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RESEARCH PROJECTS SUMMARY:

- **Identification of unique epigenetic signatures in cancer stem cells for therapeutic targeting.** At Roswell Park Cancer Institute, my research focus was identifying unique epigenetic signatures in cancer stem cells, a sub-population of cancer cells which are capable of self-renewing and rendering drug refractory characteristics to cancers. I continue to pursue research on this exciting area. In addition, I am utilizing bioinformatic approaches to identify the contribution of non-coding RNAs and epigenetic regulators in cancer development.
- **The role of Epigenetics in the pancreatic development and diseases.** During my postdoc at Children's Health Research Institute, Western University Canada, I initiated and led a project on Epigenetics, and, using genome wide approaches (ChIP-seq, RNA-seq and microarray), identified epigenetic dysregulation in pancreatic acinar cells under genetic and environmental stresses. Moreover, I established that important developmental genes were epigenetically silenced by polycomb repressive complex 2 (PRC2) in chronic pancreatitis and pancreatic cancer, and epigenetic drugs could relieve this gene repression.
- **Study of regulatory nuclear import pathways for transcription factors during neuronal differentiation and in the Embryonic Stem cells.** During my PhD research, I used systematic mutational analysis to identify nuclear localization signals in NeuroD1, MyoD and E47, which are important transcription factors for neuronal and muscular lineage specifications, respectively. Utilizing biochemical and molecular approaches, and unique cellular models, I unveiled a novel crosstalk between two distinct nuclear import pathways underlying the nuclear accumulation of HLH transcription factors. On a translational aspect, the mutants I generated were instrumental in targeting HLH transcriptional network thus limiting experimental glioma in xenograft models. The projects also helped identify the role of nuclear import receptors in mouse embryonic stem cell maintenance.
- **Identification of genes causing human autosomal recessive retinitis pigmentosa.** This project was undertaken for my master thesis. I was involved in identification of families affected with autosomal recessive retinitis pigmentosa in consultation with ophthalmologists at Lahore, obtaining blood samples after the informed consent, DNA isolation from blood, scanning the genome by PCR amplification of microsatellites using labeled primers, amplicon analysis using ABI prism 3100 genetic analyzer followed by haplotype analysis. Using this strategy, I found PDE6A gene linkage in families affected with autosomal recessive retinitis pigmentosa.

TEACHING EXPERIENCE:

- **TEACHING CERTIFICATION: Associate Level-(2017)-University of Buffalo, New York, USA.** Successfully completed a comprehensive teaching certification by Centre for Integration of Teaching, Research and Learning (CIRTL) at University of Buffalo, New York, USA. This certification is specifically designed to prepare next generation of STEM faculty in teaching excellence.
- **COURSES DEVELOPED AND TAUGHT**
Advanced courses taught at Alfaisal University; **Research Methodology, Stem cells and regenerative medicine, Molecular Biology, Cell Biology, Human Genetics, Epigenetics-Special topics, Introductory Biology.**

EDUCATION:

Postgraduate Diploma in Project Management (2016). Western University, London ON, Canada.

Ph.D (Cell & Mol. Biology) (2008). Graduate School of Frontier Biosciences, Osaka University, Japan.

Dissertation: Synergistic Nuclear Import of NeuroD1 and its partner transcription factor E47 via heterodimerization.

M.Phil. (Molecular Biology) (2004). National Centre of Excellence in Molecular Biology, Lahore, Pakistan.

Dissertation: Genetic evaluation of PDE6A gene in families affected with Autosomal Recessive Retinitis Pigmentosa.

B.Sc (Hons) (Plant Genetics) (2002) Agricultural University, Peshawar, Pakistan.

EXPERIENCE

- **Assistant Professor of Molecular Biology:** Department of Life Sciences, Alfaisal University, KSA. Feb.2018~
 - **Senior Research Affiliate:** Roswell Park Cancer Institute, Buffalo, NY, USA. 2016-2018.
 - **Research Associate:** London Health Sciences Centre, London ON. Canada. Feb, 2015-Aug, 2016.
 - **Postdoctoral Researcher:** Children's Health Research Institute, University of Western Ontario, Canada. November, 2009 - Feb, 2015.
 - **Specially Appointed researcher:** Graduate School of Frontier Biosciences, Osaka University, Japan. April, 2008-October, 2009.
 - **Molecular biologist at the Molecular Diagnostics and HCV Genotyping Unit:** At Rahila Research and Reference Lab, Lahore, Pakistan, April 2004- March 2005.
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SERVICES:

- Head of Life Sciences department since 2019.
 - Manuscript reviewer for *Epigenomics*, *Seminars in Cancer Biology*, *Molecular Carcinogenesis*, *British Journal of Cancer*, *Molecular Biology Reports*, *Oncology Reports*, *Journal of Cancer Research and Therapeutics*, *The Tohoku Journal of Experimental Medicine*.
 - Member of Curriculum Development Committee, Faculty Awards Committee, Faculty Recruitment Committee, Lab safety committee, College Council at Alfaisal University, Saudi Arabia.
 - Member of Career Directions Advisory Committee at Roswell Park Cancer Institute, USA. 2017.
 - External thesis reviewer for University of Health Sciences, Lahore, Punjab, Pakistan, Kohat University of Science and Technology, Kohat, Pakistan.
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FUNDED RESEARCH PROJECTS:

- 1- Non-coding RNAs in breast cancer. (PI). Internal Research Grant. Alfaisal University. (SAR. 50,000). 2022-2023
- 2- Epigenetic dysregulations in breast cancer and their therapeutic implications (PI). Academic Research Enhancement Grant. Alfaisal University. (SAR. 50,000). 2019-2020
- 3- Sequencing local SARS-CoV-2 isolates (PI). Alfaisal Covid-19 Initiative (SAR. 30,000). 2020-2021
- 4- Targeting the iron responsive element (IRE) mRNAs for the iron mis-regulation and diseases; role of translation initiation factor eIF4F (Co-PI). Alfaisal University. (SAR. 50,000). 2019-2020

AWARDS/ FELLOWSHIPS:

- Outstanding Teaching Award, Alfaisal University, Riyadh, KSA (2022).
- 2007-2008- Pre-doctoral Fellowship by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.
- 2006-2007- Pre-doctoral Fellowship by Japan Student Services Organization (JASSO), Japan.
- Best poster presentation award at the Roswell Park symposium, Buffalo, NY, USA. September, 2017.
- Best Oral Presentation Award at the 24th Pediatrics Research Day, University of Western Ontario, London ON, Canada, May 26, 2011.
- Best Poster Presentation Award at the 23rd Pediatrics Research Day, University of Western Ontario, London ON, Canada, May 27, 2010.
- Travel fellowship for “*The 6th International Stem Cell School in Regenerative Medicine*”, University of Southern Denmark, July 14-16, 2009, Odense, Denmark.
- July-August, 2004- Trainee fellowship by FBS Osaka University, Japan for Summer School.

PRESENTATIONS AS INVITED SPEAKER:

- “Loss of Mist1 leads to epigenetic reprogramming of pancreatic acinar cells”. “*CHRI Seminar Series*”. Victoria Hospital, London ON, Canada. June 9, 2011.
- “EPIGENETICS in Pancreatic Health and Disease”. Institute of Biomedical and Genetic Engineering, Islamabad, Pakistan. May 28, 2013.
- “Dissection of epigenetic dysregulation in pancreatic diseases”. Deptt. of Biological sciences, COMSATS, CIIT, Islamabad. December 15, 2015.
- “Epigenetics of Cancer stem cells-the drug evaders” at the Basic Medical Conference 2018 at Khyber Medical University, Peshawar. October 23-25, 2018.
- “Epigenetic modifications as therapeutic targets in human diseases”. Deptt. Of Life Sciences, King Fahd University of Petroleum and minerals (KFUPM). April 12, 2021.

PUBLICATIONS:

- 1) **Mehmood R**, Alsaleh A, Want MY, Ahmad I, Siraj S, Ishtiaq M, Alshehri FA, Naseem M, Yasuhara N. 2023. Integrative Molecular Analysis of DNA Methylation Dynamics Unveils Molecules with Prognostic Potential in Breast Cancer. *BioMedInformatics.*; 3(2):434-445. <https://doi.org/10.3390/biomedinformatics302002>
- 2) **Mehmood R***, Jibiki K, Alsafwani Z, Naseem M, Yasuhara N. 2022 Systems genomics of nucleoporins provides prognostic insights into breast cancer. *Adv. life sci.*, vol. 9, no. 1, pp. 98-110.
- 3) Alrashed S, Min-Allah N, Ali I, **Mehmood R**. 2022 COVID-19 outbreak and the role of digital twin. *Multimed Tools Appl.* 3:1-15. doi: 10.1007/s11042-021-11664-8.
- 4) Jibiki K, Kodama TS, Suenaga A, Kawase Y, Shibazaki N, Nomoto S, Nagasawa S, Nagashima M, Shimodan S, Kikuchi R, Okayasu M, Takashita R, **Mehmood R**, Saitoh N, Yoneda Y, Akagi KI, Yasuhara N. 2021 Importin $\alpha 2$ association with chromatin: Direct DNA binding via a novel DNA-binding domain. *Genes Cells.* 2021;26(12):945-966. doi: 10.1111/gtc.12896
- 5) **Mehmood R***, Jibiki K, Shibazaki N, Yasuhara N. 2021. Molecular profiling of nucleocytoplasmic transport factor genes in breast cancer. *Heliyon (Cell Press).* 30;7(1):e06039.
- 6) Liu B, Kumar R, Chao HP, **Mehmood R**, Ji Y, Tracz A, and Tang DG. 2020. Evidence for context-dependent functions of KDM5B in prostate development and prostate cancer. *Oncotarget.* 17; 11(46):4243-4252
- 7) Alrashed S, Min-Allah N, Saxena A, Ali I, **Mehmood R**. 2020. Impact of lockdowns on the spread of COVID-19 in Saudi Arabia. *Informatics in Medicine Unlocked.* 2352-9148, Vol: 20, 100420.
- 8) Li Q, Liu B, Chao HP, Ji Y, Lu Y, **Mehmood R**, Jeter C, Chen T, Moore JR, Li W, Liu C, Rycaj K, Tracz A, Kirk J, Davis T, Xiong J, Deng Q, Huang J, Foster BA, Chen X, Tang DG. LRIG1 is a pleiotropic androgen

- receptor-regulated feedback tumor suppressor in prostate cancer. *Nature Communication*.
- 9) Ishtiaq M, Waseem M, **Mehmood R***. MicroRNA Regulation Along the Course of Cellular Reprogramming to Pluripotency. *Curr Mol Med*. 2018. doi: 10.2174/1566524018666180416102129.
 - 10) Liu B, Gong S, Li Q, Chen X, Moore J, Suraneni MV, Badeaux MD, Jeter CR, Shen J, **Mehmood R**, Fan Q, Tang DG. 2017. Transgenic overexpression of NanogP8 in the mouse prostate is insufficient to initiate tumorigenesis but weakly promotes tumor development in the Hi-Myc mouse model. *Oncotarget*. doi: 10.18632/oncotarget.17186.
 - 11) Fazio EN, Young CC, Levy M, Berger K, Johnson CL, **Mehmood R**, Toma J, Swan P, Chu A, Cregan SP, Dilworth JF, Howlett, C, and Pin CL. 2017. Activating Transcription Factor 3 promotes loss of the acinar cell phenotype in response to ceruelin-induced pancreatitis in mice. *Molecular Biology of the Cell*. 1;28(18):2347-2359.
 - 12) Khan FS, Ali I, Afridi UK, Ishtiaq M, **Mehmood R***. 2016. Epigenetic mechanisms regulating development of Hepatocellular Carcinoma and their promise for therapeutics. *Hepatology International*. doi:10.1007/s12072-016-9743-4.
 - 13) Fenech M, Sullivan CM, Ferreira LT, **Mehmood R**, MacDonald WA, Stathopoulos PB, Pin CL. 2016. *Atp2c2* is transcribed from a unique transcriptional start site in mouse pancreatic acinar cells. *J. Cell. Physiol*. doi: 10.1002/jcp.25391.
 - 14) Pin CL, Ryan J, **Mehmood R**. 2015. Acinar cell reprogramming: a clinically important target in pancreatic disease. *Epigenomics*. 7(2):267-81.
 - 15) Beyeler S, Joly S, Fries M, Obermair FJ, Burn F, **Mehmood R**, Tabatabai G, Raineteau O. 2014. Targeting the bHLH transcriptional networks by mutated E proteins in experimental glioma. *Stem Cells*. 32(10):2583-95.
 - 16) Johnson CL, **Mehmood R**, Laing SW, Stepniak CV, Kharitonov A, Pin CL. 2014. Silencing of the Fibroblast growth factor 21 gene is an underlying cause of acinar cell injury in mice lacking MIST1. *Am J Physiol Endocrinol Metab*. 306(8):E916-28.
 - 17) **Mehmood R**, Varga G, Mohanty S, Laing SW, Lu Y, Johnson CL, Kharitonov A, Pin CL. 2014. Epigenetic reprogramming in *Mist1*^{-/-} mice predicts the molecular response to cerulein-induced pancreatitis. *PLoS One*. 9(1):e84182.
 - 18) Yasuhara N, Yamagishi R, Arai Y, **Mehmood R**, Kimoto C, Fujita T, Touma K, Kaneko A, Kamikawa Y, Moriyama T, Yanagida T, Kaneko H, and Yoneda Y. 2013. Importin Alpha Subtypes Determine Differential Transcription Factor Localization in Embryonic Stem Cells Maintenance. *Developmental Cell*. (26):123-35.
 - 19) Alahari S, **Mehmood R**, Johnson C L, Pin C L. 2011. The Absence of MIST1 Leads to Increased Ethanol Sensitivity and Decreased Activity of the Unfolded Protein Response in Mouse Pancreatic Acinar Cells. *PLoS One*. doi:10.1371/journal.pone.0028863.
 - 20) **Mehmood R**, Yasuhara N, Fukumoto M, Oe S, Tachibana T, Yoneda Y. 2011. Cross-talk between distinct nuclear import pathways enables efficient nuclear import of E47 in conjunction with its partner transcription factors. *Mol Biol Cell*. (19):3715-24.
 - 21) Nagai M, Moriyama T, **Mehmood R**, Tokuhiko K, Ikawa M, Okabe M, Tanaka H, Yoneda Y. 2011. Mice lacking Ran binding protein 1 are viable and show male infertility. *FEBS Lett*. 585(5):791-6.
 - 22) Ohara R, Hata K, Yasuhara N, **Mehmood R**, Yoneda Y, Nakagawa M, Yamashita T. 2011. Axotomy induces axonogenesis in hippocampal neurons by a mechanism dependent on importin β . *Biochem Biophys Res Commun*. 405(4):697-702.
 - 23) **Mehmood R**, Yasuhara N, Oe S, Nagai M, Yoneda Y. 2009. Synergistic Nuclear Import of NeuroD1 and its partner transcription factor, E47, via heterodimerization. *Experimental Cell Research*. 315(10):1639-52.
 - 24) **Mehmood R**, Ramzan M, Ali SA, Riaz A, Ali I, Zulfiqar F, Riazuddin S. 2005. Prevalence of mutations in PDE6A gene in families affected with autosomal recessive retinitis pigmentosa. *Biologia (Pk)*; 50 (2).
 - 25) Ali SA, **Mehmood R**, Riaz A, Ramazan M. 2005. Genetic evaluation of CNGB1 gene in a large

consanguineous RP family. *Biologia(Pk)*; 50 (2).

26) Farhatullah, **Mehmood R**, Raziuddin. 2002. In vitro effect of salt on the vigor of potato (*Solanum tuberosum* L.) plantlets. *Biotechnology* (Pk). 1: 73–77.

CONTRIBUTION TO BOOKS:

- 1) **Mehmood R**, Ramzan M, Ali A, Zulfiqar F, Riazuddin S. Identification of genes causing Autosomal Recessive Retinitis Pigmentosa. 2006. *GENE THERAPY- PROSPECTIVE TECHNOLOGY ASSESSMENT IN ITS SOCIETAL CONTEXT*". Elsevier, Edited By; Christof Tannert, Jörg Niewöhner, Max-Delbrueck Centre, Berlin, Germany.
- 2) Fazio EN, **Mehmood R**, Pin C L. 2011. Chromatin Immunoprecipitation (ChIP) from pancreatic acinar cells and whole pancreatic tissue. The Pancreapedia: Exocrine Pancreas Knowledge Base, www.pancreapedia.org/tools/methods ,DOI: [10.3998/panc.2011.24](https://doi.org/10.3998/panc.2011.24).
- 3) **Mehmood R**. 2011. FGF21, Molecule. The Pancreapedia: Exocrine Pancreas Knowledge Base, www.pancreapedia.org/molecules/fgf21, DOI: [10.3998/panc.2011.35](https://doi.org/10.3998/panc.2011.35)

PRESENTATIONS/ABSTRACTS IN CONFERENCES/MEETINGS:

- **2017 American Association for Cancer Research (AACR)**, April 1-5, 2017, Washington, D.C, USA
- **Gordon Research Conference; IGF & Insulin System in Physiology & Disease**- March 8-13, 2015. Ventura, CA, USA.
- **"2nd Canadian Conference on Epigenetics"** June 24 - June 27, 2014. Western University, London ON.
- **"London Health Research Day"**, March 20, 2013, Lawson Health Research Institute, Western University Canada (Oral Presentation).
- **"Physiology and Pharmacology Research Day"**, University of Western Ontario, Canada, November 6, 2012.
- **"The 4th Annual Developmental Biology Research Day"** Developmental Biology, University of Western Ontario, Canada, May 31, 2012.
- **"The 25th Pediatrics Research Day"** May 16, 2012, University of Western Ontario, London ON, Canada. (Oral Presentation).
- **"London Health Research Day"**, March 20, 2012, Lawson Health Research Institute, Western University Canada.
- **"The FASEB Summer Research Conference on Epigenetics, Chromatin & Transcription"**, July 31 - Aug. 5, 2011 in Snowmass Village, Colorado, USA.
- **"The 3rd Annual Developmental Biology Research Day"** Developmental Biology, University of Western Ontario, Canada, May 31, 2011.
- **"The 24th Pediatrics Research Day"** May 26, 2011, University of Western Ontario, London ON, Canada.
- **"Epigenetics Eh, first Canadian Epigenetic Conference"**, May 4-7, 2011, London ON Canada.
- **"The 23rd Pediatrics Research Day"** May 27, 2010, University of Western Ontario, London ON, Canada.
- **"The 82nd Japanese Biochemical Society Meeting"**, October 21-24, 2009 Kobe, Japan (Oral Presentation).
- **"The 6th International Stem Cell School in Regenerative Medicine"**, University of Southern Denmark, July 14-16, 2009, Odense, Denmark (Oral Presentation).
- **Cold spring Harbor Laboratory Meeting "The Dynamic Organization of Nuclear Function"** September 17-21, 2008, New York, USA.
- **"Biochemistry and Molecular Biology conference"**: December 11-15, 2007 at Pacifico Yokohama, Japan.
- **"The GCOE young researcher training camp"**; February 18-20, 2008, Kyoto, Japan.

