

Suman Kumar Dhar



Name : Suman Kumar Dhar

Designation: **Professor**

Centre: Special Centre for Molecular Medicine

School: Special Centre for Molecular Medicine

Room No: SCMM

Off. Phone: 011-26742572, 26738774

Residence: 596, Tower D, Paschimabad, JNU, ND-67, #26742476

E-mail: skdhar@mail.jnu.ac.in, skdhar2002@yahoo.co.in

Web Address: <http://www.jnu.ac.in/Faculty/sdhar/cv.pdf>

Area of Research

Bacterial/Parasite/Mammalian DNA Replication and cell cycle regulation

Our laboratory in JNU is actively engaged in studying the unique characteristics of DNA replication and cell cycle regulation in two medically important pathogens, *Plasmodium falciparum* and *Helicobacter pylori*. Both these pathogens are extremely important although poorly understood from the basic biology point. Not a single effective vaccine is available for either of these pathogens. There are reports of drug resistant strains too. Our aim is to find the key regulators in DNA replication processes so that we can identify potential targets for therapy. The DNA replication process offers various important and interesting targets for new inhibitors development. Understanding the mechanism of

initiation of DNA replication in *P. falciparum* and *H. pylori* will be useful in finding new targets for screening new antibiotics to eradicate these pathogens. We have already identified two such targets (PfGyrase for *P. falciparum* and HpDnaB helicase for *H. pylori*).

Education

INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Burdwan University, West Bengal, India	B. Sc	1989	Chemistry
Kalyani University, West Bengal, India	M. Sc.	1992	Biochemistry
Jawaharlal Nehru University, New Delhi, India	Ph.D.	1998	Molecular Biology

Career

1997-1998 Research Assistant, Dept. of Microbiology, University of Virginia, Charlottesville, USA

1998-2001 Post-Doctoral Fellow, Dept. Of Pathology, Harvard Medical School, Boston, USA

2001-2005 Asstt. Professor, Special Centre for Molecular Medicine, Jawaharlal Nehru University, New Delhi, India

2005- Associate Professor, SCMM, JNU, New Delhi, India

2002-2003 Visiting Fellow, Dept. of Pathology, Harvard Medical School, Boston.

2003-2004 Visiting Fellow, Harvard School of Public Health, Boston, USA (summer)

2007 Visiting Fellow, Bernard Nocht Institute for Tropical Medicine, Hamburg, Germany

2008 Humboldt Fellow, Bernard Nocht Institute for Tropical Medicine, Hamburg, Germany

2011 Professor, SCMM, JNU

2011-2013 Chairperson (Head), SCMM, JNU, ND-67

Research Projects

ONGOING

Centre of Excellence in Parasitology funded by Department of Biotechnology, India.
Role: Co-PI; Duration: 2012-2017

Awards and honours

- 1997-1998 Training grant in emerging infectious diseases, National Institute of Health, USA
- 2000-2003 Post doctoral fellowship in breast cancer, Breast cancer research programme, Department of Army, USA
- 2005-2010** Wellcome Trust Senior International Research Fellowship, Wellcome Trust, London
- 2007 Elected member, Guha Research Conference, India
- 2008-2013** Swarnajayanti Fellowship, Department of Science and Technology, Govt. of India
- 2008 Alexander Von Humboldt Fellowship, Germany
- 2010 Wellcome Trust-DBT Senior Research Fellowship
- 2010** National Biosciences award for career development awarded by Department of Biotechnology, Govt. of India
- 2011 Elected fellow, National Academy of Sciences, India
- 2012** Shanti Swarup Bhatnagar Award in the Biological Sciences
- 2012** Invited speaker, Gordon Research Conference on Host-Parasite interaction held in Rhode Island, USA
- 2014** Appeared in National Television (Rajya Sabha TV) under Eureka programme for popularization and promotion of Science

Ad-hoc reviewer: Journal of Biological Chemistry, Molecular Microbiology, FEBS Journal, Medical Science Monitor and various Indian journals.

Membership

American Society for Microbiology
Elected member of Guha Research Conference (2007)

Publications

Publications of Suman Kumar Dhar (48 Total) as of Dec 2014.

(a) Full research papers.

Papers published from JNU as independent researcher

1. Narayanaswamy N, Kumar M, Das S, Sharma R, Samanta PK, Pati SK, **Dhar SK**, Kundu TK, Govindaraju T (**2014**). A Thiazole Coumarin (TC) Turn-On Fluorescence Probe for AT-Base Pair Detection and Multipurpose Applications in Different Biological Systems. *Sci Rep.* 4:6476.
2. Srivastava S, Bhowmick K, Chatterjee S, Basha J, Kundu TK, **Dhar SK.** (**2014**) Histone H3K9 acetylation level modulates gene expression and may affect parasite growth in human malaria parasite *Plasmodium falciparum*. *FEBS J.* Sept 22. [Epub ahead of print]

3. *Dana S, Prusty D, Dhayal D, Gupta MK, Dar A, Sen S, Mukhopadhyay P, Adak T, **Dhar SK. (2014)** The potent Anti-malarial activity of Acriflavine *in vitro* and *in vivo*. *ACS Chem Biol.* 2014 Aug 4. [Epub ahead of print]
4. *Sharma A, Kamran M, Verma V, Dasgupta S, **Dhar SK. (2014)** Intracellular Locations of Replication Proteins and the Origin of Replication during Chromosome Duplication in the Slowly Growing Human Pathogen *Helicobacter pylori*. *J Bacteriol.* 196:999-1011. **Journal cover article.**
5. Bhowmick K, **Dhar SK. (2013)** *Plasmodium falciparum* single-stranded DNA-binding protein (PfSSB) interacts with PfPrex helicase and modulates its activity. *FEMS Microbiol Lett.* 2013 Nov 23. doi: 10.1111/1574-6968.
6. *Abdul Rehman SA, Verma V, Mazumder M, **Dhar SK¹**, Gourinath S¹. (2013) Crystal structure and mode of helicase binding of the C-terminal domain of primase from *Helicobacter pylori*. *J Bacteriol.* 195:2826-38. (**¹Co-corresponding author**)
7. *Deshmukh A, Srivastava S, Herrmann S, Gupta A, Mitra P, Gilberger TW and **Dhar SK. (2012)** The role of N-terminus of *Plasmodium falciparum* ORC1 in telomeric localization and *var* gene silencing. *Nucleic Acids Research* 40:5313-31
8. *Nitharwal RG, Verma V, Subbarao N, Dasgupta S, Choudhury NR and **Dhar SK. (2012)** DNA binding activity of *Helicobacter pylori* DnaB helicase: the role of the N-terminal domain in modulating DNA binding activities. *FEBS J.* 279:234-50. **Journal cover article.**
9. Dorin-Semblat D, Carvalho TG, Nivez M, Halbert J, ...Mehra P, **Dhar S**,...Tilley L, Doerig C. (2012) An atypical cyclin-dependent kinase controls *Plasmodium falciparum* proliferation rate. *Kinome.* 1: 4-16.
10. *Prusty D, Dar A, Priya R, Sharma A, Dana S, Choudhury NR, Rao NS and **Dhar SK. (2010)**. Single-stranded DNA binding protein from human malarial parasite *Plasmodium falciparum* is encoded in the nucleus and targeted to the apicoplast. *Nucleic Acids Res.* 38:7037-53
11. Kashav T, Nitharwal R, Abdulrehman SA, Gabdoulkhakov A, Saenger W, **Dhar SK***, Gourinath S*. (2009) Three-dimensional structure of N-terminal domain of DnaB helicase and helicase-primase interactions in *Helicobacter pylori*. *PLoS One.* 20: e7515. (* **co-corresponding** author)
12. *Dar A, Prusty D, Mondal N and **Dhar SK. (2009)** A Unique 45 Amino Acid Region in the Toprim Domain of *Plasmodium falciparum* Gyrase B is Essential for Its Activity. *Eukaryot Cell* 8: 1759-69.

13. *Gupta A, Mehra P, Deshmukh A, Dar A, Mitra P, Roy N and **Dhar SK. (2009)** Functional dissection of the catalytic carboxyl-terminal domain of human malaria parasite *Plasmodium falciparum* origin recognition complex subunit 1 (PfORC1). *Eukaryot Cell* 8: 1341-51
14. Sharma A., Nitharwal RG., Singh B., Dar A., Dasgupta A and **Dhar SK. (2009)** *Helicobacter pylori* single-stranded DNA binding protein-functional characterization and modulation of *H. pylori* DnaB helicase activity. *FEBS J.* 276: 519-531
15. *Gupta, A., Mehra P. and **Dhar SK. (2008).** *Plasmodium falciparum* origin recognition complex subunit 5: functional characterization and role in DNA replication foci formation. *Molecular Microbiology* 69: 646-65
16. *Prusty D., Mehra P., Srivastava S., Shivange AV., Gupta A., Roy N and **Dhar SK. (2008)** Nicotinamide inhibits *Plasmodium falciparum* Sir2 activity in vitro and parasite growth. *FEMS Microbiol Lett.* 282: 266-72.
17. *Nitharwal RG, Paul S, Soni RK, Sinha S, Prusthy D, Keshav T, RoyChoudhury N, Mukhopadhyay G, Chaudhury T, Gourinath S, and **Dhar SK. (2007)** The domain structure of *Helicobacter pylori* DnaB helicase: The N-terminal domain can be dispensable for helicase activity whereas the extreme C-terminal region is essential for its function. *Nucleic Acids Res.* 35: 2861-74
18. *Dar MA, Sharma A, Mondal N and **Dhar SK. (2007)** Molecular cloning of apicoplast targeted *Plasmodium falciparum* DNA gyrase genes: unique intrinsic ATPase activity and ATP-independent dimerisation of PfGyrB subunit. *Eukaryotic Cell.* 6:398-412.
19. Gupta A, Mehra P, Nitharwal R, Sharma A, Biswas AK and **Dhar SK. (2006)** Analogous expression pattern of *Plasmodium falciparum* replication initiation proteins PfMCM4 and PfORC1 during the asexual and sexual stages of intraerythrocytic developmental cycle. *FEMS Microbiol. Lett.* 261:12-8.
20. Mehra P, Biswas AK, Gupta A, Gourinath S, Chitnis CE and **Dhar SK. (2005)** Expression and characterization of human malaria parasite *Plasmodium falciparum* origin recognition complex subunit 1. *Biochem Biophys Res Commun.* 337:955-66.
21. *Soni RK, Mehra P, Mukhopadhyay G and **Dhar SK. (2005)** *Helicobacter pylori* DnaB helicase can bypass *E. coli* DnaC function *in vivo*. *Biochem J.* 389(Pt 2):541-8

22. *Soni RK, Mehra P, Choudhury NR, Mukhopadhyay G, **Dhar SK**. (2003) Functional characterization of *Helicobacter pylori* DnaB helicase. *Nucleic Acids Res.* 31:6828-40.
23. Jha S, Karnani N, **Dhar SK**, Mukhopadhyay K, Shukla S, Saini P, Mukhopadhyay G, Prasad R. (2003). Purification and characterization of the N-terminal nucleotide binding domain of an ABC drug transporter of *Candida albicans*: uncommon cysteine 193 of Walker A is critical for ATP hydrolysis. *Biochemistry* 42:10822-32.
24. **Dhar, S.K^{\$}**, Mondal, N., Soni, R.K., and Mukhopadhyay, G. (2002). A ~35 kDa polypeptide from baculovirus infected insect cells binds to yeast ACS like elements in the presence of ATP. *BMC Biochemistry* 2002, 3:23 (^{\$}corresponding author)

Papers from post-doctoral research:

25. Zhu W, Ukomadu C, Jha S, Senga T, **Dhar SK**, Wohlschlegel JA, Nutt LK, Kornbluth S, Dutta A. (2007) Mcm10 and And-1/CTF4 recruit DNA polymerase alpha to chromatin for initiation of DNA replication. *Genes Dev.* 21:2288-99.
26. ***Dhar SK^{\$}**, Saxena S^{\$}, Yuan P^{\$}, Senga T, Takeda D, Robinson H, Kornbluth S, Swaminathan K, Dutta A. (2004) A dimerized coiled-coil domain and an adjoining part of geminin interact with two sites on Cdt1 for replication inhibition. *Mol Cell.* 15:245-58. ^{\$}Co-first authors.
27. Mondal N, Zhang Y, Jonsson Z, **Dhar SK**, Kannapiran M, Parvin JD. (2003) Elongation by RNA polymerase II on chromatin templates requires topoisomerase activity. *Nucleic Acids Research* 31(17):5016-24.
28. Wohlschlegel, J.A., **Dhar, S. K.**, Prokhorova, T. A., Dutta, A. and Walter, J. C. (2002) Xenopus Mcm10 binds to origins of DNA replication after Mcm2-7 and stimulates origin-binding of Cdc45. *Mol. Cell* 9(2):233-40
29. ***Dhar, S.K.**, Yoshida, K., Machida, Y., Khaira, A., Chaudhuri, B., Wohlschlegel, J.A., Leffak, M., Yates, J. and Dutta, A. (2001) Replication from *oriP* of Epstein-Barr Virus requires human ORC and is inhibited by geminin. *Cell* 106(3), 287-96.
30. ***Dhar, S.K.**, Delmolino, L. and Dutta A. (2001) Architecture of the human origin recognition complex. *J. Biol. Chem.* 276(31), 29067-71.
31. Jonsson, Z.O, **Dhar, S.K.**, Narlikar, G.J., Auty, R., Wagle, N., Pellman, D., Pratt, R.E., Kingston, R. and Dutta A. (2001) Rvb1p and Rvb2p are essential components of a chromatin remodeling complex that regulates transcription of over 5% of yeast genes. *J. Biol. Chem.* 276(19), 6279-88

32. *Wohlschlegel, J.A., Dwyer, B.T., **Dhar, S.K.**, Cvetic, C., Walter, J.C., Dutta, A. (2000) Inhibition of eukaryotic DNA replication by geminin binding to Cdt1. *Science* 290(5500), 2309-12
33. Thome, K.C., **Dhar, S.K.**, Quintana, D.G., Delmolino, L., Shahsafaei, A. and Dutta A. (2000) Subsets of human ORC subunits are expressed in non-proliferating cells and associate with non-ORC proteins. *J. Biol. Chem.* 275(45), 35233-41
34. ***Dhar, S.K.** and Dutta, A. (2000). Identification and characterization of the human ORC6 homolog. *J. Biol. Chem.* 275(45), 34983-87

Papers from Pre-doctoral research:

35. **Dhar, S.K.**, Vines, R.R., Bhattacharya, S. and Petri, W.A., Jr. (1998). Ribosomal DNA fragments enhance the stability of transfected DNA in *Entamoeba histolytica*. *Jr. of Euk. Microbiol.* 45(6), 656-660.
36. Olvera, A., Olvera, F., Vines, R.R., Ricillas-Targa, F., Lizardi, P.M., **Dhar, S.K.**, Bhattacharya, S., Petri, W.A. and Alejandro Alagon (1997) Stable transfection of *Entamoeba histolytica* trophozoites by lipofection. *Arch. of Med. Res.* 28, S49-51
37. ***Dhar, S.K.**, Roychoudhury, N., Mittal, V., Bhattacharya, A. and Bhattacharya, S. (1996). Replication initiates at multiple random sites in the ribosomal DNA plasmid of the protozoan parasite *Entamoeba histolytica*. *Mol. Cell. Biol.* 16, 2314-2324.
38. ***Dhar, S.K.**, Roychoudhury, N., Bhattacharya, A. and Bhattacharya, S. (1995). A multitude of circular DNAs exist in the nucleus of *Entamoeba histolytica*. *Mol. Biochem. Parasitol.*, 70, 203-206.
39. Sehgal D, Mittal V, Ramachandran S, **Dhar SK**, Bhattacharya A, Bhattacharya S. (1994) Nucleotide sequence organisation and analysis of the nuclear ribosomal DNA circle of the protozoan parasite *Entamoeba histolytica*. *Mol Biochem Parasitol.* 67:205-14.

(b) Scientific reviews

40. Deshmukh AS, Srivastava S, **Dhar SK.** (2013) *Plasmodium falciparum*: epigenetic control of *var* gene regulation and disease. *Subcell Biochem.* 61:659-82.
41. Mitra P, Deshmukh A and **Dhar SK.** (2012) DNA replication during intra-erythrocytic stages of human malarial parasite *Plasmodium falciparum*. *Current Science.* 102;725-740.

42. Nitharwal RG, Verma V, Dasgupta S, **Dhar SK.** (2011) *Helicobacter pylori* chromosomal DNA replication: current status and future perspectives. ***FEBS Lett.*** 585:7-17.

43. **Dhar, S. K[§],** Soni R. K., Das, B. K. and Mukhopadhyay, G. (2003) Molecular Mechanism of Action of Major *Helicobacter pylori* Virulence Factors. ***Molecular and Cellular Biochemistry*** 253:207-15 ([§]corresponding author)

(c) articles (not abstracts) published in seminars, symposia, conference volumes,

44. Doerig C, Baker D, Billker O, Blackman MJ, Chitnis C, **Dhar SK et al.** (2009) Signalling in malaria parasites. The MALSIG consortium. ***Parasite.*** 16: 169-82

45. Gupta A, Mehra P and **Dhar SK.** (2010) *Plasmodium falciparum* origin recognition complex (ORC): a master regulator of parasite DNA replication and *var* gene regulation. The tenth sir Dorabji Tata symposium held in Indian Institute of Science, Bangalore (10-12 March, 2010). **Mechanism of microbial pathogenesis.** Edited by D. Raghunath and V. Nagaraja.

46. Kamran M and **Dhar SK.** (2013) Characterization of *H pylori* cell division protein ftsZ. National symposium on new horizons in Biotechnology held at Haldia Institute of Technology, Haldia, West Bengal, India (29-31 August, 2013). **New horizons in Biotechnology.** Edited by Prof. Pranab Roy.

(d) Chapters contributed to books

47. Wohlschlegel, J.A., Dutta, A. and **Dhar, S.K.** (2002). ORC and the Initiation of DNA Replication. ***Chemtracts: Biochemistry and Molecular Biology*** 15: 533-543.

48. Sharma A and **Dhar S. K.** (2005) *Helicobacter pylori*: Diseases and Cure: a molecular approach in “**Microbes: Health and Environment**” edited by Prof. Ajit Varma. Publisher I. K. International. Delhi. India.

(e) Intellectual property, technological innovations, new products etc.

1. **US Patent Application Approved** by US Patent Office on "GEMININ AND ORC3N INHIBIT REPLICATION OF HERPESVIRUSES, PAMILOMAVIRUSES AND POLYOMAVIRUSES" BY DUTTA, A AND **DHAR S.K.** No. B0801.70253US00

2. Method of screening anti-*Plasmodial* activity of acriflavin and acriflavin as an anti-malarial agent: Indian patent (2630/DEL/2012) and PCT filed (**PCT/IN2013/000411 dated 27/02/2014**)