West Bengal 10th to 14th May. 2022
21. Invited Talk, Yoga In Health and Medicine" AIIMS, Jodhpur, 7th May 2022
22. Invited Talk, Yoga Mahotsav – 2022 Meenakshi academy of higher education and research Chennai 28 April 2022
23. Lecture at Govt College sec 23 A Chandigarh 18-Apr-22
24. Invited Talk: Human Genomics- National Centre of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, Mar, 23, 2022
25. Invited Speaker, Webinar on “Implementation and inculcation of Y-Break (Yoga Break) at CII, New Delhi on 29 March, 2022
26. Invited Speaker, Webinar on “Beyond Consciousness”, Annual meeting of Indian Physiologists at New Delhi on 9 February, 2022
27. Guest Speaker, Regional meeting of Arogya Bharti at Una, 28 October, 2021
28. Panelist, Inaugurate 2nd International Virtual Summit ‘Tech4Seva: Technology Outreach as Enabler for Inclusive, Sustainable and Affordable Healthcare’ on 20 October, 2021
29. Invited deliver a talk, IBRO-APRC School at Amarkantak from 20th -24th September 2021.
30. Invited Speaker National Conference Role of Yoga and Naturopathy in management of Post COVID-19 symptoms at Chandigarh from 16th-17th September 2021
31. Invited deliver a talk, IBRO-APRC School at Amarkantak from 23th -27th August, 2021.
32. Invited deliver a talk: Scientific communications at the Continued Research Education (CRE) Program at SVYASA, on 31 July 2021.
33. Deliver a talk, Occasion on International Yoga Day celebrations at IIT Mandi on 22 June, 2021
34. Invited Speaker, occasion of celebrating International Day of Yoga at Haryana Yog Aayog, Haryana on June 21, 2021.
35. Invited talk, occasion of celebrating International Day of Yoga at CDFD, Hyderabad on June 21, 2021.
36. Resource Person: “Yoga Saptah” organizing by Arogya Bharti on 19th June 2021.
37. Invited deliver a talk, on COVID 19 and Mental Health at Panjab University on 10 June, 2021.
38. Invited Guest of Honor cum speaker, organizing free yoga Camp from 1st June to 21st June 2021 to celebrate International Yoga Day on 21st June, at Directorate of Sports, Panjab University on 1 June 2021.
39. Invited Talk: Human Genomics- National Center of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, Mar, 23, 2021.
40. Invited Speaker: 48th Annual National Conference of Indian Association of Preventive and Social Medicine 2021 (IAPSMCON2021) from 19th-21st March 2021
41. Invited Guest Speaker, Thinking through India: Debating the Legacy of Intellectual traditions of India and Contemporary Challenges” at Department of Philosophy, Panjab University Chandigarh on 22nd February, 2021
42. Resource Person: Online Training course on ‘Lifestyle Diseases and Health Promotion’ at National Institute of Health & Family Welfare, New Delhi on 11th February 2021
43. Chief Speaker: webinar on “Prospects of Research in Yoga in 21st Century” at Sivananda Yoga Vedanta Academy (SYVA), Odisha on 21st January 2021.
44. Resource Person: Workshop on 'Strengthening Hypertension Services and Trans-fat regulation in the State of Punjab with the involvement of the Media' at PGIMER, Chandigarh, on 19th December 2020.
45. Resource Person: AICTE Training and learning (ATAL) Faculty development program as Nagpur University, Nagpur on 16th December, 2020.
46. Invited Talk: Enhancing Visibility & Quality of Research Output and Research Ethics, UGC-Human Resource Development Center, Panjab University, Chandigarh on 17th November' 2020.
47. Invited Speaker; Symposium on Occasion of 96th foundation day of Kaivalyadham at Pune on 25th October, 2020.
48. Invited Speaker; Global Summit of Indian Overseas Researchers and Academicians called *Vaishvik Bhartiya Vaigyanik* (VAIBHAV) at AIIMS, Rishikesh on 2 October 2020.
49. Invited Speaker; YANTRA-2020 at NIMHANS, Bangalore on 10th October, 2020.
50. Invited Speaker; International Virtual Colloquium Healthcare students- Med Invade 2020 from 25-27 September, 2020.
51. Invited Speaker; E-Conference: Addressing Nutritional issues through Integrated Solutions at PGIMER, Chandigarh on 16 September, 2020.
52. Resource Person: virtual coffee talk for discussion on Short Course on Cardiovascular Health scheduled at PGIMER, Chandigarh on 28th August 2020.

53. Invited Speaker, Webinar on Atmanirbhar Madhya Pradesh organizing by Govt of Madhya Pradesh on 10 August 2020.
54. Invited Speaker, Webinar on Meeting the Challenge of Covid-19: An Integrative Medicine Approach at S-VYASA, from 1-2 August, 2020.
55. Invited Talk: Yoga intervention in pre-diabetic individuals at Bharati Vidyapeeth Deemed to be University on 10 July, 2020.
56. Guest speaker: Webinar on Yoga Ayurveda and other indigenous Techniques for Psychophysiological Immunity at Patanjali from 18-20 June, 2020.
57. Invited Talk: Webinar on 6th International Yoga Day at Department of Science & Technology, New Delhi on 21 June, 2020.
58. Invited Talk: Webinar on Yoga Research-Relevance to Covid Pandemic at Amity University on 16 June, 2020.
59. Resource Person: Workshop on Development of Research Tools in Physical Education at Panjab University through online on 13 June, 2020.
60. Invited Talk: State Level Workshop for Media Persons "Combating Hypertension, a Silent Epidemic- the Role of Media" at PGIMER, Chandigarh on 13th March, 2020.
61. Invited Talk: Hypertension: Prevention and Management' at PGIMER, Chandigarh on 15th Feb, 2020
62. Resource Faculty: 7th International Public Health Management Development Program at PGIMER, Chandigarh, from Feb 4th -13th 2020.
63. Invited Talk: International Conference on Imminent Concerns & Applications (ICONICA) 2020 at Panjab University, CHANDIGARH, from Feb,12-14,2020
64. Guest Speaker: Workshop on Mind body Medicine at AIIMS, RISHIKESH from Feb, 03-04, 2020
65. Invited Talk: Department of Physical Education, at Panjab University, CHANDIGARH, on 31.01.2020.
66. Invited Talk: National Meet of All India Neurotherapists at JAIPUR from Jan, 24-26, 2020
67. Invited Talk: Human Genomics- National Center of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, Jan, 20, 2020.
68. Resource Person: State Level Sensitization Meeting for strengthening political and administrative commitment on hypertension and develop a state and district level plan for improving prevention and management of hypertension services in Punjab, at CHANDIGARH, Nov, 30th 2019.
69. Invited Talk: Lineage Negative stem cell enhances neurotrophic factors mediated anti-apoptotic activity and proliferation in laser induced injury mouse model, 37th IAN Conference, AIIMS, NEW DELHI Nov 18-20, 2019
70. Invited Talk: Biological agent for alleviating memory loss artificially caused due to Beta amyloid deposition in mouse NEUROCON 2019, AMBALA, Nov 15-18, 2019
71. Invited Talk: International Yoga Conference at MYSORE from November 15-16, 2019
72. Invited Talk: 1st World Assembly on Ayurveda, Yoga & Naturopathy organized by Indian Yoga Association at NOIDA, Uttar Pradesh from November 7th – 10th 2019.
73. Invited Talk: National Policy on Education (NPE) formulated by the Government of India at National Institute of Open Schooling, regional center, CHANDIGARH on 24 July, 2019.
74. Invited lecture in the 'Seminar on Yoga' at IMA Hall, Sector-35, CHANDIGARH on 19 June, 2019.
75. Resource Person: National Symposium and Workshop on "Yoga and Meditation for Neuro Health" being held at ANDAMAN & NICOBAR from June 14-15, 2019
76. Key note speaker, IC3 School Conference, Strawberry World High School, CHANDIGARH, May 11, 2019
77. Key note speaker: Art and Science of Common Yoga Protocol: Morarji National Institute of Yoga and Naturopathy, NEW DELHI, May 2, 2019
78. Invited Speaker: IBRO-APRC school on Advanced Techniques in understanding of the functions of healthy and Diseased Brain April 25, 2019, Sree Chitra Medical Institute of Science and Technology, TRIVANDRUM

79. Invited as a Guest: Conference on Yoga for Health and Therapy from 29th – 31th March, 2019 at Patanjali Yogpeeth, HAIRDWAR, Uttarakhand
80. Key note Speaker: National Conference 'ZOOCON-2019 from 26-27 March, 2019 at Panjab University, CHANDIGARH
81. Invited Talk: World Congress of Ayurveda (WCABHU- 2019) from 14th – 16th March 2019 at BHU, VARANASI.
82. Resource Person, Meditation and Yoga session in 6th International Public Health Management Development Program (IPHMDP) from 27th February- 8th March, 2019, PGIMER Chandigarh
83. Invited Talk: Golden Jubilee Celebration of the Insecticides Act 1968 (Promoting Food Safety and Security)" organized by IIBAT at Faridabad, HARYANA on 22nd February, 2019.
84. Invited Speaker, Global Eye Genetics Consortium meeting at MUMBAI from 18th – 19th Feb, 2019,
85. Invited Talk: Celebrating Darwin week between at IISER MOHALI from 11-16 February,2019.
86. Invited Talk: Human Genomics- National Center of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, January 15, 2019.
87. Invite Speaker: 9th International Conference Yoga as Therapy: Scope, Evidence and Evolution at Lonavla, PUNE from December 27-30, 2018.
88. Invited Talk: 8th World Ayurveda Congress (8thWAC) at AHMEDABAD from 14th – 17th Dec, 2018.
89. Invited Speaker: 50th Golden Jubilee meeting of Indian Pharmacological Society (IPS)at Chandigarh from December 1-3rd, 2018.
90. Invited Talk: International Conference on Yoga-2018 at Panaji, GOA from November 12-13, 2018.
91. Invited Talk: XXXVI Annual meeting of Indian Academy of Neurosciences at BHU, VARANASI from October 29-31,2018.
92. Invited Speaker: International Yoga Fest-2018at NEW DELHI from March 21-23, 2018
93. Invited Talk: Human Genomics- National Center of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, January 30, 2018.
94. Invited Speaker: 22nd International Conference on frontiers in Yoga Research and Its Applications at BENGALURU from January 5-8, 2018.
95. Invited Speaker: MEDCHEM-2017 at IIT Madras, CHENNAI from November 27-28, 2017
- 96.** Invited Speaker: XXXV Annual Conference of Indian Academy of Neurosciences at Ravenshaw University, CUTTACK October 28, 2017
97. Invited Speaker:International Conference on "Advances in Dementia" organized by Alzheimer's & Related Disorders Society of India, Calcutta chapter at KOLKATA from September 22-24,2017.
98. Plenary talk in 4th National Seminar under UGC SAP (DRS-I) entitled " Recent Advance in human genetics" at Panjab University, PATIALA from Mar 27th – 28th, 2017.
99. Invited Talk: Human Genomics- National Center of Human Genomic Studies and Research (NCHGSR) at Panjab University, CHANDIGARH, January 27, 2017.
100. Invited Speaker:"Yoga for Good Life" Organised by Chandigarh Administration at CHANDIGARH, June 09-12, 2016
101. Invited Speaker: Symposium on "Genomics in Clinical practice: Future of precision medicine, atYenepoya University,MANGALORE, June 01-02,2016.
102. Invited Talk: International Conference on Biomaterials, Biodiagnostics, Tissue Engineering, Drug delivery and RegenerativeMedicine (BiTERM-2016) at IIT, New Delhi, April 15-17, 2016.
103. Invited Talk:International Conference on Recent trends in Information Technology-2016 (ICRTIT) at CHENNAI, April 08-09,2016.

104. Invited Talk: Regional Consultation on "*Beti Bachao Beti Padhao*: Building a Collective Response- strengthening Civil Society Engagement and Community Action' at CHANDIGARH November 18-19, 2015.
105. Invited Talk: XXXIII Annual Conference of Indian Academy of Neurosciences (IAN) at CHANDIGARH October 31st – November 2,2015.
106. Invited Talk: National Symposium on "SYS-BIOMICS 2015"at Panjab University, CHANDIGARH, April 4th 2015.
107. Invited Plenary Lecture: 9th Chandigarh Science Congress (CHASCON-2015) at Panjab University, CHANDIGARH February 25-27, 2015.
108. Invited Speaker: Neurocon-2015, at KOLKATA, January 7-10,2015.
109. Invited Speaker: 47th Annual Conference of Indian Pharmacological Society IPSCON-2014, at GUWAHATI December 28-30,2014.
110. Invited Talk: XXXII Annual Conference of Indian Academy of Neurosciences (IAN) at BANGALORE November 01-03,2014.
111. Invited Talk: Asia-ARVO 2013 at NEW DELHI, Oct 28-31,2013.
112. Invited Talk: XXXI Annual Conference of Indian Academy of Neurosciences (IAN) at ALLAHABAD October 25-27,2013.
113. Invited Talk: Scopus Indian Journals' Editors' Workshop 2013, at NEW DELHI, July 17,2013.
114. Invited Talk: BRNS Young Scientist CRIKC at Panjab University, CHANDIGARH. March 21-22,2013.
115. Invited Talk: Innovation in Ethnopharmacology, Recent developments in biological and chemical sciences for societal benefits at PITHORAGARH, Uttrakhand. March 1-3,2013.
116. Invited Talk: "Biosparks"2013 at Jawaharlal Nehru University NEW DELHI, February 15-16,2013.
117. Invited Talk: Research Methodology in Sciences (Interdisciplinary) Punjab University at CHANDIGARH, November 23,2012.
118. Invited Talk: XXX Annual Conference of Indian Academy of Neurosciences (IAN) at AMRITSAR, October 27-30,2012.
119. Invited Talk: National Workshop on Ph.D Program for Medical Innovation, at KOLHAPUR, October 18-19,2012.
120. Invited Talk: National Seminar on Stem Cell; An Emerging Health Care frontier, AMETHI, August 20-21, 2012.
121. Invited Talk: Guru Gobind Singh University, FATEHGARH SAHIB, Punjab, April 11,2012.
122. Invited Talk: Department of Biotechnology Mata Gujari College, FATEHGARH SAHIB, Punjab, March 2,2012.
123. Invited Talk: CME in Regenerative and Transplantation Medicine in Ophthalmology, BENGALURU, Nov12-15,2011.
124. Invited Talk: XXIX Annual Conference of Indian Academy of Neurosciences, NEW DELHI, 30thOct-1st Nov, 2011.
125. Invited Talk: 2nd International Conference on Holistic Medicine (ICHM), KOTTAYAM, Kerala, Sep 11-13, 2011.
126. Invited Talk: IAN symposium on Biomarkers in neurological disorders, neuroimaging and its promises, biomarkers of psychiatric disorders and neurotoxicity, Indian Academy of Neurosciences, LUCKNOW Nov 23- 24, 2010.
127. Invited Talk: World Laboratory Animal Day organized by National Centre for Laboratory Animal Sciences, National Institute of Nutrition HYDERABAD, April 24, 2010.
128. Invited Talk: Advances in Herbal Technology organized by Lakshmi Narain College of Technology, BHOPAL, March 26 -27, 2010.

129. Invited talk at 4th Annual Medical Development Congress-Stem Cell Research and Therapy-Advances in Basic and Clinical Research, NEW DELHI, ICMR, April 13-14, 2009.
130. Invited Talk: Frontiers in Macular Degeneration at Vadodara, MS University, BARODA, December 17th, 2008.
131. Invited Talk: International Stem Cell Summit, India-2008 at IIT, CHENNAI, November 14-16, 2008.
132. Invited Talk: Elevated Levels of CCL2. CCR2 in circulation lymphocytes in North Indian patients of ALS, 27th Indian Academy of Neurosciences meeting, KOCHI, Dec 2008.

Supervisor/Co supervisor for PhD/MD/MS program: Mentoring activities

- Effect of Yoga on pregnancy outcome and efficacy of umbilical cord blood derived lineage negative stem cells for reversal of amyloid β induced memory loss-**Pooja**
Contribution: Guided her to implement the thesis plan, mobilise resources to administer Yoga Protocol to pregnant women, collect UCB, isolate stem cells and transplant them in animal model of memory loss.
- The role of laser induced retinal injury on visual-spatial memory and its rescue by sub retinal transplantation of human Umbilical Cord derived lineage negative stem cells in mice- **Priya Mehra**
Contribution: Guided her to write a thesis plan, obtain regulatory approvals and learn GLP principles for carrying out experiments.
- The role of biomarkers associated with Amyotrophic Lateral Sclerosis and their effect on NSC34 cell line- **Radhika Khosla**
Contribution: Guided her to write thesis plan, manuscripts and compile ICMR report, carried out routine discussions, meetings and document data compliant to GLP principles.
- Role of candidate gene loci in age related macular degeneration- **Priya Battu**
Contribution: Edited the thesis plan adapted to advancement of knowledge generated from thesis of Dr Kaushal Sharma, trained her to audit data, encouraged her to attend meetings and attend routine discussion and lab meetings,
- The role of mind body techniques in exerting neuroprotective effects: molecular, cellular and biochemical study- **Kanupriya**
Contribution: Guided her to test the efficacy of Common Yoga protocol on health parameters, create documents compliant to ethical and GLP principles, learn molecular techniques
- Role of diabetic yoga protocol in biochemical and molecular profile of pre-diabetic women - **Navneet Kaur**
Contribution: Helped her to implement her project by including molecular studies, edited her thesis plan and motivated her to be punctual and adopt Quality Assurance practices in studies.
- Expression of VEGFR-12 MCP-1 HSP-27 and caspase-3 in acute spinal cord injury-**Dr. Vidya Sagar**
Contribution: Helped him understand and write MD thesis revolving around molecular techniques, edited his thesis plan and started teaching him PBMC isolation encouraging him to attend lab meetings. And motivating for Swachh Bharat voluntary activities after lab hours
- Association of gene polymorphisms in col1a1 and col12a1 with ACL tears- A study in the Indian population- **Dr. Rakesh John**
Contribution: Co guided him to plan India's first study for ACL tear polymorphism, edited his synopsis, trained him in molecular techniques and encouraging him to make International presentation. 2 manuscripts are being communicated. After his thesis completion his colleague Vidya Sagar wanted to pursue research under my guidance.

- Outcome related to general anaesthesia versus regional anaesthesia for lower extremity surgery in patients with mild traumatic brain injury- **Dr. Venkata Ganesh**

Contribution: Helped him design his ELISA experiment, with special focus on normalization to total protein.
- Investigating the molecular mechanism governing reversal of amyloid β induced memory loss in mice by transplantation of human umbilical cord blood derived lineage negative stem cells- **Parul Bali**, currently post doc fellow at IISER, Mohali

Contribution: Co guided her, trained her in MWM, Stereotaxis, molecular techniques, animal experiments and edited her synopsis, review and troubleshooted her experiments besides designing her study, instilled competitive spirit and encouraged her to make presentations in conferences, master scheduled her work and trained her in grant writing and GLP besides motivating her for *Swach Bharat* voluntary weekly activities after lab hours.
- The role of early life lead exposure in progression of retinal degeneration in mouse model of retinal ganglion cells(RGC) disruption- **Shweta Modgil**, currently post doc fellow at Emory University, Atlanta, USA

Contribution: Co-conceptualised her thesis plan, trained her in molecular techniques, grant writing, animal surgeries, edited her synopsis and manuscript encouraging her to travel for conferences, teaching her PCR, GLP and motivating for *Swach Bharat* voluntary activities after lab hours.
- Comprehensive analysis of candidate genes, risk factors and associated serum levels in pathogenesis of AMD- **Kaushal Sharma**, currently ICMR Young Scientist, Advanced Pediatric Centre, PGIMER, Chandigarh

Contribution: Co-Conceptualisation, Designing & coordination between two co guides, molecular aspect of experiments, editing the synopsis, PI on DBT grant application, troubleshooting, analysis & validation of pilot data, as PI on pilot intramural grant form PGI instilling collaborative spirit; trained him in genetic screening, and molecular techniques, worked with him on his English and helped him publish several papers; encouraging International presentations; trained in grant writing, GLP and motivating for weekly *Swach Bharat* activities.
- To study genotype-phenotype correlation between cognitive impairment and dystrophin loci in Becker's/ Duchenne Muscular Dystrophy patients- **Rahul Tyagi**, currently Research Associate at Advanced Pediatric Centre, PGIMER, Chandigarh

Contribution: Recruitment; Concept, Designing & supervision of the experiments, editing the synopsis patient support groups; as PI on related DAE grant application, troubleshooting, analysis & validation of pilot data; encouraging International presentations, currently editing the manuscript supervising, instilling collaborative spirit, grant writing and GLP and motivating for *Swach Bharat* weekly voluntary activities after lab hours.
- Comparative analysis of the efficacy of human umbilical cord blood derived lineage negative stem cells and human fetal pigmented ciliary epithelium derived neurospheres in repair of laser injured mouse retina model- **Sridhar Bammidi**, currently post doc fellow at University of Pittsburgh, USA

Contribution: Recruitment; resource mobilisation, Designing of the study, Laserizing the mouse retina using laser photocoagulator, trained in animal and cell culture experiments, molecular techniques, analysis and validation of data, editing of synopsis, corresponding author on review and organizing his experiments, Grant PI on related DST funding application; encouraging International presentations and training in sub retinal injections in mouse eyes, grant writing, GLP and motivation for *Swach Bharat* activities after lab hours
- The effect of human umbilical cord blood derived Lineage negative stem cells in reversal of amyloid β peptide induced memory loss in mice - **Avijit Banik**, Assoc Prof, GITAM, Visakapatnam

Contribution: Recruitment, Concept and design of study, editing the synopsis, troubleshooting the experiments, trained him in MWM, IHC, molecular techniques, GLP and as corresponding author on 1 published article, and motivating for *Swachh Bharat* voluntary activities after lab hours.

- Comprehensive analysis of the candidate genes Chemokine (C-C motif) receptor 3, complement factor H, Vascularendothelial growth factor receptor-2 (VEGF R2), Chemokine ligand-2 and Chemokine receptor -2 in age related macular degeneration patients in north India – **Neel Kamal Sharma**, currently Study Director, Nobel Life Sciences, Sykesville, MD, USA

Contribution: Recruitment, Conceptualisation and design of experiments, GLP orientation and resource mobilisation for carrying out the experiments and supervision and training of student for various techniques and methodologies; corresponding author on 6 manuscripts.

- Molecular analysis of repair of NMDA induced ganglion cell loss by transplantation of stem cells in mice—**Neeru Jindal**

Contribution: Recruitment; Concept, design, analysis and validation of data; PI on related ICMR related project. Published various research articles and trained her in intravitreal and tail vein injections besides IHC and molecular techniques.

- The role of bone-marrow derived Lin⁻ Sca⁺ cells in recovery of experimentally induced stroke and stroke related retinal ischemia – **Gillipsie Minhas**, Scientific Writer, Novartis Healthcare Pvt Ltd, Hyderabad

Contribution: Concept, design of the study; as PI on a funded DST grant application; used collaborative network to arrange training at Morishita's Lab, Japan, for training of mice MCAo/PPA micro surgeries, published various research articles, trained her in molecular and IHC techniques and grant writing.

- Studies on stem cell migration and the effect of bone marrow derived stem cells in repair of laser injured mouse retina - **Tajinder Singh**; Post Doc scholar, Medical University of South Carolina, Charleston, USA

- To study the Vascular Endothelial Growth Factor – A (VEGF-A), Chemokine Ligand 2 (CCL-2) and Superoxide Dismutase 1 (SOD-1) Expression in patients of Amyotrophic Lateral Sclerosis and their Clinical Correlation- **Pawan Gupta**; Senior Scientist, Astra Zeneca

- Investigating the role of VEGF on proliferation and differentiation of ciliary epithelial cells - **Chandrika Abburi**; Former Research Asst Prof, University of Chicago, USA

- Analysis of PARK 2 mutations in patients of Parkinsonism- **Monika Vinish**; CRA, Global Operations, Sites and Patients Solutions, USA

- Study of molecular and genetic basis of traditional cognition enhancing drugs-**Manish K Saraf**; Former Scientist I in University of Texas, USA

Examiner :

- PhD Examiner, Thesis entitled "Yoga-based Lifestyle Treatment and Composite Treatment Goals in type 2 Diabetes in a Rural South Indian Setup-A Retrospective Study" S-VYASA, Bangalore-2021.
- PhD Examiner, Thesis entitled "Yoga and diabetes: a multi-centric research study yoga and diabetes" S-VYASA, Bangalore-2020
- PhD Examiner, Thesis entitled "Impact of various styles of Mantra chanting in novices based on physiological and cognitive variables" S-VYASA, Bangalore- 2020
- PhD Examiner, Thesis entitled "Fibrin based matrix directed differentiation of adipose derived mesenchymal stem cells into oligodendrocytes for cell replacement therapy in spinal cord injury- Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvanthapuram, 2019

- PhD Examiner, Thesis entitled “Yoga enhances molecular and systemic homeostasis in type 2 diabetes mellitus: studies on short and long- term yoga practitioners” S-VYASA, Bangalore-2019
- PhD Thesis Evaluation entitled “Role of protein homestasis pathways in Amyotrophic Lateral Sclerosis.” Jamia Hamdard University- 2019.
- PhD Examiner, Thesis entitled “Safety and efficacy of siddha treatment methodologies/ medicines for the management of special children” The Tamil Nadu Dr. M.G.R. Medical University, Chennai- 2019.
- PhD Examiner, Evaluation entitled “Effect of Yoga based lifestyle intervention on biomarkers of cellular aging in patients with depression” AIIMS, New Delhi-2019.
- PhD Examiner, Thesis entitled “Use of an Integrated Approach Of Yoga Therapy And Ayurveda In The Management Of Migraine Headache” S-Vyasa, Bangalore-2018
- PhD Examiner. Thesis entitled “ Study of Functional Dopaminergic Neurons Derived from Human Mesenchymal Stem Cells. AIIMS, New Delhi-2017
- PhD Examiner, Thesis entitled “Cardio-Respiratory Variables During two Yoga Breathing Practices. (Alrernate Nostril Yoga Breathing and Meditative Breath. University of Patanjali.- 2017
- PhD Examiner, Himanchal Pardesh University, Himanchal,2013-
- PhD Examiner, Jawaharlal Nehru University, Delhi-2013-
- PhD Examiner, Universidad de Valladolid, Spain-2013-
- PhD. Examiner, National Institute of Immunology, New Delhi-2014.
- PhD. Examiner, PRIST University, Tamilnadu- 2009.
- PhD Examiner, Sri Ramachandra University, Chennai,2007 and HNB Garhwal University, Srinagar, 2007
- Board of Examiner: Inter University Centre for Biomedical Research & Super Speciality Hospital, Mahatma Gandhi University Campus at Thalappady, Rubber Board P.O. Kottayam, Kerala.

Education activities through Doctoral Committee monitoring of Institute PhD/MD students

Sr. No	Student Name/Department	Title	Guide	Year
1	Sandeep Negi/ APC	Genotypic and phenotypic characterization of Vaccination associated seizure/epilepsy	Dr. Jitender Kumar	2017
2	Ashutosh Rai/ Neurosurgery	Phosphoproteomic analysis of non-functioning pituitary adenoma	Dr. K.K. Mukherjee	2014
3	Dr. Venkata Ganesh , MD/ Anesthesiology and Intensive Care	Outcome related to general anaesthesia versus regional anaesthesia for lower extremity surgery in patients with mild traumatic brain injury	Dr. Hemant Bhagat	
4	Shaveta/Exp. Med.& Biotech.	Functional microdissection of AATF Rnome in oncogenesis	Dr. D. Kaul	2011
5	Karanvir Kaushal/ Biochemistry	Molecular genetics and functional genomics of chronic pancreatitis	Dr. Rajendra Prasad	2013
6	Himani/ Neurosurgery	To study the differential protein expression and its functional significance in pituitary adenoma	Dr. K.K. Mukherjee	2014
7	Deepika/ Biochemistry	Sirtuins mediated interplay of foxo3a transcription factor in aluminium neurotoxicity and its protection vias resveratrol	Dr. Sadhna Sharma	2012
8	Dr. Rakesh john/ Orthopaedics	Association of gene polymorphisms in col1a1 and col12a1 with ACL tears in indian population	Dr Sharad Prabhakar and Dr M S Dhillon	

9	Alka Kaushal/ Biochemistry	Neuroprotective efficacy of alpha asarone against okadaic acid and hypoxia induced dementia model of alzheimer's type in rats involvement of oxidative stress	Dr. Jyotdeep Kaur	2011
10	Poonam Saharan/ Anaesthesia & intensive care	Metabolomic profiling and biomarker identification in patients with intracranial aneurysm	Dr. Hemant Bhagat	2014
11	Rakesh K. Ruhela/ Pharmacology	Effect of resperidone and withania somnifera treatment alone and in combination on behavioral and molecular parameters in modified valproic acid induced model of autistic spectrum disorder (ASD) and experimentally induced epilepsy in rats	Dr. Bikash Medhi	2013
12	Paramjit Kaur/ System biology & bioinformatics, PU	Intergrated bioinformatics approach for developing an open access database and tool for face recognition in humans.	Dr. Suresh Sharma, PU	2016
14	Neha/ Pharmacology	Effect of dimethyl fumarate on Nrf2-Are-NFkB signaling pathway in chemical kindling model in rat	Dr. Lekha Saha	2013
15	Mansi Arora/ Exp. Med. & Biotech.	Micro-dissection of CYLD Rnome and its significance to the pathogenesis of acute lymphoblastic leukemia (AAL) subjects of pediatric age group	Dr. D. Kaul	2011
16	Ragini Khajuria/ Biochemistry	Molecular and functional characterization of spectrum of mutations in congenital adrenal hyperplasia (CYP21A2) gene form CAH patientis diagnostic and genet c implications	Dr. Rajendra Prasad	2012
17	Manila Salaria/ Pediatrics	Toll like receptorgene expression and signaling pathway in acute bacterial meningitis	Dr. Sunit Singhi	2012

Papers presented at International Conferences/Workshops

1. Poster Presentation: American Psychosomatic Society Annual Scientific Meeting at Long beach Hotel Hilton, **California**, USA-March 23-26, 2022.
2. 2nd Neurogenesis Conference at Nassau **Bahamas**, March 05- 08, 2019.
3. 41st Annual Meeting of the Japan Neuroscience Society at **Kobe**, Japan from July 25-29, 2018.
4. International Conference on Traditional Medicine at **Colombo**, Sri Lanka from November 23-25, 2017.
5. International Science of Learning Conference, to be at **Brisbane**, Australia, September 18 to 20, 2017.
6. Symposium on "Brain Ageing and Dementia in LMICS" at **Nairobi** from December 06-09, 2016
7. 5th Biennial South Asian Association of Physiologist conference (SAAPCON2016, at **Nepal** from November 10-13, 2016
8. XXII Biennial Meeting of the International Society for Eye Research (ICER) **Tokyo**, Japan from September 25-29, 2016
9. International Conference on "System organization psychophysiological and autonomic functions (medical-biological aspects)" at **Lutsk**, Ukraine, from June 8-10, 2016.
10. 1st National Festival and international Congress of Stem Cell and Regenerative Medicine" at **Tehran**, Iran from May 19-21, 2016.
11. IBRO-APRC Associate School at **Nepal**, February 09-13, 2016.
12. IBRO-APRC Neuroscience School at **Sri Lanka**, December 14th – 20th, 2015.
13. 9th World Congress International Brain Research Organization (IBRO) at Rio de Janeiro, Brazil, July 7-11, 2015.

14. 5th World Congress on Cell & Stem Cell Research, at **Chicago**, USA, March 23-25,2015.
15. Asia-ARVO 2015,**Yokohama**, Japan, Feb 16-19, 2015,
16. Conference on Epigenetics and Neurological Disorders: from bench side to bedside at **Mansura**, Egypt Oct 19-25,2014.
17. World Ophthalmology Congress 2014 at **Tokyo**, Japan, April 02-06, 2014.
18. 43rdAnnual meeting of Society for Neurosciences at **San Diego**, USA, Nov 9-13, 2013.
19. Royan International Twin Congress on “Reproductive Biomedicine and Stem Cells Biology & Technology” at **Tehran**, Iran, September 04-06, 2013.
20. Emerging Concepts on Neuronal Cytoskeleton at Marbella, **Maitencillo**, Chile, May 26-30,2013.
21. Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting at Seattle,**Washington**, USA, May 5-9,2013.
22. Brain Ageing and Dementia in Developing Countries at Nairobi, **Kenya**. December 4-7, 2012.
23. 3rd NeuroMalaysia Society Symposium at Monash University **Malaysia** November 29-30,2012.
24. 42nd Annual Meeting of the Society For Neuroscience at**New Orleans**, LA (USA) October 13-17,2012.
25. 2nd New Zealand Conference on Applied Neurosciences, **Auckland**New Zealand September 14-16th, 2012.
26. Indo-Bhutan International Seminar on Advances in Environment Sciences **Bhutan**, May 10-14,2012.
27. International Visiting Lecture Team Programme (IBRO), **Srilanka**, April 18-25,2012.
28. ICGEB Advanced Summer School on Nutrition and Disease: Biochemical and Molecular insights, Capetown, **South Africa**, March 24-31, 2012.
29. International Conference on Statistical Concepts and Methods for the Modern World at Colombo, **Srilanka**, dec ,28-30,,2011.
30. 2nd International Conference on Environment and Biotechnology **Maldives**, Nov 25-26, 2011.
31. 1st International Workshop on Bioethics and Ethical Aspects of Biosofety, Teheran**Iran**, Nov 20-22, 2011.
32. 20thWorld Congress of Neurology conference at Marrakesh, **Morocco**, Nov 12-17, 2011.
33. International Conference in UN sponsored by Technology and Productive Innovation of Argentina (ICGEB), Buenos Aires, **Argentina**, Oct 5-7, 2011.
34. IBRO fellowship to attend 8th World Congress of Neurosciences, **Florence**, Italy, July 14-18, 2011.
35. IBRO School of Neuroinfection and Worldwide Impact held in St Denis Reunion Island, **France** Dec 2nd - 6th 2010.
36. 8th World Congress of Stroke, Seoul, **Korea**, Oct 13-16, 2010.
37. 10th South East Asia Regional Scientific Meeting of the International Epidemiological Association, Colombo, **Sri Lanka** May, 23- 26, 2010.
38. Conference on Cancer and developmental Biology: Latest Biochemical Advances organized by Bangladesh Society of Biochemistry and Molecular Biology at **Bangladesh**, January 29-31,2010.
39. 2nd International Conference on Drug Discovery and Therapy in **Dubai**, UAE Feb 1-4, 2010.
40. 32nd Japanese Neuroscience Society meeting in Nagoya Congress Centre, Nagoya, **Japan**, September 15-18, 2009.
41. 3rd Canadian meeting on Neuro Degeneration and Regeneration in IBRO school of Neuroscience,Vancouver, B.C. **Canada**, May 24 to June 4, 2009.
42. 1st International Congress on Clinical Neurology and Epidemiology meeting in Munich, **Germany** August 27-30, 2009.
43. XVII WFN World Congress on Parkinson’s disease and related disorders at Amsterdam in **Netherlands**, December 9-13, 2007.

44. 1st International Conference on Wealth Creation from knowledge in India; Challenges and Opportunities, at Georgia Institute of Technology, Georgia, **Atlanta, USA**, October 19-20, 2007.
45. 11th Congress on Movement Disorders, Istanbul, **Turkey**, June 3-7, 2007.
46. The 10th Multidisciplinary International Conference 'Stress and Behavior St-Petersburg, **Russia**, May 16-20, 2007.
47. Annual meeting of World Federation of Neurology (WFN), Sydney, **Australia**, Nov 5-11, 2006.
48. 29th Japanese Academy of Neurosciences, Kyoto, **Japan**, July 18-21, 2006.
49. First International Conference, Intellectual Property and Technology Transfer in Life Science: A North-South Dialogue (United Nation's meeting) organized by International Centre of Genetic Engineering and Biotechnology, Trieste, **Italy** June 12-14, 2006.
50. 1st Potsdam retina meeting in Potsdam, **Germany**, April 7-8, 2006.
51. 58th Annual meeting of American Academy of Neurology, San Diego, **USA**, April 1-8, 2006.
52. 2nd SERI-ARVO meeting in **Singapore**, February 16-21, 2005.
53. Annual meeting on Retinal Angiogenesis, Vanderbilt University, Nashville, **USA** Oct 2004.
54. 34th Annual meeting of Society for Neurosciences, San Diego, **USA**, October 23-27, 2004.
55. Intel International Science and Engineering Fair, **Cleveland, USA**, May, 11-17 2003.
56. ARVO meeting, FtLauderdale **USA**, May 4-9, 2003.
57. ARVO Annual meeting Fort Lauderdale, Florida, **USA**, May 5-10, 2002.
58. Intel International Science and Engineering Fair, Louisville, **USA**, May 12-18, 2002.
59. 12th Engelberg Forum, Engelberg, **Switzerland**, March, 2001.
60. 11th Engelberg Forum 2001, Engelberg, **Switzerland**, March 28th-30th, 2000

Papers presented at National Conferences/Workshops

1. International Conference on Imminent Concerns & Applications (ICONICA) 2020 at Panjab University from Feb, 12-14, 2020
2. XXXVII Annual meeting of Indian Academy of Neurosciences at AIIMS, New Delhi Nov 18-20, 2019
3. NEUROCON 2019, AMBALA, Nov 15-18, 2019
4. International Yoga Conference at Mysore from November 15-16, 2019
5. 1st World Assembly on Ayurveda, Yoga & Naturopathy organized by Indian Yoga Association at Noida, Uttar Pradesh from November 7th – 10th 2019.
6. National Symposium and Workshop on "Yoga and Meditation for Neuro Health" being held at Andaman & Nicobar from June 14-15, 2019
7. IBRO- Asia Pacific Regional Committee School-2019 from 22 April – 06 May, 2019 at Kerala.
8. World Congress of Ayurveda (WCABHU- 2019) from 14th – 16th March 2019 at BHU, Varanasi.
9. National Conference 'ZOOCON-2019 from 26-27 March, 2019, Panjab University.
10. Golden Jubilee Celebration of the Insecticides Act 1968 (Promoting Food Safety and Security)" organized by IIBAT at Faridabad, Haryana on 22nd February, 2019.
11. Global Eye Genetics Consortium meeting at Mumbai from 18th – 19th Feb, 2019,
12. Celebrating Darwin week between at IISER Mohali from 11-16 February, 2019.
13. 9th International Conference Yoga as Therapy: Scope, Evidence and Evolution at Mumbai from December 27-30, 2018.
14. International Conference on Yoga-2018 at Panaji, Goa from November 12-13, 2018.
15. XXXVI Annual meeting of Indian Academy of Neurosciences at BHU, Varanasi from October 29-31, 2018.
16. 5th Annual Conference of Cognitive Science at IIT Guwahati from October 10-12, 2018
17. International Yoga Fest-2018 at New Delhi from March 21-23, 2018
18. 22nd International Conference on frontiers in Yoga Research and Its Applications at Bengaluru from January 5-8, 2018.
19. MEDCHEM-2017 at IIT Madras from November 27-28, 2017

20. XXXV Annual Conference of Indian Academy of Neurosciences at Ravenshaw Unvirisity, Cuttack October 28, 2017
21. International Conference on "Advances in Dementia" organized by Alzheimer's & Related Disorders Society of India, Calcutta chapter in Kolkata at Kolkata from September 22-24,2017.
22. XXXIV Annual Conference of Indian Academy of Neurosciences at NBRC, Manesar, **New Delhi** October 19-21, 2016
23. "Yoga for Good Life" Organised by Chandigarh Administration at **Chandigarh**, June 09-12, 2016
24. Symposium on "Genomics in Clinical practice: Future of precision medicine, at Yenepoya University, **Mangalore**, June 01-02,2016.
25. International Conference on Biomaterials, Biodiagnostics, TissueEngineering, Drug delivery and RegenerativeMedicine (BiTERM-2016) at IIT, **New Delhi**, April 15-17, 2016.
26. International Conference on Recent trends in Information Technology-2016 (ICRTIT) at **Chennai**, April 08-09,2016
27. 41st ISHG Conference-2016 at **Chennai**, March 3-5, 2016.
28. Enhancing Organizational Performance through ICT at **Goa**, February 15-19,2016.
29. Global Biotechnology Summit-2016, at **New Delhi**, February 5-6, 2016.
30. 8th Annual Meeting of The Cytometry Society at **Mumbai**, October 24th – 25th - 2015
31. 9th Chandigarh Science Congress (CHASCON-2015) at Panjab University, **Chandigarh** February 25-27, 2015.
32. Neurocon-2015, **Kolkata**, January 7-10,2015.
33. 47th Annual Conference of Indian Pharmacological Society IPSCON-2014,**Guwahati**December 28-30,2014.
34. XXXII Annual Conference of Indian Academy of Neurosciences (IAN) at **Bangalore** November 01-03,2014.
35. Invited Talk: MPAI-2014, Mumbai, Feb,14-15,2014.
36. Asia-ARVO 2013 at **New Delhi**, Oct 28-31,2013.
37. XXXI Annual Conference of Indian Academy of Neurosciences (IAN) at **Allahabad** October 25-27,2013.
38. Innovation in Ethnopharmacology, Recent Developments in Biological and Chemical Sciences for Societal Benefits at Pithoragarh, **Uttrakhand**. March 1-3,2013
39. Biosparks2013 at Jawaharlal Nehru University **New Delhi**. February 15-16,2013.
40. XXX Annual Conference of Indian Academy of Neurosciences (IAN) at **Amritsar** October 27-30,2012.
41. National Seminar on Stem Cell An Emerging Health Care Frontier ,**Amethi**, August 20-21, 2012
42. National Productivity Council "HR & IT Tools for Performance Enhancement" at **Srinagar**, (J&K), June,11-15,2012
43. CME in Regenerative and Transplantation Medicine in Ophthalmology in **Bengaluru**, Nov 12-15, 2011.
44. XXIX Annual Conference of Indian Academy of Neurosciences, **New Delhi**, 30th Oct-1st Nov, 2011.
45. 2nd International Conference on Holistic Medicine (ICHM), Kottayam, **Kerala**, Sep 11-13, 2011.
46. Symposium on New Paradigms in Laboratory Animal Science in an Era of Advanced Biomedical Research Centre for Animal Disease Research and Diagnosis (CADRAD) Indian Veterinary Research Institute,**Izatnagar**, Jan 28 -29, 2011.
47. IAN symposium on Biomarkers in neurological disorders, neuroimaging and its promises, biomarkers of psychiatric disorders and neurotoxicity, IndianAcademy of Neurosciences, **Lucknow** Nov 23- 24, 2010.
48. World Laboratory Animal Day organized by National Centre for Laboratory Animal Sciences National Institute of Nutrition **Hyderabad**, April 24, 2010.

49. Workshop on Six Sigma Work Culture for Excellence conducted by National Productivity Council, at **Gangtok**, April 19– 23, 2010.
50. Advances in Herbal Technology” organized by Lakshmi Narain College of Technology, **Bhopal** March 26-27, 2010.
51. 4th International Conference on Management Research, Athenaeum organized by Bharathidasan Institute of Management **Tiruchirappalli**, Feb 13-14 ,2010.
52. 27th Indian Academy of Neuroscience meeting at **Jaipur**, December 18-20, 2009.
53. 4th Annual Medical Development Congress-Stem Cell Research and Therapy-Advances in Basic and Clinical Research, **New Delhi**, ICMR, April 13-14, 2009.
54. International Conference on Photonics, Nanotechnology and Computer Application, PRIST University, **Thanjavur**, Feb 25-28, 2009
55. International Conference on Translational Pharmacology, AIIMS, **New Delhi**, December 18-20, 2008.
56. Invited talk on Frontiers in Macular Degeneration at **Vadodara**, MS Univ, December 17th, 2008.
57. 26th Indian Academy of Neuroscience 2008 at **Cochin, Kerala** December 12-14, 2008.
58. International Stem Cell Summit, India-2008 at IIT, **Chennai**, November 14-16, 2008.
59. National Symposium on Genetics and Family Welfare at **Thrissur**, October 14-15, 2008.
60. Indo-US Symposium on Good Laboratory Practice (GLP), INDO-US Science and Technology Forum, New Delhi National GLP Compliance Monitoring Authority, DST (Govt. of India) Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, **Kerala**, March 5-7th, 2008.
61. 25thAnnual meeting of Indian Academy of Neurosciences, **Varanasi**, Feb, 2008.
62. International Symposium on Advances in Neurosciences and Silver Jubilee Conference of Indian Academy of Neurosciences at **Varanasi**, November 22-25, 2007.
63. Training Programme on Technology commercialization for Senior Scientists, **Hyderabad** march 26th to April 6th, 2007.
64. International Symposium on Chemical Biology at **Kolkata**, March 7-9, 2007.
65. Workshop on Commercialisation of Biotechnology, at **New Delhi**, March 2, 2007.
66. 3rd Indo-Australian Conference on Biotechnology at **Hyderabad**, March 6-8, 2006.
67. 1st U.K India Stem Cell Workshop, JNCASR, **Bangalore**, April 4-11, 2005.
68. Summer school on ‘Working of Mind’ Organized by Indian Institute of Advanced Studies, Rashtrapati Niwas, **Shimla**, June 3-24,2000

Sustenance of Quality Assurance Program(First Research Lab to be awarded by Quality Council of India (2014-2016)

We have sustained National GLP norms in research projects which are not under the purview of GLP, by including documentation of research data, ensuring back traceability such that it is auditable, archivable, reliable and reproducible. This includes generation of Standard Operating Procedures (SOPs) for each methodology which are adhered to by research personnel at the behest of quality assurance or document controller. This is done through the Quality Assurance (QA) driven audit control of Data Recording Sheets (DRS) and monitoring of self proposed monthly master schedules, infrastructure, equipments, study based and facility based inspections. The data continues to be generated and filed in a defined format using mandatory raw books, master codes, maintenance sheets of calibrated instruments (with Installation Qualification, Operational Qualification, Performance Qualification), log sheets for regulating infrastructure, room and consumables. This data and samples (if any) continue to be archived in defined shelves or freezers appropriately. We continue to periodically train research personnel and staff in order to adhere to bio waste management, sanitation, fire extinguisher safety, first aid, animal handling. Lab developed coding system for both animal and human samples continue to be followed in order to build a repository of samples and maintaining sample logs.

The sustenance of GLP based computers, driven by internal server, stores data and video recordings in secure formats and monitors internet and academic activity in order to ensure compliance to IP data generated in the facility.

Science Art Convergence Projects:

On the pattern of Wellcome Grants special initiative, there is a special effort to collaborate with Artists to paint on various themes of Neuroscience research, communication, society and brain drain. Several of these paintings adorn the walls of the lab, including those on cover pages of Annals of Neurosciences. These inspire the researchers to remain motivated, this promotes dialogue between research and society.

Neuroscience communication and role modeling for Swachh Bharat:

After taking over as the **Editor** of Annals of Neurosciences (the official Journal of Indian academy of Neurosciences) in Feb 2009, the Journal was revamped with continuous efforts of editorial team and staff. This has resulted in increased readership statistics, annual subscriptions as well as developing partnership between IAN and Karger, Switzerland who re publishing it worldwide. The Journal is now **indexed in PUBMED** and also being **considered for Impact factor**, it has recently released a special supplement of '**Magical Broom**' and '**Magical Broom returns**' for education for kids about health by public health initiatives. Profiling the completion of **230 weeks** or **460 hours** of continuous Clean India activates voluntary being carried out by volunteers of Research lab in the campus @2 hrs every week in the after office/lab hours.

Social Media Citations

Yoga Education daily Series - <https://www.facebook.com/YogaScholarPGIMER/>

The Continuous Yoga Education series broadcast live from 'yoga scholars PGIMER' Facebook was inspired by the need to bring the authentic scientific and traditional perspective of Yoga, meditation and mindfulness, from all schools of Yoga, under a singular platform. This was conceptualised to benefit medical specialists, yoga trainers and life scientists when they were experiencing lockdown situations. The need of this live program was also felt due to certain misbeliefs about Yoga that persisted among the medical and scientific community as the latter remained busy in delivering service to patients and society unmindful of the principles of holistic health aligned to the prevailing dogmatic belief system. This also acted as a barrier for integrated approach to healthcare, disease management, knowledge advancement and dissociation of public health intervention strategies from delivering Yoga and mindfulness models for public health. The uncertainty of COVID crisis provided the needed pause to the perpetuation of this dogma. The program was spontaneously endorsed by the Ministry of AYUSH as eminent people like Sadguru Jaggi Vasudeva, Baba Ramdev, H.H. Dalai Lama, Guruji Dr H R Nagendra, David Frawley, Pallela Gopichand, Swami Nitypajna, Dr N K Manjunath, Dr Shirley Telles, Dr Sat Bir, Dr Helen, BK Shivani, Dr JLN Sastry, Dr Lorenzo, Secretary of AYUSH, Dr Rob Friedland, Sri Sri and Daa ji and many other Professors from top Indian and other Institutes have agreed to present their views and come live for the benefit of experts and people alike. This program has now become a vibrant platform with more than 800,000 combined views, 550 archived videos, 250 speakers and 13560 subscribers. The biology series for AYUSH professionals alongwith presentations by patient groups in on the anvil.

Postcard from India- <https://www.youtube.com/watch?v=KQ4cwqk7qEU>

International Visiting Lecture Team Programme (IBRO), SRILANKA, April 18-25,2012.(Part 1)-
https://www.youtube.com/watch?v=uz5zTmeF_HI

International Visiting Lecture Team Programme (IBRO), SRILANKA, April 18-25,2012.(Part 2)-
<https://www.youtube.com/watch?v=52cA5RfeO5A>

International Visiting Lecture Team Programme (IBRO), SRILANKA, April 18-25,2012.(Part 3)-
<https://www.youtube.com/watch?v=JUcuQTgs43s>