

# DR. AVINABA MUKHERJEE

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**Objective:** To explore myself in the field of teaching and research and get the opportunities to prove my abilities by accepting challenges, fulfilling the organizational goal and climb the career ladder through continuous learning and commitment.

**Current position: Assistant Professor**

**Department of Zoology,**

**Charuchandra College, University of Calcutta**

## Personal profile:

**Sex:** Male  
**Nationality:** Indian  
**Hobby:** Listening music

## Educational Qualification:

- **Ph.D.** from **Cytogenetics and Molecular Biology Lab**, Department of Zoology, University of Kalyani, India. (*Appraisal for Ph.D. coursework: A<sup>+</sup>*) under **Prof. Anisur Rahman Khuda Bukhsh**.
- **M.Sc. in Zoology** with specialization in **Parasitology and Immunology** from University of Calcutta.
- **B.Sc. (Honours) in Zoology as Major and Physiology, Chemistry as Minor** from University of Calcutta.
- **Higher Secondary (class 12)** from West Bengal Council of Higher Secondary Education.
- **Secondary (class 10)** from West Bengal Board of Secondary Education.

## Awards and achievements:

- **Qualified National Eligibility Test (NET) in Life Sciences conducted by CSIR-UGC JUNE 2009.**
- **DS-Kothari (UGC) Post-Doctoral Fellowship.**
- **'Travel Award' for basic part in the AMS Awards, 2015 held at New Zealand**, for the research article entitled "Ethanollic Extract of Marsdenia condurango Ameliorates Benzo[a]pyrene-induced Lung Cancer of Rats."
- **Editorial Board Member in Journal of Drug Design and Medicinal Chemistry (JDDMC).**
- **Editorial Board Member in EC PHARMACOLOGY AND TOXICOLOGY.**
- **Reviewer in JOURNAL OF BIOCHEMICAL AND MOLECULAR TOXICOLOGY.**
- **Reviewer of journal entitled as 'ASIAN PACIFIC JOURNAL OF TROPICAL MEDICINE.**

- **Author of the book entitled as ‘Fundamental Zoology’ on Parasitology & Biology of Insects for CSCS UG Syllabus from Santra Publication Pvt. Ltd. (ISBN: 978-93-92426-43-8).**

## **Teaching Experiences:**

### **PG DEPARTMENT OF ZOOLOGY**

- Worked as honorary guest lecturer in **PG Department of Zoology**, Bidhannagar Govt. College.
- Worked as a part-time lecturer in **PG Department of Zoology** of Barasat Govt. College.
- Worked as honorary lecturer in **PG Department of Zoology**, Lady Brabourne College.

### **UG DEPARTMENT OF ZOOLOGY**

- Worked as honorary guest lecturer in **Department of Zoology**, Sammilani Mahavidyalaya.
- Worked as a guest lecturer **Department of Zoology**, Vidyasagar College.
- Worked as a part-time lecturer **Department of Zoology**, Acharya Prafulla Chandra College.

## **Research Experiences:**

### **Post Doctoral Research Experiences:**

#### **February 2015- January 2017**

Worked as **DS Kothari Postdoctoral Fellow (UGC)** in the project entitled as “Determination of anti-cancer, anti-proliferative and apoptotic potential of synthesized benzenesulphonyl glutamine derivatives in both free and PLGA nano encapsulating form targeting matrix metalloproteinase and associated signalling pathways” under the supervision of Prof. Tarun Jha, Natural Science Laboratory, Department of Pharmaceutical Technology, Jadavpur University.

### **Doctoral Research Experiences:**

#### **July 2010-August 2014**

Worked on Ph.D. thesis project entitled as “Intervention of non-small cell lung cancer by a plant extract, *Thuja occidentalis* and its bioactive ingredients: *in vitro* and *in vivo* studies on apoptotic signaling pathways” in the project funded by Boiron Laboratory, Lyon, France, under the supervision of Prof. Anisur Rahman Khuda Bukhsh.

#### **January 2010-June 2010**

Worked as a Junior research fellow (JRF) in a CSIR project entitled as “Modulation of Heat Shock Proteins in Tumor Cells by Natural Isothiocyanates” in Environmental Carcinogenesis and Toxicology Laboratory, Chittaranjan Cancer Research Institute, Kolkata, India.

## **Skills:**

### **Molecular Biology and Biotechnology**

- Chromosome karyotyping from mouse bone marrow.
- Sperm head anomaly detection.
- Study of meiotic stages.
- Micronucleus assay.
- DNA and RNA isolation and quantification.
- Total, cytosolic and mitochondrial protein isolation and quantification.
- Gel electrophoresis.
- COMET assay.
- Polymerase chain reaction (PCR)
- Semi-quantitative reverse transcriptase-polymerase chain reaction (RT-PCR).

- Western blot analysis.
- Enzyme linked immunosorbent assay (ELISA).
- Fluorimetric assay.
- Fluorescence activated cell sorting (FACS) analysis (mitochondrial membrane potential, ROS activity, annexin V assay, TUNEL assay, cell cycle analysis, protein expression, nuclear translocation and cytokine titre measurement).
- Matrigel invasion assay.
- Histological analysis.
- Scanning electron microscopy.
- Confocal microscopy.
- Immunohistochemistry.

#### **Biochemical and biophysical**

- Total antioxidants enzyme estimation by FRAP assay.
- Antioxidants enzymes estimation.
- Drug-DNA interaction study by CD spectral analysis.

#### **Pharmacology and Nanotechnology**

- Isolation of bio-active compounds from plant extract.
- Column chromatography and thin layer chromatography (TLC).
- Nanomolecule preparation and characterization by DLS, FTIR and AFM.
- Drug toxicity assay by MTT, LDH and trypan blue exculsion assay (*in vitro*) and acute, chronic toxicity assay (*in vivo*).

#### **Cell Biology**

- *In vitro* mammalian cell lines (cancer- A549, H460, A375, PA1, HeLa, HepG2, HT-1080, PC3, MDA-MB-231, MCF-7, K562 and normal- L-132) and primary cell lines (perfused lung cells from mice and peripheral blood mononuclear cells) culture.
- Fluorescence imaging of cancer cells by fluorescence and confocal microscopy.
- Protein localization and fluorescence imaging by confocal microscopy.

#### **Others**

- Structure activity relationship (SAR) determination in anticancer drug development.
- Molecular docking analysis.
- Rearing and maintenance of mice and rat.
- *In vivo* induced tumor generation and tumor bioassay.
- Isolation and characterization of parasites from different animals.
- Dissection of invertebrate animals and vertebrate animals for observational study of different body systems.

#### **INSTRUMENT HANDLING:**

- Fluorescence Activated Cell sorter and flow cytometer (BD Biosciences)
- UV-Spectrophotometer (Shimadzu PharmaSpec UV-1700)
- PCR (Applied Biosystems, USA)
- ELISA plate reader (Thermo-MultiSkan Ex)
- Fluorescence Microscope (Leica DMLS)
- Confocal microscope (Carl Zeiss LSM510 META Laser Scanning Microscope)
- Dispersion Light Scattering (Malvern Instruments, Southborough, UK)
- Ultra Sound Sonicator (Sonics-Vibra Cell)
- Gel Doc (Bangalore GENEI, BioradUvitec - Ultracam)

#### **COMPUTER SKILLS:**

MS-Office, CELLQuest software (FACS analysis), SPSS analysis (statistical analysis), Primer 3 (primer designing), Image J (image analysis), OriginPro 6.1, Adobe Photoshop CS3, Chem Draw Ultra Version 5.0, Discovery 4.0 studio (Molecular docking analysis).

## List of Publications:

### 2022

1. Chakra BK, Debnath S, **Mukherjee A**, Kuotsu K, Chakraborty M, Chatterjee TK (2022) Potent Anti-Diabetic Activity of Polymeric Microsphere Formulated Metforminon Streptozotocin-Induced Diabetic Rat Model. **International Journal of Life science and Pharma Research**. doi 10.22376/ijpbs/lpr.2022.12.2. 68-81

### 2021

1. Sen R, Sengupta D, **Mukherjee A\*** (2021) Mechanical dependency of the SARS-COV-2 virus and the renin-angiotensin-aldosterone (RAAS) axis: a possible new threat. **Environmental Science and Pollution Research**, 2;1-13.

2. Debnath S, **Mukherjee A**, Saha D, Dash J, Chatterjee TK (2021) Poly-L-Lysine inhibits VEGF and c-Myc mediated tumor-angiogenesis and induces apoptosis in 2D and 3D tumor microenvironment of both MDA-MB-231 and B16F10 induced mice model. **International Journal of Biological Macromolecules**, 183, 528-548.

3. Sharma D, Mazumder ZH, Sengupta D, **Mukherjee A**, Sengupta M, Das RK., Barbhuyan MH, Palit P, Jha T (2021) Cancer photocytotoxicity and anti-inflammatory response of cis-A2B2 type meso-p-nitrophenyl and p-hydroxyphenyl porphyrin and its zinc(II) complex: A synthetic alternative to the THPP synthon. **New Journal of Chemistry**, 45, 2060-2068.

4. Sengupta D, Das S, Sharma D, Chattopadhyaya S, **Mukherjee A**, Mazumdar ZH, Das B, Basu S, Sengupta M. An Anti-inflammatory Fe<sub>3</sub>O<sub>4</sub>-Porphyrin Nanohybrid Capable of Apoptosis through Upregulation of p21 Kinase Inhibitor Having Immunoprotective Properties under Anticancer PDT Conditions. **Chem Med Chem** 2021, 16, 1–15

### 2020

1. **Mukherjee A** (2020) A Systematic Review on Parasite Induced Carcinogenesis. **International Journal of Innovative Science and Research Technology**. 2020, 5, 1095-1099.

2. Debnath S, **Mukherjee A**, Karan S, Chatterjee TK (2020) The Therapeutic Value of Lysine against Cancer: A Comprehensive Review. **International Journal of Biology, Pharmacy and Allied Sciences**, 9, 3218-3247.

3. Mazumdar ZH, Sharma D, **Mukherjee A**, Basu S, Shukla PK, Jha T, Sengupta D (2020) meso-Thiophenium Porphyrins and Their Zn(II) Complexes: A New Category of Cationic Photosensitizers. **ACS Medicinal Chemistry Letters**, 11, 2041-2047.

### 2019

1. Sengupta D, Timilsina U, Mazumder ZH, **Mukherjee A** et al. Dual activity of amphiphilic Zn(II) nitroporphyrin derivatives as HIV-1 entry inhibitors and in cancer photodynamic therapy. **European Journal of Medicinal Chemistry**. 2019, 174, 66-75

### 2018

1. Debnath S, **Mukherjee A**, Karan S, Debnath M, Chatterjee TK (2018) Induction of apoptosis, anti-proliferation, tumor-angiogenic suppression and down-regulation of Dalton's Ascitic Lymphoma (DAL) induced tumorigenesis by poly-L-lysine: A mechanistic study. **Biomedicine and Pharmacotherapy**. 102:1064-1076.
2. Sengupta D, Mazumdar ZH, **Mukherjee A**, Sharma D, Halder AK, Basu S, Jha T (2018) Benzamide porphyrins with directly conjugated and distal pyridyl or pyridinium groups substituted to the porphyrin macrocycles: Study of the photosensitising abilities as inducers of apoptosis in cancer cells under photodynamic conditions. **Journal of Photochemistry and Photobiology B**. 178:228-236.

#### **2017**

1. **Mukherjee A**, Adhikari N, Jha T (2017) A pentanoic acid derivative targeting matrix metalloproteinase-2 (MMP-2) induces apoptosis in a chronic myeloid leukemia cell line. **European Journal of Medicinal Chemistry**. 141:37-50.
2. Adhikari N, **Mukherjee A**, Saha A, Jha T. (2017) Arylsulfonamides and selectivity of matrix metalloproteinase-2: An overview **European Journal of Medicinal Chemistry**. 129, 72-109.

#### **2016:**

1. **Mukherjee A**, Sikdar S, Khuda-Bukhsh AR (2016) Evaluation of ameliorative potential of isolated flavonol fractions from *Thuja occidentalis* in lung cancer cells and in Benzo(a)pyrene induced lung toxicity in mice. **International Journal of Traditional and Complementary Medicine**, 1, 0001-0013
2. **Mukherjee A**, Sadhukhan GC. (2016) Anti-malarial Drug Design by Targeting Apicoplasts: New Perspectives. **Journal of Pharmacopuncture**. 19, 007-015.
3. Halder AK, **Mukherjee A**, Adhikari N, Saha A, Jha T (2016) Development of nitric oxide synthase (NOS) inhibitors for cancer angiogenesis. **Current Enzyme Inhibition**. 12, 49-66.

#### **2015:**

1. **Mukherjee A**, Khuda-Bukhsh AR (2015) Quercetin Down-regulates IL-6/STAT-3 Signals to Induce Mitochondrial-mediated Apoptosis in a Non-small-cell Lung-cancer Cell Line, A549. **Journal of Pharmacopuncture**. 18, 19-26.
2. Sikdar S, **Mukherjee A**, Khuda-Bukhsh AR (2015) Anti-lung cancer potential of pure esteric-glycoside condurangenin A against non-small-cell lung cancer cells in vitro via p21/p53 mediated cell cycle modulation and DNA damage-induced apoptosis. **Pharmacognosy Magazine**. 11, 73-85.
3. Ghosh S, Sikdar S, **Mukherjee A**, Khuda-Bukhsh AR (2015) Evaluation of chemopreventive potentials of ethanolic extract of *Ruta graveolens* against A375 skin melanoma cells in vitro and induced skin cancer in mice in vivo. **Journal of Integrative Medicine**. 13, 34-44.

#### **2014:**

1. **Mukherjee A**, Sikdar S, Bishayee, Khuda-Bukhsh AR (2014) Flavonol isolated from ethanolic leaf extract of *Thuja occidentalis* arrests the cell cycle at G2-M and induces ROS-independent apoptosis in A549 cells, targeting nuclear DNA. **Cell Proliferation**. 47, 56-71.
2. Sikdar S, **Mukherjee A**, Khuda-Bukhsh AR (2014) Ethanolic Extract of *Marsdenia condurango* Ameliorates Benzo[a]pyrene-induced Lung Cancer of Rats: Condurango Ameliorates BaP-induced Lung Cancer in Rats. **Journal of Pharmacopuncture**. 17, 7-17.

**2013:**

1. **Mukherjee A**, Boujedaini N, Khuda-Bukhsh AR (2013) Homeopathic Thuja 30C ameliorates benzo(a)pyrene induced DNA damage, stress and viability of perfused lung cells of mice in vitro. **Journal of Integrative Medicine**. 11, 397-404.
2. Sikdar S, **Mukherjee A**, Boujedaini N, Khuda-Bukhsh AR (2013) Ethanolic extract of Condurango (Marsdenia condurango) used in traditional systems of medicine including homeopathy against cancer can induce DNA damage and apoptosis in non small lung cancer cells, A549 and H522, in vitro. **International Journal of Genuine Traditional Medicine (TANG)**. 3, 1-10.
3. Sikdar S, **Mukherjee A**, Bishayee K, Paul A, Saha SK, Ghosh S, Khuda-Bukhsh AR (2013) Post-cancer treatment with Condurango 30C shows amelioration of benzo[a]pyrene-induced lung cancer of rats through caspase-3 mediated apoptosis induction. **Journal of Pharmacopuncture**. 16, 011-022.
4. Sikdar S, **Mukherjee A**, Ghosh S, Khuda-Bukhsh AR (2013) Condurango glycoside-rich components stimulate DNA damage-induced cell cycle arrest and ROS-mediated caspase-3 dependent apoptosis through inhibition of cell-proliferation in lung cancer, in vitro and in vivo. **Environmental Toxicology and Pharmacology**. 37, 300-314.
5. Saha SK, Sikdar S, **Mukherjee A**, Bhadra K, Boujedaini N, Khuda-Bukhsh AR (2013) Ethanolic extract of the Goldenseal, Hydrastis canadensis, has demonstrable chemopreventive effects on HeLa cells in vitro: Drug-DNA interaction with calf thymus DNA as target. **Environmental Toxicology and Pharmacology**. 36, 202-214.
6. Bishayee K, Ghosh S, **Mukherjee A**, Sadhukhan R, Mondal J, Khuda-Bukhsh AR (2013) Quercetin induces cytochrome-c release and ROS accumulation to promote apoptosis and arrest the cell cycle in G2/M, in cervical carcinoma: signal cascade and drug-DNA interaction. **Cell Proliferation**. 46, 153-163.
7. Chakraborty D, Sikdar S, Bishayee K, **Mukherjee A**, Khuda-Bukhsh AR (2013) Helonias dioica extract enhances the anti-diabetic effect of Metformin hydrochloride through increased insulin responsiveness and activation of PI3K/AKT signaling in liver of obese hyperglycemic mice. **Chinese Journal of Integrative Medicine** (article in press).
8. Chakraborty D, Ghosh S, Bishayee K, **Mukherjee A**, Sikdar S, Khuda-Bukhsh AR (2013) Antihyperglycemic drug Gymnema sylvestre also shows anticancer potentials in human melanoma A375 cells via reactive oxygen species generation and mitochondria-dependent caspase pathway. **Integrative Cancer Therapies**. 12, 433-441.
9. Ghosh S, Bishayee K, Paul A, **Mukherjee A**, Sikdar S, Chakraborty D, Boujedaini N, Khuda-Bukhsh AR (2013) Homeopathic mother tincture of Phytolacca decandra induces apoptosis in skin melanoma cells by activating caspase-mediated signaling via reactive oxygen species elevation. **Journal of Integrative Medicine**. 11, 116-124.
10. Bishayee K, Paul A, Ghosh S, Sikdar S, **Mukherjee A**, Biswas R, Boujedaini N, Khuda-Bukhsh AR (2013) Condurango-glycoside-A fraction of Gonolobus condurango induces DNA damage associated senescence and apoptosis via ROS-dependent p53 signalling pathway in HeLa cells. **Molecular and Cellular Biochemistry**. 382, 173-183.

## **2012:**

1. **Mukherjee A**, Sikdar S, Bishayee K, Paul A, Ghosh S, Boujedaini N, Khuda-Bukhsh AR (2012) Ethanolic extract of *Thuja occidentalis* blocks proliferation of A549 cells and induces apoptosis in vitro. **Journal of Chinese Integrative Medicine**. 10, 1451-1459.
2. Chakraborty D, **Mukherjee A**, Sikdar S, Paul A, Ghosh S, Khuda-Bukhsh AR (2012) [6]-Gingerol isolated from ginger attenuates sodium arsenite induced oxidative stress and plays a corrective role in improving insulin signaling in mice. **Toxicology Letters**. 210, 34-43.
3. Bishayee K, **Mukherjee A**, Paul A, Khuda-Bukhsh AR (2012) Homeopathic mother tincture of Conium initiates reactive oxygen species mediated DNA damage and makes HeLa cells prone to apoptosis. **International Journal of Genuine Traditional Medicine (TANG)** .2, 37-41.
4. Paul A, Bishayee K, Ghosh S, **Mukherjee A**, Sikdar S, Chakraborty D, Boujedaini N, Khuda-Bukhsh AR (2012) Chelidonine isolated from ethanolic extract of *Chelidonium majus* promotes apoptosis in HeLa cells through p38-p53 and PI3K/AKT signalling pathways. **Journal of Chinese Integrative Medicine**. 10, 1025-1038.

## **Conference Presentation:**

- Certificate of ORAL PRESENTATION on “Induction of ROS-independent apoptosis by isolated fraction of flavonols from *Thuja occidentalis* in a K-ras mutated NSCLC cell line, A549 interacting with nuclear DNA” in 24th ALL INDIA CONGRESS OF ZOOLOGY and NATIONAL SEMINAR held on and from 23rd-25th November, 2013.
- Participated and presented a paper on "Induction of Apoptosis in Lung Cancer Cells by Quercetin through Stress Modulation via DNA interaction" in YOUNG SCIENTISTS' CONFERENCE as a part of INDIA INTERNATIONAL SCIENCE FESTIVAL 2019.

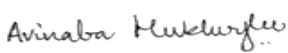
## **Workshop Participation:**

- Bioinformatics Workshop Programme at Presidency College, Kolkata under sponsorship of Dept. of Biotechnology (DBT), India.

## **DECLARATION**

I hereby declare that all statements made above are true, complete and correct to the best of my knowledge and belief.

Place: Kolkata

  
(Avinaba Mukherjee)