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Biochemistry
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ACADEMIC QUALIFICATIONS

| <u>DEGREE/TRAINING</u> | <u>UNIVERSITY / INSTITUTE</u> | <u>CLASS</u> | <u>YEAR</u> |
|--|---|--------------|--------------|
| Assistant Professor & Head of Department | Central University of Haryana | | 2015- Contd. |
| Research Scientist | University of Central Florida, Orlando | | 2013-2014 |
| Post Doctorate | University of Cincinnati, Ohio | | 2011-2013 |
| PhD (Biochemistry) | All India Institute of Medical Sciences (AIIMS), New Delhi, India | | 2003-2010 |
| MS (Biochemistry) | Hamdard University New Delhi, India | First | 2001-2003 |
| BS | Delhi university New Delhi, India | First | 1997- 2000 |

AWARDS and HONOURS

GATE (Graduate Aptitude Test in Engineering): Qualified (**99.7** percentile, All India top ranker)

NET (National Eligibility Test): Qualified

CSIR JRF (Council of Scientific and Industrial Research Fellowship): qualified

SPM (Shyama Prasad Mukherjee Fellowship): Qualified

BARC (Bhabha Atomic Research Centre): Qualified scientific officer

MSc: Topper

Chairman: Society of Young Scientists (SYS), AIIMS, Delhi

American Heart Association (AHA) Member

Editorial board member of international journals (more than 10)

Central purchase committee member at CUH

Board of Studies member at Central University of Haryana

RESEARCH EXPERIENCE:

Post-Doctoral training: Stem cell therapy for Cardiovascular Diseases

1) Survival of stem cells upon transplantation is major setback in stem cell therapy. Pharmacological Preconditioning (treatment with drugs) of Stem Cells/Mice/Rat with Tadalafil, a Phosphodiesterase Inhibitor so as to increase their survival/cardioprotection against ischemic stress like ischemia/reperfusion (IR). The aim was to elucidate molecular mechanisms/signaling pathways involved in early and late phase of protection, if there any. We studied GPCR, PI3K, AKT, ERK, NFkB, P38, NOS, NO, GC, PDE, PKG, PKC, GSK3 β , Phospholipase, Calcium signaling, Mitochondrial pathways, MPTP, Potassium channel etc. in our study

in vivo ischemic model made by ligating LAD (left anterior descending coronary artery) whereas IR (ischemia/reperfusion) model by ligating LAD for 30 min and followed by reperfusion by releasing the knot.

2) Regulation of cell cycle under ischemic condition in stem cell and to determine the role of hypoxamir miRNA210 in it.

Post-Doctoral training: Ubiquitin Proteasomal pathway

To identify and characterize the deubiquitinase, RNase and E3 ligase activity of MCPIP protein and elucidate its role and signaling pathways involved in macrophage polarization using tissue specific knockouts (endothelial, smooth muscle) of the protein.

Ph.D Thesis: Brain Cancer (Gliomas) (AIIMS; All India Institute of Medical Sciences)

Title: To study the role of HIC1 in tumorigenesis and cell response

HIC-1, Hypermethylated in Cancer-1, a tumor suppressor and transcription factor located on 17p13.3, telomeric to the *p53* gene. HIC1 found to be hypermethylated which results in epigenetic silencing in several types of tumor. It's a novel tumor suppressor gene whereas the underline molecular mechanism involved was grossly unknown. We tried to study role of HIC1 in regulating processes like cell cycle, apoptosis etc. We first knocked down different transcripts using SiRNA/ShRNA in glioma cell lines (U87MG, U373MG, SAOS2) by transfection (**stable and transient**) and studied its effects on cell phenotype (**microscopy**), cell cycle profiling (**Flow cytometry**), survival index (**MTT**), RNA expression of related genes (**Real time PCR**), proteins (**western blot**) which includes **p53, p21, p27, E2F responsive genes (cyc E, cycA2, Bim, Noxa, Puma, Caspase3, Diablo), SIRT1, hsp90, cfos, cjun, cmc, bax, survivin, cycB, CDK1** and others suspected to be related with HIC1 in regulating crucial pathways. We proposed the molecular mechanism of HIC1 in regulating cell cycle and apoptosis. Moreover, the cell response under adverse growth condition like serum free media was also studied.

Our study had revealed that P21, a p53 response gene, well known for its involvement in arresting cell in different phases of cell cycle was increased at RNA as well as protein level which plausibly could explain decreased cell numbers and arrest upon HIC1 knock down. P27 did showed significantly high expression at RNA and protein level by nine and fivefold, respectively, and could

be an additional major factor in G2/M arrest. P21 and p27 can synergistically inhibit progression through the cell cycle and slow the rate of cell division

We also tried and successfully **clone and expressed** the sturdy full length HIC1 protein in bacterial system (2.2 kb with 73% GC). Followed by **protein isolation, purification** and using that to raise antibodies against it in rabbit and later using that antibody to check the expression of HIC1 in various grades of brain tumors.

Junior Research Fellow (2004-2005): AIIMS, Delhi

Department of Biochemistry and Medicine in All India Institute of Medical Sciences worked on a project “**Mycoplasma pneumoniae in asthma**”

Project in Masters (2003):

“**Isolation and purification of egg albumin and generation of antibody against it in mice**”.

Ovalbumin was salted out (precipitated) from egg, purification by gel exclusion column chromatography, running the SDS-PAGE, eluted protein from gel and immunized the mice. Furthermore, took the serum out of blood and perform immunodiffusion to confirm the presence of the antibody against ovalbumin.

SCIENTIFIC/TECHNICAL EXPERTISE:

Novel technologies:

Tissue specific conditional Knockout mice study
Animal surgery (LAD and Heart Ischemia/reperfusion model)
Echocardiography

Other regular lab techniques:

CHIP, IP, FLOW CYTOMETRY, Immunohistochemistry, Ubiquitome Proteosomal pathway, E1-E2-E3 ligase activity, PROTEOMICS, TUNEL assay, CFSE, mitochondrial membrane potential determination, apoptotic assay, electron microscopy, enzyme activity assay, siRNA, shRNA, miRNA (antimir and mimics), DNA and RNA extraction, Primer designing and PCR, plasmid extraction, RT-PCR, Real time PCR, cloning, southern blotting, Bacterial cell culture, competent cell, transformation, ligation, digestion, sequencing, gel elution, western blot, ELISA, immunoassay, cell fixation, cell staining, tissue culture, Cell viability assay (MTT), doubling time, stable and transient transfection, stable cell line, protein extraction, protein estimation by spot densitometry, BCA and Bradford methods, protein expression and purification, chromatography (paper, thin layer, gel filtration), SDS/NATIVE PAGE, agarose gel electrophoresis, spectrophotometry, gel extraction, salt fractionation, dialysis, determination of mol wt. of protein, immunization of mice and detection of antibodies in antisera-immunodiffusion .

Computation: Scientific softwares like Genomatrix (metinspector), Transfec, targetscan, Primer3, siRNA, shRNA designing, DNA STAR, Blast etc. Windows, Microsoft word, excel, PowerPoint, Adobe Photoshop etc.

PUBLICATIONS

- 1) **Sanjay Kumar** and Muhammad Ashraf. *Tadalafil, a Phosphodiesterase Inhibitor Protects Stem Cells over Longer Period against Ischemic-Reperfusion Injury through STAT3/PKG-I Signaling.* Stem Cells Dev. 2015; 24(11):1332-41. [PMID: 25602782]
- 2) **Sanjay Kumar** and Meenal Vaidya. *Hypoxia Inhibits Mesenchymal Stem Cell Proliferation through HIF1 α Dependent Regulation of P27.* Mol Cell Biochem 2016; 415(1-2):29-38. DOI 10.1007/s11010-016-2674-5 [PMID: 26920732]
- 3) **Sanjay kumar.** *Stem Cell Therapy for Cardiovascular Diseases and its major setback.* Intervention Cardiology Journal (Editorial).
- 4) **Sanjay Kumar**, Motoi Okada, Dehua Chang, Ibrahim Elmadbouh, Muhammad Ashraf. *Heart specific conditional STAT3 knockout abolish cardioprotection against ischemic reperfusion injury upon Tadalafil Treatment, a Phosphodiesterase Inhibitor. (Manuscript Completed)*
- 5) **Sanjay Kumar.** *P53 Induction Accompanying G2/M Arrest upon Knockdown of Tumor Suppressor HIC1 in U87MG Glioma cells.* Mol Cell Biochem. 2014 ;395(1-2):281-90. [PMID: 24992983]
- 6) **Sanjay Kumar.** *Molecular Cloning and Expression of High GC rich Novel Tumor Suppressor Gene HIC-1.* Mol Biotechnol. 2014 ;56(11):1040-8. [PMID: 25001210]
- 7) **Sanjay Kumar.** *P53 and HIC1 in Brain Cancer Gliomas.* Journal of Headache and pain Management (Editorial).
- 8) Nidhi Kapoor, Jianli Niu, Yasser Saad, **Sanjay Kumar**, Tatiana Sirakova, Edilu Becerra, Xioman Li, and Pappachan E. Kolattukudy. *MCPIP implements STAT6/KLF4 mediated IL-4 induction of macrophage polarization via its dual catalytic activities.* J Immunol. 2015; 194(12):6011-23 [PMID: 25934862]
- 9) Vallabhapurapu SD, Noothi SK, Pullum DA, Lawrie CH, Pallapati R, Potluri V, Kuntzen C, Khan S, Plas DR, Orłowski RZ, Chesi M, Kuehl WM, Bergsagel PL, Karin M, Vallabhapurapu S. Transcriptional repression by the HDAC4-ReI β -p52 complex regulates multiple myeloma survival and growth. **Nature Commun.** 2015;6:8428.
- 10) Nazima Nisar, Randeep Guleria, **Sanjay Kumar**, Tirlok Chand Chawla, Nihar Ranjan Biswas. *Mycoplasma pneumoniae and its role in asthma.* Postgrad Med J. 2007; 83(976):100-4. [PMID: 17308212]

- 12) **Sanjay Kumar** and Muhammad Ashraf. *Heart specific conditional STAT3 knockout abolish cardioprotection against ischemic reperfusion injury upon Tadalafil Treatment, a Phosphodiesterase Inhibitor*. Circulation 2012; 126: A16938. (Accepted AHA abstract 2012, Los Angeles, California, US)
- 13) **Sanjay Kumar** and Muhammad Ashraf. *A Novel Phosphorylating Mechanism of STAT3 in Protection against Ischemia/reperfusion by Pharmacological Preconditioning with Tadalafil, a PDE Inhibitor*. Circulation 2013; 128: A9244 (Accepted AHA abstract 2013, Dallas, Texas, US).
- 14) **Sanjay Kumar**, Muhammad Ashraf, Khawaja Husnain Haider. *Hypoxamir-210: A key regulator of stem cell proliferation under hypoxia*. Cardiovascular Centre of Excellence, University of Cincinnati, Ohio, US
- 15) Nazima Nisar, Randeep Guleria, **Sanjay Kumar**, Tirllok C. Chawla, Niranjana Nayak, Arvind K. Singh, and Nihar R. Biswas, *Sero-prevalence of Mycoplasma pneumoniae in asthmatics: Correlation with Interleukin-5 levels*. Chest 2006
- 16) **Sanjay Kumar**. *Viagra and other Phosphodiesterase Inhibitors: An Answer to Cardiovascular Diseases? CUH journal 2016*
ISSN:2348 3377
- 17) Avijit Pramanik and Sanjay Kumar. *Bottlenecks of Molecular Mass Determination of Oligomeric Membrane Protein - Detergent Complexes and What can be Achieved*. Biological Systems 2016; 5:2

BOOK

- 1) **Sanjay Kumar**. *HIC-1 in tumorigenesis: Tumor suppressor gene (Book)*. Scholar's press, ISBN: 978-3-639-76130-6

Editorial/ Reviewer Board

Editorial Member of Interventional Cardiology Journal
 Journal of Headache and Pain Management
 International Journal of Molecular Biology and medicine
 International Journal of Cell Science
 Cardiology
 Journal of Nutrition and Food Science
 Annals of Bone Marrow Research
 Biological Systems
 Radiation Oncology
 Journal and Neurobiology and neurology
 International journal of Stem Cell Research & Practice

Stem Cell Fundamentals and practice
Advances in Biosciences and Biotechnology
Glioma
Cancer and Therapy
Journal of Regenerative Therapy
Journal of Genetic Medicine
Reviewer of Journal of Clinical Radiation Oncology, Journal of cancer Biology & Research
Journal of Biomedical Science and engineering Cell, Stem cell and regenerative Medicine
Journal Tumor Biology

Organization and leadership experience

Conference Organized

2006-2007 **CHAIRMAN** of SYS (Society of Young Scientists) at AIIMS, Delhi

1) Organized two International Seminar

- a) **Nanotechnology in medicine** (2007) as a **co-chairman** of conference.
- b) **Immunity to infection** (2007) as **president** of conference.

2) Organized more than twenty scientific lectures by national and international scientists.

3) Started SYS annual oration award and first time gave to Dr. Lalji Singh (Director Center for Cellular and Molecular Biology (CCMB))

2007-2008 **PATRON** of SYS

Central University of Haryana

2015-16 Organized Seminar and posters presentation (Science day)
Biotechnology in sustainable development
Microbes on Human Health and Infection

Presentation: Effects of Tadalafil on stem cell survival upon preconditioning
miRNA 210 and its role in regulating cell cycle and apoptosis
Human Genome Project
Real Time PCR technique
Tumor Suppressor HIC1
siRNA technology
Flow Cytometry etc.

OTHER ACTIVITIES

- 1) **Central Purchase committee** member at Central University of Haryana
- 2) **Rate Contract committee** member at Central University of Haryana
- 3) **National level athlete**
- 4) Member of college amendment committee
- 5) Involved in many blood donation and vaccination programs

TEACHING EXPERIENCE

- 1) Assistant Professor and Head (Central University Haryana): Teaching Biochemistry (PG)
- 2) Taught Biology (Biotechnology, molecular biology, genetics, enzymes, physical chemistry etc) to medical aspirants.
- 3) Trained many students from different institutions of India including IITs, AIIMS, Central and State universities, Amity etc. to complete their dissertation, summer training, thesis.

Specialization : 1) Biomedical Engineering