## Projects running (Internal/Extramural)

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| **1. Use of some Schiff's base metal chelate as resistance modifying agent (RMA) to surmount multidrug resistance (MDR) in cancer** | **Council for Scientific and Industrial Research (CSIR), New Delhi, [09/030(0061/2011). EMR-I]** | **01.07.2011-01.07.2014** |
| **2. Modulation of immune system by metal chelates and overcoming drug resistance in cancer** | **University Grants Commission; UGC: 20-12/2009 (ii) EV-IV, Dated: 13.06.2010** | **13.06.2010-2.06.2013** |
| **3.Overcoming MDR in cancer through induction of apoptosis and immunomodulation by generation of ROS and RNS with Redox active molecule** | **Council for Scientific and Industrial Research (CSIR), New Delhi,[09/030(0069/2012).EMR-I]** | **01.06.2012-31.05.2014** |
| **4. Induction of programmed cell death in drug resistant cancer** | **CNCI, sanctioning a JRF** | **8.11.2011-7.11.2014** |

# Recent Publications

1. Chakraborty P., Chatterjee S., Ganguly A., Saha P, Adhikary A., Das T., Chatterjee M, **Choudhuri S.K.** , Reprogramming of tumor associated macrophage (TAM) towards proimmunogenic type through regulation of MAP kinases using a redox active copper chelate, **Journal of Leucocyte Biology,** 2012: 91(4), 609-619.

2. Ghosh RD, Chakraborty P, Banerjee K, Adhikary A, Sarkar A, Chatterjee M, Das T, **Choudhuri, S.K.,** The Molecular Interaction of a Copper Chelate with Human P-glycoprotein, **Molecular and cellular Biochemistry, 2012, 364, 309-320.**

3. A novel copper chelate acts as resistance modifying agent in vitro by altering efflux mechanism against multidrug resistant Vibrio cholerae O1, Koel Bhattacharya, **S.K. Choudhuri,** S.K. Neogi, Indian Journa l of Medical Research, (Accepted for publication), 2012.

4. Myeloid Derived Suppressor cells (MDSCs) can induce the geeration of TH17 response from naïve CD 4+ T cells, Shilpak Chatterjee, Satyajit Das, Paramita Chakravorty, Alak Manna, Mitali Chatterjee, **Soumitra Kumar Choudhuri, Immunobiology, 218, 718-724, 2013.**

# Extramural projects/ grants

## Ph.D. awarded

1. Thesis entitled "overcoming multidrug resistance (MDR) in cancer through reactive oxygen species (ROS) generated by novel iron chelate" (D-7/Sc/1746/08) had been awarded Ph.D. to Mr. Avishek Ganguly, ICMR, SRF (under Dr. S. K. Choudhuri), Jadavpur University, July, 2012.
2. Thesis entitled "reactive oxygen species (ROS) mediated targeted therapy in drug resistant cancer" had been awarded Ph.D. to Mrs. Soumya Basu, (D-7/Sc/32/11), SRF in ICMR project (under Dr. S.K. Choudhuri), Jadavpur University, August 2012.
3. Thesis entitled "modulation of tumor microenvironment by novel chemicals-a possible approach for cancer therapy" had been awarded Ph.D. to Ms. Paramita Chakravorty, JRF in ICMR project (under Dr. S. K. Choudhuri), Jadavpur University, March, 2013.

## Paper presented

- Invited talk on "Novel approach of overcoming multidrug resistance (MDR) in cancer" in the department Biotechnology NIT, Durgapore, West Bengal on 27.02.2013.

## Interesting observations

Interesting observations were published in I) Journal of Leucocyte Biology 91: 000–000; 2012 and II) Immunobiology 218 (2013) 718– 724] in detail. The summary of the interesting observation is:

Tumor-associated macrophages (TAMs) present in the tumor microenvironment (TME) play an immunosuppressive role and lead to tumor progression and metastasis. Under this backdrop we showed that our synthesized novel copper chelate, viz., copper N-(2-hydroxy acetophenone) glycinate [CuNG] can reprogram TAMs toward proimmunogenic type and consequently mount antitumor immune response.

We were successful to explore the signaling mechanisms responsible for such reprogramming of TAMs that cures cancer. CuNG-inducedROS generation triggers activation of two MAPKs, i.e., p38MAPK and ERK1/2, and also causes up-regulation of intracellular glutathione. Furthermore, activation of p38 MAPK up-regulated the initial IL-12 production and the

activation of ERK1/2 in tandem with GSH, found responsible for IFN-? production by TAMs. This IFN-? in turn prolonged IL-12 production and down-regulated TGF-ß production and thus could play the decisive role in CuNG-mediated reprogramming of regulatory cytokine production by TAMs. We showed that ROS-mediated activation of MAPKs could convert suppressive macrophages toward the proimmunogenic type. The interesting findings open the possibility of targeting TAMs by the use of redox-active compounds for designing a novel, therapeutic strategy against cancer. J. Leukoc. Biol. 91: 000–000; 2012.

Th17 (IL-17 producing CD4+ T cells) are a subset of pro inflammatory T cells of various murine and human cancer cases and governs the neoplastic process through tumor angiogenesis and metastasis. As the development of Th17 response in the tumor microenvironment remained elusive, we studied and disclosed the important aspect that involvement of tumor infiltrating antigen presenting cells (APCs), especially tumor associated macrophages (TAMs) and myeloid derived suppressor cells (MDSCs) polarize naïve CD4+ T cells toward IL-17+ T cells. We observed the interesting phenomenon that MDSCs, either isolated from the tumor site or generated in vitro are superior over TAMs to induce IL-17 production by naïve CD4+ T cells and MDSCs-mediated induction of IL-17+ T cell response is independent of MDSCs-T cell contact but crucially depends on the cytokines secreted by MDSCs. Our study may help to develop therapeutic strategies by harnessing the ability of MDSCs to induce IL-17 production by CD4+ T cells and thus restrict the generation of inflammatory Th17 population at the disease site [Immunobiology 218 (2013) 718 – 724].

## Training Program

- The following six students viz, Ria Mishra (Durgapore NIT), Sarani Nath (Calcutta University), Avishek Chakravorty (Durgapore Engineering College), Sambadi Majumder (Durgapore Engineering College, Minaksi Prodaan (Utkal university) completed summer training programs on various aspect of cancer during 2012-2013.

## Review of papers

1. PloS One

2. British Journal Of Cancer

3. Free Radical Biology and Medicine

4. British journal of Pharmacology

5. Journal of Medicinal Chemistry

6. Pharmacological Research