Curriculum Vitae

Name: **SUNITA SINGH**
Designation: Professor
Present address: Department of Zoology
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Academic Qualifications:

Ph.D. 1996: Centre for Advanced Study in Zoology, Banaras Hindu University, Varanasi
Thesis title: **"Genetic variation and level of genetic divergence in Indian pygmy field mice**"

M.Sc. 1987: Zoology (Cytogenetics – special paper), Bhagalpur University, Bhagalpur
First class First position in merit list (Gold Medal)

B. Sc. (Hons.) 1985: Honours in Zoology, Bhagalpur University, Bhagalpur
First class second position in merit list (National Merit Scholarship)

Field of Specialization: **Cytogenetics & Molecular Genetics, Clinical Genetics**

Position and Employment:

S.No.	Institution/Place	Position	From	To
1.	Banaras Hindu University	Professor	14.2.2017	present
2.	Banaras Hindu University	Associate Professor	14.2.2014	13.2.2017
3.	Banaras Hindu University	Assistant Professor (Stage 3)	14.2.2011	13.2.2014
4.	Banaras Hindu University	Assistant Professor (Stage 2)	1.1.2006	13.2.2011
5.	Banaras Hindu University	Senior Lecturer	5.3.2005	31.12.2005
6.	Banaras Hindu University	Lecturer	6.1.2004	4.3.2005
7.	P.G. College, Ghazipur	Lecturer & Head	5.3.2001	5.1.2004
8.	Banaras Hindu University	Research Associate	15.5.2000	4.3.2001

Publications:

1. **Singh S**, Sharma T (1996). Biochemical genetics of Indian pygmy field mice: Superoxide dismutase (Sod- I) as a Diagnostic Marker in *Mus booduga*. **Biochemical Genetics**, 34:437-441. **Journal Impact Factor: 1.927. Times Cited: 2**

2. **Singh S**, Sharma T (1997). High levels of Genetic Variation in Indian field and house mice. **Journal of Genetics**, 76:189-200. **Journal Impact Factor: 0.672. Times Cited: 10**

3. Singh BN, **Singh S** (2000). Bibliography on the *Drosophila bipectinata* complex. **DIS**, 83. **Journal Impact Factor: 1.069**

4. **Singh S**, Singh BN (2001). The *Drosophila bipectinata* species complex. **Indian Journal of Experimental Biology**, 39:835-844. **Journal Impact Factor: 1.475. Times Cited: 13**

5. Singh BN, **Singh S**, Singh SR (2001). Presence of two pairs of spermathecae (sperm storage organ) in a *Drosophila* female: a freak of nature. **DIS**, 84:20-22. **Journal Impact Factor: 1.069**

6. **Singh S**, Cheong N, Narayan G, Sharma T (2009). Burrow characteristics of the co-existing sibling species *Mus booduga* and *Mus terricolor* and the genetic basis of adaptation to hypoxic/hypercapnic stress. **BMC Ecology**, 9: 6. **Journal Impact Factor: 2.315. Times Cited: 14**

7. **Singh S** (2011). A new haplotype of the beta globin gene complex (Hbbb) in Indian field mouse Mus booduga. **Journal of Scientific Research, Banaras Hindu University**, 55: 49-56. **Journal Impact Factor: NA**

8. **Singh S** (2011).Genetics of Type 2 diabetes: A Review. **Journal of Scientific Research**, **Banaras Hindu University**, 55: 35- 48. **Journal Impact Factor: NA. Times Cited: 31**

9. **Singh S**, Ansari MA, Narayan G (2012). Pathobiology of gallbladder cancer. **Journal of Scientific Research, Banaras Hindu University**, 56: 35-45. **Journal Impact Factor: NA. Times Cited: 14**

10. **Singh S**, Prasad SB, Yadav SS, Agrawal NK, Narayan G (2012). Association of common variants of CDKN2A/2B rs10811661 (C/T) and WFS1 rs6446482 (C/G) with type 2 diabetes mellitus in Indian population of eastern Uttar Pradesh. **Journal of Diabetes and Metabolism**, 3: 9. **Journal Impact Factor: 1.15. Times Cited: 17**

11. **Singh S** (2013). Identification of genetic pathways in cervical cancer progression: Whole genome approach. **The Indian Journal of Bio Research**. 85 (4): 23-37. **Journal Impact Factor: NA.**

12. Das M, Prasad SB, Yadav SS, Govardhan HB, Pandey LK, **Singh S**, Pradhan S, Narayan G (2013). Over expression of Minichromosome Maintenance genes is clinically correlated to cervical carcinogenesis. **PLoS One**, 8: e69607. **Journal Impact Factor: 3.54; Times Cited: 63**

13. Prasad SB, Yadav SS, Das M, Govardhan HB, Pandey LK, **Singh S**, Pradhan S, Narayan G (2014). Down regulation of FOXO1 promotes cell proliferation in cervical cancer. **Journal of Cancer**, 5: 655-662. **Journal Impact Factor: 3.249. Times Cited: 23**

14. Kumari S, Mishra SP, Rahul, Prasad SB, Yadav SS, Das M, Kumar M, Nath G, Khanna A, Dixit VK, Puneet, **Singh S**, Narayan G (2014). Differential expression of COX-2: a potential marker for clinical phenotypes of gastric cancer. **International Journal of Advanced Research**, 2: 278-288. **Journal Impact Factor: NA.**

15. **Singh S** (2014). Diabetes Research and Treatment. **Diabetes Res Treat Open Access**, 1:2. **Journal Impact Factor: NA**

16. Yadav SS, Prasad SB, Das M, Kumari S, Swain PK, Pandey LK, **Singh S**, Pradhan S, Narayan G (2014). Epigenetic silencing of CXCR4 promotes loss of cell adhesion in cervical cancer. **BioMed Research International**, 2014: 581403. **Journal Impact Factor: 2.583. Times Cited: 16**

17. Das M, **Singh S**, Pradhan S, Narayan G (2014). MCM Paradox: Abundance of Eukaryotic Replicative Helicases and Genomic Integrity. **Molecular Biology International**, 2014: 574850. **Journal Impact Factor: NA. Times Cited: 29**

18**. Singh S** (2015): Genetics of Type 2 Diabetes: Advances and Future Prospect. **Journal of Diabetes and Metabolism**, 6:4. **Journal Impact Factor: 1.15.**

19. Prasad SB, Yadav SS, Das M, Modi A, Kumari S, Pandey LK, **Singh S**, Pradhan S, Narayan G (2015). PI3K/AKT pathway-mediated regulation of $p27^{Kip1}$ is associated with cell cycle arrest and apoptosis in cervical cancer. **Cellular Oncology**, 38: 215-225. **Journal Impact Factor: 4.761. Times Cited: 30**

20. Yadav SS, Prasad CB, Prasad SB, Pandey LK, **Singh S**, Pradhan S, Narayan G (2015). Anti-tumor activity of staurosporine in tumor microenvironment of cervical cancer: an *in vitro* study. **Life Sciences**, 133: 21-28. **Journal Impact Factor: 3.234. Times Cited: 7**

21. Ansari MA**, Singh S** (2015). Pathobiology of Breast Cancer. **Journal of Scientific Research**, 59: 47-59. **Journal Impact Factor: NA**

22. Das M, Prasad SB, Yadav SS, Modi A, **Singh S**, Pradhan S, Narayan G (2015). HPV type specific response of cervical cancer cells to cisplatin after silencing replication licensing factor MCM4. **Tumor Biology**, 36: 9987-9994. **Journal Impact Factor: 3.650. Times Cited: 5**

23. Mishra D, Singh VK, **Singh S**, Narayan G (2015): Molecular modelling-docking cell surface receptor CD10 target for doxorubicin. **Online Journal of Bioinformatics**, 16: 286-292. **Journal Impact Factor: NA.**

24. **Singh S**, Agrawal NK, Narayan G (2016): Association of KCNJ11 E23K (rs5219) polymorphism to Type 2 diabetes mellitus: a case-control study in Indian population of Eastern Uttar Pradesh. **Diabetes Research and Treatment Open Access**, 3:130. **Journal Impact Factor: NA. Times Cited: 1**

25. Yadav SS, Prasad SB, Prasad CB, Pandey LK, Pradhan S, **Singh S**, Narayan G (2016): CXCL12 is a key regulator in tumor microenvironment of cervical cancer: an in vitro study. **Clinical and Experimental Metastasis,** 33:431-439. **Journal Impact Factor: 3.455. Times Cited: 6**

26. Kumari S, Puneet, Prasad SB, Yadav SS, Kumar M, Khanna A, Dixit VK, Nath G, **Singh S**, Narayan G (2016): Cyclin D1 and cyclin E2 are differentially expressed in gastric cancer. **Medical Oncology**, 33:40. **Journal Impact Factor: 2.920. Times Cited: 13**

27. Mishra D, Singh S, Narayan G (2016): Curcumin induces apoptosis in pre-B acute lymphoblastic leukemia cell lines via PARP-1 cleavage. **The Asian Pacific Journal of Cancer Prevention**, 17: 3863-3867. **Journal Impact Factor: 2.52. Times Cited: 5**

28. Kazmi HR, Narayan G, **Singh S** (2016): Retinoblastoma: A review. **International Journal of Ocular Oncology and Oculoplasty**, 2: 75-79. **Journal Impact Factor: NA.**

29. Mishra D, **Singh S**, Narayan G (2016): Role of B Cell Development Marker CD10 in Cancer Progression and Prognosis. **Molecular Biology International**, 2016:4328697. **Journal Impact Factor: NA. Times Cited: 5**

30. Prasad CB, Prasad SB, Yadav SS, Pandey LK, **Singh S**, Pradhan S, Narayan G (Revised manuscript under review): Olaparib modulates DNA repair efficiency, sensitizes cervical cancer cells to cisplatin and exhibits anti-metastatic property. **Scientific Reports**, 7: 12876. **Journal Impact Factor:** 4.122. **Times Cited: 3**

Ongoing Research

My research laboratory is actively working in collaboration with various departments of Institute of Medical Sciences, Department of Molecular and human Genetics, Institute of Science, BHU; a few private pathology laboratories and hospitals of Varanasi on several aspects of complex diseases viz., carcinogenesis and type 2 diabetes. A brief view of the accomplishments and ongoing research in my laboratory is outlined below.

Genetic studies of Type 2 Diabetes:

So far we have genotyped one variant each of CDKN2A/B rs10811661(C/T), WFS1 rs6446482 (C/G), PPARγ rs1801282 (Pro12Ala), TCF7L2 rs12255372 (G/T) and KCNJ11 rs5219 E23K in case-control cohort of eastern Uttar Pradesh, India for type 2 diabetes (in 597 diabetic and 373 control samples). We studied association of these variants with type 2 diabetes for the first time in Indian population of eastern Uttar Pradesh.

- We found CDKN2A/2B rs10811661 variant with modest effect size (OR 1.50; 95% CI 1.109-2.032; P = 0.009) as significant risk factor predisposing to T2D and WFS1 rs6446482 variant

also with modest effect size (OR 1.43; 95% CI 1.074 - 1.896; P = 0.014) as predisposing risk factor for T2D in the population of eastern Uttar Pradesh, India (Journal of Diabetes and Metabolism; 3: 9).

- Our findings suggest that TCF7L2 rs12255372 gene polymorphism is strongly associated (OR 1.34; 95% CI 1.030-1.737 P = 0.034) with T2D in the population of eastern Uttar Pradesh (India), as previously described in European populations with similar effect size. However, the PPARγ (Pro12Ala) polymorphism does not show significant association with T2D in the population of eastern Uttar Pradesh unlike south Asian Indians, where Ala12 allele has been found to increase susceptibility to T2D, while Ala12 allele is consistently associated with protection of T2D in European populations (Manuscript in preparation).
- KCNJ11 rs5219 E23K shows weak association to T2D in our population (Diabetes Research and Treatment Open Access 3:130).

Molecular pathology of carcinogenesis in Multiple Cancers

Cervical carcinogenesis:

- Minichromosome maintenance complex: Minichromosome Maintenance (MCM) proteins play important roles in cell cycle progression by mediating DNA replication initiation and elongation. We have done expression profiling of MCMs and RECQL4 and shown that association of expression levels with clinical parameters in cervical cancer. We have shown that binding and function of MCM 2-7 to pre-replication complex is regulated by MCM 10 mediated binding of RECQL4 with MCM 2-7. We have shown that large amount of MCM proteins help cancer cells to endure replication stress and cervical cancer cells follow different pathways, probably HPV-dependent to regulate the function of MCMs according to their HPV status. These proteins may be used as diagnostic markers for cervical cancer (PLoS One 2013, 8:e69607; Tumor Biology 2015, 36:9987-9994).
- SLIT-ROBO/CXCR4-CXCL12 Signalling axis: SLIT2 is a secretary glycoprotein which mediates its function by binding to the Roundabout receptor (ROBO). These SLIT-ROBO complexes perform its function by interaction with downstream signaling axis CXCR4-CXCL12. Despite the biological and clinical importance of the interaction between the chemokine receptor CXCR4 and its ligand CXCL12 in human cancers, little is known about transcriptional regulation of the CXCR4 gene. Our study demonstrates the evidence of frequent epigenetic silencing of CXCR4 in cervical cancer. Our data suggests that CXCL12/CXCR4 chemokine signaling pathway may play critical role in tumor progression and therefore, may be a potential molecular therapeutic target (BioMed Research International, 2014: 581403; Clinical and Experimental Metastasis 2016, 33:431-439).
- PI3K-AKT-PTEN pathway: The PI3K/AKT signaling pathway is a critical regulator of many normal cellular processes including cell growth, proliferation, motility, survival and apoptosis. Deregulation of this pathway has been shown in variety of human cancers. FOXO1 and p27 important downstream effecters of PI3K/AKT signaling pathway, are significantly down-regulated in cervical cancer. We have shown the molecular mechanism of FOXO1 regulation in cervical cancer. Similarly we have dissected the molecular mechanism of the regulation of another PI3K-AKT signaling regulated gene p27 and its role in cell proliferation and apoptosis (Journal of Cancer 2014, 5: 655-662; Cellular Oncology 2015, 38: 215-225).
- DNA repair/Mitotic Checkpoint regulation: Our study demonstrated the disruption of PAR-γH2A.X association results in formation of DSBs and persistent recruitment of 53BP1 foci in cervical cancer cells leading to subsequent cell cycle arrest and cell death. Inhibition of recruitment of broad spectrum DNA repair factors from different repair pathways contributes to failure of cisplatin induced DNA damage repair. Intrestingly, our data also suggest the anti-

metastatic property of olapaprib, an inhibitor of PARP, in cervical cancer cells (revised manuscript under review in Scientific Reports).

Gastric carcinoma:

- We have demonstrated that the COX-2 expression and its cross talk with *H. pylori* infection may be critical in the progression of gastric cancer (International Journal of Advanced Research 2014, 2:278-288); and Cyclin D1 & cyclin E2 have critical role in gastric carcinogenesis (Medical Oncology 2016, 33:40). Various cell cycle regulatory proteins including p53 and p21 negatively regulate cell cycle progression. Though, the over expression of p53 and p21 is well known, its role in gastric cancer progression is poorly understood. We have demonstrated the clinical correlation of differential expression of p53, p27, p21 and in gastric carcinoma.

Hematological Malignancies:

- We have demonstrated chemo-sensitizing and chemo-preventive role of curcumin and CD10 as a secondary target for doxorubicin that may share a common active binding site with curcumin in leukemias (Online Journal of Bioinformatics 2016, 16:286-292; Asia Pacific Journal of Cancer Prevention 2016, 17:3865-3869)
- We have shown chromosomal instability in refractory cytopenia with multilineage dysplasia (a subtype of Myelodysplastic syndrome); CML; ALL; and AML. Multiple chromosomal abnormality includes premature sister chromatid separation, chromatin decondensation in metaphase cells, hyperdiploidy, translocations and endoreduplication.
- We have recently initiated studies on the role of genetic and cytogenetic determinants of the progression of B-cell acute lymphoblastic leukemia (B-ALL). Our preliminary study indicates that Curcumin mediated TLR9 downregulation inhibits pre-B Acute Lymphoblastic Leukemia (pre B-ALL) proliferation and induces apoptosis.

Gallbladder carcinoma: We have recently initiated studies to understand the role of chemokines in the carcinogenesis of gallbladder. We have demonstrated the role of copy number alteration of mitochondrial genome in gallbladder cancer (manuscript under preparation). We studied the expression profiles of six genes (NF-κB, TNF α, IL1β, COX-2, MMP1, MAPK14). All the six genes studied are frequently up-regulated in gallbladder carcinoma compared to gallstone samples. Our preliminary data suggests that expression profiles of these genes can be potential diagnostic and/or prognostic markers of gallbladder cancer. It may have important clinical implications in the management of the disease and may reveal useful therapeutic targets for the treatment of the gallbladder cancer. Study of these genes in a larger cohort may be useful in defining the role of NF-κB-mediated proinflammatory cytokines and their involvement in gallbladder carcinogenesis.

Books:

1) "A Practical Handbook of Cell Biology and Cytogenetics" ISBN 81-86376-19-4 – Sole author – Vishwajnana Adhyayan Sansthan (Regd.) Publisher. Date of publication: March, 2014

Book Chapters:

1. Narayan G, **Singh S** (2016): Molecular Genetics of Cervical Precancerous Lesions: Implications to Prognostic Model Development. **In: Cervical Cancer: Recent Research and Review Studies**. SM eBooks, pp1-14. ISBN: 978-1-944685-91-1.

2. Narayan G, **Singh S** (2017): Genetic and epigenetic mechanisms of cervical cancer progression: Integrative genomic approach. **In: Human Genomics and Applications**, Ed. RC Sobti, Sanjiv Puri, VL Sharma, AJS Bhanwer. Narendra Publishing House, New Delhi, pp1-14. ISBN: 978-93-86110-55-8.