BIOGRAPHICAL SKETCH

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NAME: Umasankar De

eRA COMMONS USER NAME (credential, e.g., agency login): Umasankar

POSITION TITLE: Postdoctoral associate of Pathology, Immunology and Laboratory Medicine

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
West Bengal University of Technology, Kolkata, India	B. S.	06/2007	Pharmacy
Sungkyunkwan University, Suwon, South Korea	Ph. D.	02/2018	Bio-pharmacy
Sungkyunkwan University, Suwon, South Korea	Postdoc	04/2018-03/2019	Bio-pharmacy
University of Florida, Florida, USA	Postdoc	Present from 05/2019	Pathology, Immunology, and Laboratory Medicine

A. Personal Statement

I am a pharmacist and a scientist. I received my Ph. D. degree at the bio-pharmacy from Sungkyunkwan University, Suwon, South Korea. I did research on various topics that are closely related cancer biology and molecular toxicology I, have a strong background in cancer research.

During my PhD I, mainly focused on the intercellular signaling pathways linked to cancer cell proliferation. Specifically, I worked on finding cell death mechanisms along with a new biomarker that can help to regulate cell proliferation as well as an alternative cell death mechanism in apoptotic-resistant cancer cells.

In 2019 I started working in University of Florida (Department of Pathology, Immunology, and Laboratory Medicine) and during this short period of time, I have made excellent progress within cancer immunology. Our lab largely focuses on tumor infiltrating regulatory T cell (TI- T cell), Treg cell have impotent role to protect from autoimmune disorders through inhibition of active T cells. So, it was very much challenging to specifically target TI-Treg cell without hurting peripheral Treg cell.

I have a measure contribution on this project to identify specific target for TI-T cell. In this study our primarily focus on survival proteins, we found that BCL-XL significantly overexpress in TI-T cell compare with PBMC using recently develop single cell RNA sequencing database based on 3 kidney cancer patents. Based on these novel findings, we hypothesize that BCL-XL is critical for the survival of TI-Tregs cells. Therefore, targeting BCL-XL with BCL-XL-Ps such as DT2216

increase antitumor immunity by selectively eliminating TI-Tregs and increase T cell-mediated cytotoxicity (Nature communication. 2021 Feb 24;12(1). PMID:33627663).

I also contributed the project based on CD177. We identified that the CD177 gene and protein are highly upregulated in tumor-infiltrating regulatory T cells (TI-Tregs) in multiple types of human cancers. However, CD177 was not expressed in peripheral blood Tregs and very low in the spleen or normal tissues. Moreover, CD177+ Tregs are more suppressive than their negative counterpart. Germline CD177 knock out (KO) and Treg specific CD177 KO mice were more resistant to breast and colorectal tumor growth than wild type (WT) mice.

Currently I am working on the project related to kill exhausted CD8 T cells within the tumor microenvironment for most effective tumor immunotherapy. My long-term goal is to develop more efficient ways to kill exhausted CD8 T cells rather than to rejuvenate them for cancer immunotherapy.

B. Positions and Honors

Positions and Employment

2018-2019 Post-Doctoral Fellow (Sungkyunkwan University, Suwon, South Korea) from March 2018 to March
2019 Under Dr. Prof. Hyung Sik Kim.
2019-present Post-doctoral fellow, University of Florida, Florida, US

Honors

2018 Fellowship of Postdoctoral Research Program of Sungkyunkwan University 2018, South Korea.

2018 National Research Foundation (NRF) grant 2018, South Korea.

2021 Experimental Pathology innovative grants (EPIG - Postdocs) 2021-2022 (University of Florida).

C. Contributions to Science

During my previous study, I was largely involved in the project based on intracellular signaling pathways closely related with p53 mediated cell death, cancer cell proliferation, and most notably finding cell death mechanisms along with new targets for cancer therapy.

a) **Umasankar De**, Ji Yeon Son, Yukyoung Jeon, Song-Yi Ha, Yu Jin Park , Sungpil Yoon , Ki-Tae Ha, Wahn Soo Choi, Byung Mu Lee, In Su Kim, Jong Hwan Kwak, Hyung Sik Kim. Plumbagin from a tropical pitcher plant (Nepenthes alata Blanco) induces apoptotic cell death via a p53-dependent pathway in MCF-7 human breast cancer cells. Food Chem Toxicol
. 2019 Jan;123:492-500. PMID: 30458268.

b) **Umasankar De**, Ji Yeon Son , Richa Sachan, Yu Jin Park, Dongwan Kang, Kyungsil Yoon, Byung Mu Lee , In Su Kim, Hyung Ryong Moon, Hyung Sik Kim. A New Synthetic Histone Deacetylase Inhibitor, MHY2256, Induces Apoptosis and Autophagy Cell Death in Endometrial Cancer Cells via p53 Acetylation. Int J Mol Sci. 2018 Sep 13;19(9):2743. PMID: 30217020 PMCID: PMC6164480.

c) Eun Young Park , Youngwoo Woo , Seong Jin Kim , Do Hyun Kim , Eui Kyung Lee , **Umasankar De** , Kyeong Seok Kim , Jaewon Lee , Jee H Jung , Ki-Tae Ha , Wahn Soo Choi , In Su Kim , Byung Mu Lee , Sungpil Yoon , Hyung Ryong Moon , Hyung Sik Kim. Anticancer Effects of a New SIRT Inhibitor, MHY2256, against Human Breast Cancer MCF-7 Cells via Regulation of

MDM2-p53 Binding. Int J Biol Sci. 2016 Dec 6;12(12):1555-1567. PMID: 27994519. PMCID: PMC5166496.

2. I have made measurable contributions with working on the novel SIRTs inhibitors and PKM2 modulator which was involved in cancer cell metabolism during cell proliferation and migration in metastatic cancer cells. Furthermore, I have experience screening and evaluating chemotherapeutic agents, developing novel biomarkers for drug response, and identifying novel targets for drugs. I worked with natural and synthetic compounds for finding new treatment options which was used either by itself or in combination with other medicinal ingredients in both in-vitro and in-vivo models.

a) Nabanita Patra, **Umasankar De**, Jin-Ah Kang, Ji Mim Kim, Mee Young Ahn, Jaewon Lee, Jee H Jung, Hae Young Chung, Hyung Ryong Moon, Hyung Sik KimA novel epoxypropoxy flavonol derivative topoisomerase II inhibitor, MHY336, induces apoptosis in prostate cancer cell. Eur J Pharmacol
. 2011 May 11;658(2-3):98-107. PMID: 21376033.

b) Jin-Ah Kang, Zunhua Yang, Ji Yeon Lee, **Umasankal De**, Tae Hyung Kim, Ji Young Park, Hye Jin Lee, Yun Jung Park, Pusoon Chun, Hyung Sik Kim, Lak Shin Jeong, Hyung Ryong Moon. Design, synthesis and anticancer activity of novel dihydrobenzofuro[4,5-b][1,8]naphthyridin-6-one derivatives. Bioorg Med Chem Lett. 2011 Oct 1;21(19):5730-4. PMID: 21885273.

c) Nabanita Patra, **Umasankar De**, Tae Hyung Kim, Young Ju Lee, Mee Young Ahn, Nam Deuk Kim, Jung Hyun Yoon, Wahn Soo Choi, Hyung Ryong Moon, Byung Mu Lee, Hyung Sik Kim. Anticancer efficacy of a novel hydroxamic acid-derived histone deacetylase inhibitor, MHY219, in human prostate cancer cell lines. Biomed Pharmacother. 2013 Jun;67(5):407-15. PMID: 23583193.

d) **Umasankar De**, Pusoon Chun, Wahn Soo Choi, Byung Mu Lee, Nam Deuk Kim, Hyung Ryong Moon, Jee H Jung, Hyung Sik Kim. A novel anthracene derivative, MHY412, induces apoptosis in doxorubicin-resistant MCF-7/Adr human breast cancer cells through cell cycle arrest and downregulation of P-glycoprotein expression. Int J Oncol. 2014 Jan;44(1):167-76. PMID: 24190517.

e) Youngmi Shin , Sangil Han, **Umasankar De**, Jihye Park, Satyasheel Sharma, Neeraj Kumar Mishra, Eui-Kyung Lee, Youngil Lee, Hyung Sik Kim, In Su Kim. Ru(II)-catalyzed selective C-H amination of xanthones and chromones with sulfonyl azides: synthesis and anticancer evaluation. J Org Chem. 2014 Oct 3;79(19):9262-71. PMID: 25225782.

f) Mijin Jeon, Neeraj Kumar Mishra , **Umasankar De**, Satyasheel Sharma, Yongguk Oh , Miji Choi, Hyeim Jo , Richa Sachan, Hyung Sik Kim, In Su Kim. Rh(III)-Catalyzed C-H Functionalization of Indolines with Readily Accessible Amidating Reagent: Synthesis and Anticancer Evaluation. J Org Chem. 2016 Oct 21;81(20):9878-9885. PMID: 27680096.

g) Sang Hoon Han, Saegun Kim, **Umasankar De**, Neeraj Kumar Mishra, Jihye Park, Satyasheel Sharma, Jong Hwan Kwak, Sangil Han, Hyung Sik Kim, In Su Kim. Synthesis of Succinimide-Containing Chromones, Naphthoquinones, and Xanthones under Rh(III) Catalysis: Evaluation of Anticancer Activity. J Org Chem
. 2016 Dec 16;81(24):12416-12425. PMID: 27978756.

h) Sang Hoon Han, Saegun Kim, **Umasankar De**, Neeraj Kumar Mishra, Jihye Park, Satyasheel Sharma, Jong Hwan Kwak, Sangil Han, Hyung Sik Kim, In Su Kim. Synthesis and Cytotoxic Evaluation of N-Aroylureas through Rhodium (III)-Catalyzed C−H Functionalization of Indolines with Isocyanates. J Org Chem. 2016 Dec 16;81(24):12416-12425. PMID: 27978756.

i) Yongguk Oh, Sang Hoon Han, Neeraj Kumar Mishra, **Umasankar De**, Junho Lee, Hyung Sik Kim, Young Hoon Jung, In Su Kim. Synthesis and Anticancer Evaluation of 2,3-DisubstitutedIndoles Derived from Azobenzenes and Internal Olefins. Eur j org chem. 2017, 42.

j) Satyasheel Sharma, Yongguk Oh, Neeraj Kumar Mishra, **Umasankar De**, Hyeim Jo, Richa Sachan, Hyung Sik Kim, Young Hoon Jung, In Su Kim. Rhodium-Catalyzed [3 + 2]

Annulation of Cyclic N-Acyl Ketimines with Activated Olefins: Anticancer Activity of Spiroisoindolinones. J Org Chem. 2017 Apr 7;82(7):3359-3367. PMID: 28385021.

k) Ji Yeon Son, Sungpil Yoon, In Hwan Tae, Yu Jin Park, **Umasankar De**, Yukyoung Jeon, Young Ju Park, Im Joo Rhyu, Byung Mu Lee, Kyu-Huck Chung, Joung Eun Lim, Se Jeong Lee, Hye Won Lee, Jong Hwan Kwak, Hyung Sik Kim, Han Yong Choi. Novel therapeutic roles of MC-4 in combination with everolimus against advanced renal cell carcinoma by dual targeting of Akt/pyruvate kinase muscle isozyme M2 and mechanistic target of rapamycin complex 1 pathways. Cancer Med. 2018 Oct;7(10):5083-5095. PMID: 30160042 PMCID: PMC6198234.

3) I also have worked with intercellular signaling pathways which are closely related to cancer cell proliferation. I have investigated important alternate cell death mechanisms and new biomarkers within cell proliferation and programmed cell death mechanisms.

a) Paltan Laha, **Umasankar De**, Falguni Chandra, Niranjan Dehury, Sadhika Khullar, Hyung Sik Kim, Srikanta Patra. Alkyl chain modified cyclometalated iridium complexes as tunable anticancer and imaging agent. Dalton Trans. 2018 Nov 13;47(44):15873-15881.

b) Suman Kumar Tripathy, **Umasankar De**, Niranjan Dehury, Satyanarayan Pal, Hyung Sik Kim, Srikanta Patra. Dalton Trans. 2014 Oct 21;43(39):14546-9. PMID: 25160655

c) Suman Kumar Tripathy, Umasankar De, Niranjan Dehury, Paltan Laha, Manas Kumar Panda, Hyung Sik Kim, Srikanta Patra. Cyclometallated iridium complexes inducing paraptotic cell death like natural products: synthesis, structure and mechanistic aspects. Dalton Trans. 2016 Sep 27;45(38):15122-15136. PMID: 27711766.

4) I contributed to finding metabolomics biomarker for chronic renal toxicity, I also involved to identify detoxifying effect of pyridoxine against acetaminophen mediated hepatotoxicity

a) Tae Hyung Kim, Mee Young Ahn, Hyun Jung Lim, Young Ju Lee, Yu Jin Shin, **Umasankar De**, Jaewon Lee, Byung Mu Lee, Suhkmann Kim, Hyung Sik Ki. Evaluation of metabolomic profiling against renal toxicity in Sprague-Dawley rats treated with melamine and cyanuric acid. Arch Toxicol. 2012 Dec;86(12):1885-97. PMID: 22885791.

b) Taehyun Roh, **Umasankar De**, Seong Kwang Lim, Min Kook Kim, Seul Min Choi, Duck Soo Lim, Sungpil Yoon, Sam Kacew, Hyung Sik Kim, Byung-Mu Lee. Detoxifying effect of pyridoxine on acetaminophen-induced hepatotoxicity via suppressing oxidative stress injury. Food Chem Toxicol. 2018 Apr;114:11-22 PMID: 29438775.

5) Two years after moving to the University of Florida, I significantly contributed to science by actively studying the role of BCL-XL in the tumor microenvironment. Importantly, BCL-XL was found to be a potential target to eliminate TI-Treg function from the tumor microenvironment. Also, I participated in study that investigates the role of CD177 in TI-Treg cell.

a) 83. Myung-Chul Kim, Nicholas Borcherding, Kawther K Ahmed, Andrew P Voigt, Ajaykumar Vishwakarma, Ryan Kolb , Paige N Kluz, Gaurav Pandey, Umasankar De, Theodore Drashansky, Eric Y Helm, Xin Zhang, Katherine N Gibson-Corley, Julia Klesney-Tait, Yuwen Zhu, Jinglu Lu, Jinsong Lu, Xian Huang, Hongrui Xiang, Jinke Cheng, Dongyang Wang, Zheng Wang, Jian Tang, Jiajia Hu, Zhengting Wang, Hua Liu, Mingjia Li, Haoyang Zhuang, Dorina Avram, Daohong Zhou, Rhonda Bacher, Song Guo Zheng, Xuefeng Wu, Yousef Zakharia, Weizhou Zhang. CD177 modulates the function and homeostasis of tumor-infiltrating regulatory T cells. Nature Communications. 2021 Oct 1;12(1):5764. PMID: 34599187. PMCID: PMC8486774.

b) Ryan Kolb, **Umasankar De**, Sajid Khan, Yuewan Luo, Myung-Chul Kim, Haijun Yu, Chaoyan Wu, Jiao Mo, Xin Zhang, Peiyi Zhang, Xuan Zhang, Nicholas Borcherding, Daniel Koppel, Dorina Avram, Guangrong Zheng, Daohong Zhou, Weizhou Zhang. Targeting tumor-infiltrating regulatory T cells by PROTAC-mediated degradation of BCL-XL. 2020. Nature communication. 2021 Feb 24;12(1). PMID:33627663. PMCID: PMC7904819.