CURRICULUM VITAE

MD JASHIM UDDIN, Ph.D.
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NATIONALITY: US Citizen

EDUCATION / TRAINING

1987 — 1991	**B.S. (Honors)** Chemistry, Dhaka University Dhaka, Bangladesh
1991 — 1993	**M.S.** Organic Chemistry, Dhaka University, Dhaka, Bangladesh Mentor – Dr. Giasuddin Ahmed
1997 — 2001	**Ph.D.** Organic Chemistry, Shinshu University, Nagano, Japan Mentor – Dr. Iwao Yamamoto
2001 — 2004	**Postdoctoral Fellow,** Medicinal Chemistry, University of Alberta, AB, Canada Mentor – Dr. Edward E. Knaus
2004 — 2005	**Postdoctoral Fellow,** Chemical Biology, Vanderbilt University, TN USA Mentor – Dr. Lawrence J. Marnett

EMPLOYMENTS

1/2016 — Present	**Associate Professor, Research –Biochemistry** Vanderbilt University, Nashville TN, USA
7/2005 — 12/2015	**Assistant Professor, Research –Biochemistry** Vanderbilt University School of Medicine Nashville TN, USA
8/1996 — 9/1997	**Lecturer (tenure-track faculty)** Department of Chemistry, Cox's Bazar Government College Bangladesh National University, Bangladesh
7/1995 — 7/1996	**Research Chemist** Ciba Specialty Chemicals R&D Group Beximco Pharmaceutical Company, Dhaka, Bangladesh
6/1994 — 6/1995	**Production Officer** Basic Chemicals Plant Beximco Pharmaceutical Company, Dhaka, Bangladesh

MAJOR ACCOMPLISHMENTS

5/16/2011 **Fluorocoxib A (Xenolight®RediJect COX-2 Probe)**: Fluorocoxib A, the first COX-2-targeted optical imaging, is discovered. Fluorocoxib A is licensed to **Perkin Elmer Inc, USA** for commercialization for pre-clinical detection of inflammation and cancer.

RESEARCH EXPERIENCE

1/2016 – Present Associate Professor, Research – Biochemistry, Vanderbilt University

• Early Detection and Targeted Therapy of Cancer.

Biomarkers, such as certain enzymes or receptors are known to involve in the pathology of several major human diseases, making the development of technologies to accurately detect them to study their role in disease progression. This information can be used not only for early detection, but also for the development of technologies to accurately target them for effective treatment of the disease. The motivation is especially strong for cancer, where the level of enzyme or receptor expression can be indicative of the tumor aggressiveness and susceptibility to a certain treatment. Detection of early stage cancer or of chronically inflamed tissue remains an important clinical challenge, leading to an ongoing search for specific imaging-relevant biomarkers for these conditions. Cyclooxygenase-2 (COX-2) mRNA and protein are detectable in a significant percentage of inflammatory and premalignant lesions and an even higher percentage of malignant tumors. Studies have shown that COX-2 expression is an early event in carcinogenesis. My goal is to develop COX-2-targeted fluorescent and pro-fluorescent activatable probes, ^{18}F-PET or ^{123}I-SPECT imaging probes for detection of cancer for clinical applications. Also, my research is devoted to develop nanotechnology-based COX-2-targeted probes for early detection for human cancers, and nano-delivery of chemotherapeutic drugs for effective treatment of cancer, using synthetic medicinal chemistry drug design and discovery, nano-technical, biomedical engineering approaches.

• Cycloxygenase-2 (COX-2) Targeted Imaging of Eye Diseases.

Ocular inflammation represents a swelling condition that is responsible in the onset and progression of many vascular diseases in the eye including retinal inflammatory disease, which is one of the leading causes of severe retinal damages. Although retinal inflammatory disease is common in patients of ages between 20 and 60, however it can be diagnosed in any ages. In general, this condition results in enormous visual impairments leading to extremely poor eyesight prior to complete loss of vision. Causes of retinal inflammatory disease include an autoimmune disorder, infection in the eye, tumor in or near the eye, trauma to the eye, or exposure to certain toxic materials. However, in some cases the cause for retinal inflammatory disease remained unclear. The complications and symptoms of this ocular disease vary from patient to patient that may include - eye pain, sensitivity to light, blurry vision, or floaters in the eye. Retinal inflammatory disease can result in irreversible blindness, if left undiagnosed and untreated. Imaging of retinal inflammation suffers from serious limitation due to the lack of targeted imaging probes, where COX-2 can serve as an ideal target for detection because it is well established that COX-2 is overexpressed in retinal inflammatory diseases. Unfortunately, COX-2 has never been evaluated for targeted diagnosis of any ocular diseases including retinal inflammatory disease. My goal is to develop fluorescent COX-2 probes to visualize retinal inflammation in age-related macular degeneration (AMD), diabetic retinopathy (DR), etc.

• Targeted Fluorescent Probes for VEGFR2, BCR-ABL, or EGFR in Cancer and HIP-1 in Hypoxia.

Elevated expressions of *VEGFR2, BCR-ABL, or EGFR* in pre-malignant and malignant tumors are ideal targets for early detection of cancer. Fluorescent conjugates of *VEGFR2, BCR-ABL, or* EGFR inhibitors, such as vandetanib or imatinib are designed, synthesized and evaluated in in vitro and in vivo pre-clinical settings. In addition, HIP-1 targeted fluorescent imaging probes are developed for optical imaging of hypoxia with a goal to predict clinical outcome from a hypoxia-directed treatment or plan radiation field in better local control. These hypoxia probes are conjugates of pimonidazole and organic fluorophores, which are evaluated for optimization of new molecular imaging probes useful for better clinical outcome.

2005 – 2015 Assistant Professor, Research –Biochemistry, *Vanderbilt University School of Medicine*

• Cycloxygenase-2 (COX-2) Targeted Imaging.

The COX-2 expression is elevated in pre-malignant precursor lesions, and even higher percentage in malignant tumors. COX-2 inhibition via celecoxib has been shown to reduce the number and size of polyps in patients with the hereditary syndrome Familial Adenomatous Polyposis (FAP), hinting at the important functional role COX-2 may play in many types of human cancer and further supported by a variety of animal model systems. This research focuses to generate a series of probes allowing in vivo optical imaging of tumors located below the skin with a depth of a few millimeters using near-infrared (NIR) probes or in vivo optical imaging in "topical" settings (e.g. endoscopy, colonoscopy or epidermal imaging), as well as internal imaging using radiolabeled probes. This project has proceeded in the following order: the design and conjugate chemistry synthesis to generate COX-2 selective optical imaging probes; evaluation of biological activity of probes using purified enzymes or intact cells; evaluation of bioavailability, pharmacokinetics and metabolism using bioanalytical methods (LC/MS/MS); evaluation of cellular internalization by fluorescence microscopy; evaluation of kinetic parameters of enzyme-probe binding interaction by fluorescence spectroscopy; imaging of COX-2 expressing human tumor xenografts in nude mice using near-infrared fluorescent, ^{123}I, and ^{18}F-radiolabelled COX-2 inhibitors; monitoring COX-2 expression through tumor development, progression. These imaging approaches are validated, and proven to be useful in the preclinical and clinical setup for early detection of cancer.

• Cycloxygenase-2 (COX-2) Targeted Anti-tumor Agents.

Selective delivery of chemotherapeutic drugs to tumors for treatment is limited by non-selective accumulation of anti-tumor drugs in normal tissues. Based on our work on tumor-specific delivery of COX-2-targeted imaging probes, tumor-specific agents are developed that target COX-2 in cancer cells. These agents are conjugates of non-steroidal antiinflammatory drugs (NSAIDs) or COX-2 selective inhibitors (COXIBs) and chemotherapeutic drugs. This project proceeded in the following order: the design and conjugate chemistry to generate COX-2 selective anti-tumor agents; evaluation of biological activity of agents using purified enzymes or intact cells; evaluation of bioavailability, pharmacokinetics and metabolism using bioanalytical methods (LC/MS/MS); evaluation of cell viability; evaluation of kinetic parameters of enzyme-probe binding interaction; in vivo evaluation of these agents in tumor growth inhibition in COX-2 positive and COX-2 negative tumor xenografts. These therapeutic approaches are validated for COX-2-targeted delivery of NSAID-toxin conjugates into tumor for its growth inhibition.

TEACHING EXPERIENCE

1996 – 1997 ***Lecturer of Chemistry**, COX's Bazar Government College, Bangladesh*
National University (BNU), Bangladesh
Teaching Level – Undergraduate Chemistry (3 semesters)

Classroom and Lab – I served as a tenure-track faculty member at the BNU with the main responsibility of teaching undergraduate students in classrooms and practical laboratories. I taught several undergraduate full-unit courses of Organic Chemistry, namely, Introduction to Organic Chemistry, General Organic Chemistry Laboratory, Stereochemistry, Heterocyclic Chemistry, Natural Products Chemistry, and Spectroscopy. I devoted plenty of time to tailoring my teaching approaches to fit each one of my students, and it was well worth it. Serving at BNU was one of my most memorable teaching experiences.

1998 – 2000 ***Teaching Assistan**t, Shinshu University, Japan*
Teaching Level – Undergraduate Chemistry (3 semesters)

NMR Lab – I taught my students the operation of Bruker 300 MHz nmr spectrometer, and how to do data processing for basic proton or carbon experiments, as well as complex proton, carbon with 2D experiments. I taught them the basics of chemical shifts, multiplicity, integration, *J*-values (Hz), and

assignments of NMR signals for 1H proton and 13C NMR. They loved my teaching, and I enjoyed teaching them as well.

Chromatography Lab – I taught my students what are different chromatographic techniques, and how to execute them on the bench top. I showed them how to approach a chromatographic problem, and helped them solve the problem, which gave them confidence to develop conditions for separation of a crude reaction mixture on their own.

Organic Chemistry Lab – I taught my students the basic practical organic chemistry laboratory experiments that include synthesis of various known organic compounds, such as synthesis of acetophenone using Friedel-Crafts electrophilic aromatic substitution reaction. The students' huge interest in my lab sessions definitely encouraged me.

2004 –2005 ***Postdoctoral Research Fellow,*** *Vanderbilt University School of Medicine*

• Synthesis and evaluation of COX-2-targeted molecular probes for early detection of cancer

Fluorescently or radio-labeled compounds (derivatives of indomethacin, celecoxib, or rofecoxib etc.) are synthesized and evaluated in purified COX-2 enzyme, or intact cells, or ex vivo/in vivo nude mice bearing COX-2 expressing tumors.

• Design of NSAID-toxin conjugates as COX-2 targeted chemotherapeutic agents for treatment of cancer

A drug delivery system is developed, where a group of taxol, doxorubicin, podophyllotoxin, mitomycin C, etc. are conjugated with NSAIDs, like-indomethacin or celecoxib. The conjugates are biologically evaluated as COX-2 inhibitors in vitro and in vivo mude mice bearing tumors/xenografts.

2001 – 2004 ***Postdoctoral Research Fellow,*** *University of Alberta, Canada*

•Design, synthesis, computational and biological evaluation of novel NSAID derivatives as selective COX-2 inhibitors

The sulfonamide group of celecoxib and methanesulfone of rofecoxib was replaced by an azidosulfonyl bioisoteres as a dual-binding pharmacophore. A quantitative structure-activity relationship study was performed for optimized the COX-2 selective inhibition, followed by evaluation of anti-inflammatory and analgesic activity of lead compounds.

• Design of novel acyclic E-, or Z-olefinic COX-2 inhibitors

I developed synthetic methods for the steroselective synthesis of di- or tri-aryl *E-,* or *Z*-olefinic compounds. These compounds were evaluated for their COX-2 inhibitory activity in purified enzyme for lead optimization. These compounds were further evaluated in vivo for anti-inflammatory and analgesic activity.

1997 –2001 ***Ph.D. Student,*** *Shinshu University, Japan*

• Design, synthesis and structure of isoxazolidine based new chiral auxiliaries and their application in asymmetric synthesis

It's a constant challenge for the organic chemists to control the stereoselectivity of the carbon-carbon or carbon-heteroatom bond forming reactions, where either a single or a group of chiral center originates

in a single laboratory operation. In this regard, to control the stereoselectivity of the asymmetric cycloaddition reactions, I developed an isoxazolidine based new chiral controller, which induces a high level of diastereoselectivity in intermolecular dipole-olefin cycloaddition reactions. Chiral isoxazolidines possessing a 2° amine moiety are synthesized with high *cis*-selectivity using an asymmetric intramolecular 1,3-dipolar cycloaddition reaction of NH-nitrones with olefin containing an electron withdrawing substituent and a chiral center at its allylic position. Purification was based on preparative TLC or column or HPLC and characterization was based on ^{1}H or ^{13}C NMR or 1H-1H COSY, ^{1}H-^{13}C HSQC or ^{1}H-^{13}C HMBC, HRMS spectroscopy. The mechanism of *cis*-selectivity was examined by calculations of each transition state (TS) by CAChe MOPAC AM1, and which indicated that intramoleculer nitrone-olefin cycloaddition reaction proceeds in a Michael addition mechanism, not in a concerted pathway. The asymmetric induction of L-phenylalanine-derived chiral auxiliary induced a high level of diastereoselectivity (> 96% *de*) in intermolecular 1,3-dipole (nitrone, nitrile oxide, azide)-olefin cycloaddition reactions, leading to synthetically useful chiral building blocks with enormous synthetic and mechanistic importance. This discovery is highly significant in modern asymmetric synthesis.

1991 – 1993 ***M.S. Student,*** *Dhaka University, Bangladesh*

• Synthesis of initial Michael adducts from the reaction of β-diketones with α,β-unsaturated carbonyl compounds with potential Biological activity.

I developed synthetic methods for the synthesis of substituted chalcones and use these chalcones to undergo Michael addition with β-diketones. The initial Michael adducts were synthesized and purified by preparative TLC or column or HPLC and characterized by ^{1}H or ^{13}C NMR spectroscopy. Acetylacetone and benzoylacetone were selected as active methylene compounds and 4-methoxybenzylidene-4-hydroxyacetophenone or benzylidene-4-hydroxyacetophenone and etc. as Michael acceptor molecules. The objective of this work was to study Michael reaction using the described donor-acceptor pair and to isolate the initial Michael adducts, and the subsequently form conjugated acyclic or cyclic products as potential bioactive molecules.

INDUSTRIAL EXPERIENCE

7/1995 – 9/1996 ***Research Chemist,*** *Ciba R & D group, Beximco Pharmaceutical Co., Bangladesh*

• Industrial large-scale synthesis of diketopyrrolopyrroles (DPPs)

Synthetic Organic and Process Chemistry – The DPPs (DPP = diketopyrrolopyrrole) are most recently developed class of technical pigments with remarkable spectral properties, such as high light fastness, extraordinary thermal stability, and very low solubility. These are due to the formation of intermolecular N---H---O hydrogen bonds. Unfortunately, such hydrogen bonds diminish fluorescence quantum yields in many cases. In this regard, hydrogen bonding was inhibited by deprotonation and coordination with transition metals. The pigments were produced with novel properties such as high solubility, high fluorescence quantum yields and bathochromic absorptions. The crystal structures indicated torsion of the planes of the rings of the substituents with respect to the plane of the chromophore depending on the complex. These multi-step DPP-based organo-color compound syntheses were scaled up and synthesized in industrial large-scale (**10.00 kg batch size**) using process chemistry approaches for aviation industry.

6/1994 – 7/1995 ***Production Officer,*** *Beximco Pharmaceuticals Co., Bangladesh*

• Large-scale synthesis of amoxicillin and ciprofloxacin

Manufacturing APIs – I synthesized high quality bulk antibiotics in large scale for local and international market, e.g. Amoxycillin trihydrate and Ampicillin Trihydrate. The production scale of each drug was **250.00 Kg/Batch**. The technology for process chemistry and process engineering for these two products were supported by J. J. Kim and Company Korea. Later, we developed process chemistry for ciprofloxacin hydrochloride manufacturing. I used the Bayer synthesis of ciprofloxacin that utilized 2,4-dichloro-5-fluorobenzoyl chloride as the starting material. With the aid of magnesium ethoxide, condensation of 2,4-dichloro-5-fluorobenzoyl chloride and diethyl malonate followed by decarboxylation to form 2,4-dichloro-5-fluorobenzoylacetate. A Dieckman-like condensation of 2,4-dichloro-5-fluorobenzoylacetate with ethyl orthoformate was carried out in refluxing acetic anhydride to afford ethylacrylate of 2,4-dichloro-5-fluorobenzoylacetate. A Michael addition using cyclopropyl amine followed by expulsion of ethoxy group gave a cyclopropylenamino-2,4-dichloro-5-fluorobenzoylacetate, which was intramolecularly cyclized through S_NAr reaction followed by acid hydrolysis gave 6-fluoro-7-chloroquinoline-3-carboxylic acid. Finally, a chemoselective S_NAr displacement (displacement of 7-chloro group) using piperazine followed by treatment with concentrated hydrochloric acid afforded the desired ciprofloxacin hydrochloride. The production scale was 5.00 Kg/Batch. In addition, I was actively involved with the industrial process development for large-scale synthesis of cephalexin Monohydrate, cephradin monohydrate, cloxacillin sodium, trimethoprim, riboflavin-5-phosphate sodium (up to 10.00 Kg batch size) for local API market.

AFFILIATIONS

The American Chemical Society, 2002 – present
The American Association of Cancer Research, 2005- Present
The Chemical Society of Japan, 1999 – 2001
Society for Pharmaceutical Chemists, Bangladesh, 1994 – 1998

AWARDS, HONORS AND RESEARCH GRANTS

American NCI/NIH – Research sub-award# UNIV42892 **08/01/2014 – 07/30/2018**
Role: Principal Investigator (PI) Status: Active
Grant Title– Detection of COX-2-expressing cancers by fluorocoxib A

American NCI/NIH – Vanderbilt ICMIC Award# 4046511161 **09/01/2011 – 08/31/2013**
Role: Principal Investigator/Program Director (PI/PD) Status: Completed
Grant Title: Detection of COX-2 expressing canine tumors by optical imaging agent fluorocoxib A.

Canadian AHFMR – Postdoctoral Fellowship Award **01/01/2002 – 12/31/2004**
Role: Principal Investigator/Program Director (PI/PD) Status: Completed
Grant Title: Design, synthesis, biological and computational evaluation of COX-2 inhibitors.

Japanese Government MONBUSHO – Doctoral Scholarship Award **09/01/1997 – 03/31/2001**
Role: Principal Investigator/Program Director (PI/PD) Status: Completed
Grant Title: Stereoselective synthesis of chiral heterocycles from asymmetric 1,3-dipolar cycloaddition reactions.

REVIEWER – SCIENTIFIC PUBLICATION

Plos One, *2015- present*
Nature Communications, 2010 – present
Journal of Medicinal Chemistry, 2005 – present

Bioorganic and Medicinal Chemistry, 2005 – present
Bioorganic and Medicinal Chemistry Letters, 2005 – present
Journal of Heterocyclic Chemistry, 2005 – present
European Journal of Medicinal Chemistry, 2005 – present

Ph.D. STUDENT SUPERVISED/MENTORED

Paola Malerba – *Design, synthesis and in vivo evaluation of COX inhibitors also as novel specific PET imaging agents in cancer and inflammation models* – Ph.D. Dissertation **2013**
Vanderbilt University, USA, and University of Bari, Aldo Moro, Italy

REVIEWER – RESEARCH GRANT

Multidisciplinary Research Grant, North Carolina Biotechnology Center - 2005

SCIENTIFIC COMMUNITY SERVICES

Chair of Executive Committee: Network for Translational Research (NTR) Chemistry Core, National Institutes of Health (NIH), National Cancer Institute (NCI), USA, 2012—2013

PUBLICATIONS

2018

Uddin, M.J., Wilson, A.J., Crews, B.C., Malerba, P., Uddin, M.I., Kingsley, P.J., Ghebreselasie, K., Daniel, C. K., Nickels, M.L., Tantawy, M.N., Jashim, E., Manning, H. C., Khabele, D., Marnett, L.J. Discovery of furanone-based radiopharmaceuticals for diagnostic targeting of COX-1 in ovarian cancer. *Nature Scientific Reports* 2018 (**submitted**).

Cavener, V.S., Gaulden, A., Pennipede, D., Jagasia, P., **Uddin, M.J.,** Marnett, L.J., Patel, S. Inhibition of Diacylglycerol Lipase Impairs Fear Extinction in Mice. *Frontiers in Neuroscience* 2018 (**In Press**)

Shaheen, S.M., Azad, A.K, Rahman, M.M, and **Uddin, M.J.** A comparative transgene expression study between a protaplex and a rotaplex embedded lipid-nano particles in murine derived dendritic cell. *Journal of Interdisciplinary Nanomedicine*, 2018; 0(0), doi: 10.1002/jin2.37

2017

Bedse, G., Hartley, N. D., Neale, E., Gaulden, A., Patrick, T., Kingsley, P., **Uddin, M. J.,** Plath, N., Marnett, L.J., and Patel, S. Functional Redundancy Between Canonical Endocannabinoid Signaling Systems in the Modulation of Anxiety. *Biological Psychiatry,* 2017, 82, 488-499.

Bluett, R., Baldi, R., Haymer, A., Hartley, N., Marcus, D., Bey, R. M., Shonesy, B., **Uddin, M. J.**, Lawrence J. Marnett, L. J., Colbran, R., Winder, D. Patel, S. Endocannabinoid mechanism promoting resilience to traumatic stress. *Nature Communications*, 2017, 8, 14782.

2016

Uddin, M. J., Crews, B. C., Xu, S., Ghebreselasie, K., Daniel, C.K., Kingsley, P. J., and Marnett, L.J. Antitumor activity of cytotoxic cyclooxygenase-2 inhibitors. *ACS Chemical Biology***,** 2016, 11, 3052-3060.

Uddin, M. J.,* Moore, C. E., Crews, B. C., Daniel, C. K., Ghebreselasie, K., McIntyre, J. O., Marnett, L. J., and Jayagopal, A. Fluorocoxib A Enables Targeted Detection of Cyclooxygenase-2 in Laser–Induced Choroidal Neovascularization, *Journal of Biomedical Optics*, 2016, 21(9), 90503. **(*Corresponding Author**).

Adeniji, A., **Uddin, M. J.,** Zang, T., Tamae, D., Wangtrakuldee, P., Marnett, L. J., Penning, T. M., Discovery of (R)-2-(6-methoxynaphthalen-2-yl)butanoic acid As a Potent and Selective AKR1C3 Inhibitor. *Journal of Medicinal Chemistry,* 2016, 59(16), 7431-7444.

Foster, D.J., Wilson, J.M., Remke, D.H., Mahmood, M.S., **Uddin, M.J**., Wess, J., Patel, S., Marnett, L.J., Niswender, C.M., Jones, C.K., Xing, Z., Lindsley, C.W., Rook, J.M., Conn, P.J. Antipsychotic-like effects of M4 positive allosteric modulators are mediated by CB2 receptor-dependent inhibition of dopamine release. *Neuron,* 2016, 91(6), 1244-1252.

Uddin, M. I., Evans, S. M., Craft, J. R., Capozzi,M. E., McCollum, G. W., Rong Yang, R., Lawrence J. Marnett, L. J., **Uddin, M. J.,** Ashwath Jayagopal, A., and Penn, J. S. *In Vivo* Imaging of Retinal Hypoxia in a Model of Oxygen Induced Retinopathy. *Scientific Reports,* **6**, 31011; doi: 10.1038/srep31011 (2016)

Uddin, M. J., Werfel, T. A., Crews, B. C., Gupta, M. K., Marnett, L. J., Duvall, C. L. Fluorocoxib A loaded into ROS-responsive nanoparticles enables in vivo targeted visualization of cyclooxygenase-2 in inflammation and cancer. *Biomaterials*, 2016, 92, 71-80.

2015

Uddin, M. J.,* Crews, B. C., Ghebreselasie, K., Daniel, C. K., Kingsley, P. J., Xu, S., Marnett, L. J. Targeted delayed imaging of cancer by fluoroocoxib C, a near-infrared cyclooxygenase-2 probe. *Journal of Biomedical Optics*, 2015, 20(5), 050502 **(*Corresponding Author**).

Wilson, A. J., Fadare, O., Beeghly-Fadeil, A., Son, D-S., Liu, Q., Zhao, S.**,** Saskowski, J., **Uddin, M. J.,** Daniel, C., Crews, B. C., Lehmann, B. D., Pietenpol, J., Crispens, M. A., Marnett, L. J., Khabele, D. Genetic disruption of COX-1 inhibits multiple oncogenic pathways in high-grade serous ovarian cancer. *Oncotarget*, 2015, 6(25), 21353-21368.

Ra, H., González-González, E., **Uddin, M. J.,** King, B. L., Lee, A., Ali-Khan, I., Marnett, L. J., Tang, J., and Contag, C. H. Detection of non-melanoma skin cancer by in vivo fluorescence imaging with fluroocoxib. A. *Neoplasia,* 2015, 17(2), 201-207.

Uddin, M. I., Evans, S. M., Craft, J. R., Marnett, L. J., **Uddin, M. J.*** Joyagopal, A*. Applications of azo-based probes for imaging retinal hypoxia. *ACS Medicinal Chemistry Letters*, 2015, ***6* (4),** 445–449 **(*Corresponding Author**)

2014

Uddin, M. J., Elleman, A. V., Ghebreselasie,K., Daniel, C.K., Crews,B. C., Nance, K. D., Huda, T., Rouzer, C. A., and Marnett,L.J. Design of fluorine-containing 3,4-diaryl-2(*5H*)-ones as selective COX-1 inhibitors. *ACS Medicinal Chemistry Letters*, 2014, 5, 1254-1258.

Uddin, M. J.,* Crews,B.C., Huda, I., Ghebreselasie,K., Daniel, C.K., and Marnett,L.J. Trifluoromethyl fluorocoxib A detects cyclooxygenase-2 expression in inflammatory tissues and human tumor xenografts. *ACS Medicinal Chemistry Letters*, 2014, 5, 445-450 **(*Corresponding Author**), [**Note – cover article]**

Perrone, M. G., Malerba, P., **Uddin, M. J.,** Vitale, P., Panella, A., Crews, B. C., Daniel, C. K., Ghebreselasie,K., Nickels, M., Tantawy, M. N., Manning, H. C., Marnett, L. J., Scilimati, A. PET radiotracer [18F]-P6 selectively targeting COX-1 as a novel biomarker in ovarian cancer: Preliminary investigation *European Journal of Medicinal Chemistry* 2014, 80, 562-568.

2013

Uddin, M. J., Crews, B. C., Ghebreselasie,K., and Marnett, L. J. Design, Synthesis, and Structure—Activity Relationship Studies of Fluorescent Inhibitors of Cycloxygenase-2 as Targeted Optical Imaging Agents. *Bioconjugate Chemistry,* 2013, 24, 712-723.

Blobaum, A.,* **Uddin, M. J.,*** Felts, A. S.; Crews, B. C.; Rouzer, C. A.; Marnett, L. J. The 2′-trifluoromethyl analog of indomethacin as a potent and selective COX-2 inhibitor. *ACS Medicinal Chemistry Letters,* 2013, 4, 486-490. **(*Joint 1st Author**)

Cekanova, M., **Uddin, M. J.;** Bartges, J. W.; Callens, A.; Legendre, A. M.; Rathore, K.; Wright, L.; Carter, A.; Marnett, L. J. Molecular Imaging of Cyclooxygenase-2 in Canine Transitional Cell Carcinomas *In Vitro* and *In Vivo* by Fluorocoxib A. *Cancer Prevention Research,* 2013*,* 6, 466-476.

2012

Cekanova, M., **Uddin, M. J.;** Legendre, A. M.; Galyon, G.; Bartges, J. W.; Callens, A.; Martin-Jimenez, T.; Marnett, L. J. Single-dose safety and pharmacokinetic evaluation of Fluorocoxib A: pilot study of novel cyclooxygenase-2-targeted optical imaging agent in a canine model. *Journal of Biomedical Optics,* 2012, 17(11), 116002-116011.

Aldrich, M. B., Milton V. Marshall, M. V., Sevick-Muraca, E. M., Lanza, G., Kotyk, J., Joseph Culver, J., Wang, L. V., **Uddin, M. J.** et al. Seeing it through: translational validation of new medical imaging modalities. *Biomecial Optics Express*, 2012, 3(4), 764-776.

2011

Uddin, M. J., Crews, B. C., Ghebreselasie,K., Huda I., Kingsley, P. J., Ansari, M. S., Tantawy, M. N., Reese, J., and Marnett, L. J. Fluorinated COX-2 Inhibitors as Agents in PET Imaging of Inflammation and Cancer. *Cancer Prevention Research,* 2011, 4, 1536-1545. **[Note – (i) cover article; (ii) 'perspective on Uddin et al'; (iii) several Web-media and Print-media headlines].**

Uddin, M. J., Crews,B.C., Ghebreselasie,K., Tantawy, M. N., and Marnett,L.J. [^{123}I]-Celecoxib Analogs as SPECT Tracer of Cyclooxygenase-2 (COX-2) in Inflammation. *ACS Medicinal Chemistry Letters*, 2010, 2, 160-164.

2010

Uddin, M. J., Schulte, M. I., Maddukuri, L., Harp, J., and Marnett, L. J. Semisynthesis of 6-Chloropurine-2′-deoxyriboside 5′-Dimethoxytrityl 3′-(2-cyanoethyl-*N,N*-diisopropylamino)phosphoramidite and its Use in the Synthesis of Fluorescently-Labeled Oligonucleotides. *Nucleosides, Nucleotides and Nucleic Acids*, 2010, 29, 831-840.

Uddin, M. J., Crews, B. C., Blobaum, A. L., Kingsley, P. J., Piston, D. W., Gordon, L., McIntyre, O., Matrisian, L., Dannenberg, A. J., Subbarahmiah, K., and Marnett, L. J. Selective visualization of Cyclooxygenase-2 in inflammation and cancer by targeted fluorescent imaging agents. *Cancer Research,* 2010, 70(9), 3618-3627. **[Note – published with several newspaper headlines**]

Uddin, M. J., Smithson, D. C., Brown, K. M., Crews, B. C., Connelly, M., Zhu, F., Marnett, L. J., Guy, R. K. *Bioorganic and Medicinal Chemistry Letters* 2010, 20(5), 1787-1791.

2009

Uddin, M. J., Crews, B. C., Blobaum, A. L., Kingslay, P. J., Ghebraselase, K., Saleh, S. S., Clanton, J. A., Baldwin, R. M. and Marnett, L. J. Synthesis and evaluation of [123I]-indomethacin derivatives as COX-2 targeted imaging agents. *Journal of Labelled Compounds and Radiopharmaceuticals*, 2009, 52, 387-393.

Konkle, M. E., Hargrove, T. Y., Kleshchenko, Y. Y., von Kries, J. P., Ridenour, W.,
Uddin, M. J., Caprioli, R. M., Marnett, L. J., Nes, W. D., Villalta, F., Waterman, M. R., Lepesheva, G. I. *Journal of Medicinal Chemistry* 2009, 52(9), 2846-2853.

2008

Uddin, M. J. Marnett, L. J. Synthesis of 5- and 6-carboxy-X-rhodamines *Organic Letters* 2008, 10(21), 4799-4801.

2006

Anning, P. B.; Coles, B; Morton, J.; Wang, H.; **Uddin, M. J.;** Morrow, J. D.; Dey, S. K.; Marnett, L. J.; Odonnell, V. B. Nitric oxide deficiency promotes vascular side effects of cyclooxygenase inhibitors. *Blood*, 2006, 13, 4059-4062.

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Methods and compositions for diagnostic and therapeutic targeting of COX-2 (US 0254910) June 2010. Disclosed subject matter provides compositions that selectively bind cyclooxygenase-2 and comprise a therapeutic and/or diagnostic moiety. Also, provided are methods for using the disclosed compositions for diagnosing (i.e. by imaging) a target cell and/or treating a disorder associated with a cyclooxygenase-2 biological activities.

Fluorocoxib A loading into ROS-responsive nano-particles (US 62/191367) February 2015. Disclosed are compositions and methods for making and using the disclosed compositions. In a further aspect, disclosed are compositions that comprise a cyclooxygenase-

2-selective therapeutic and/or diagnostic agent having a therapeutic and/or diagnostic agent conjugated to a NSAID drug; and a ROS-responsive nanoparticle.

Composition and method for detecting hypoxia (US 62/156055) November 2015. Disclosed subject matter comprised diagnostic agent conjugated to a hypoxia marker moiety. Disclosed methods and compositions for diagnosing (i.e. by optical imaging) hypoxic cells and/or treating a disorder associated with hypoxia.

Activatable compounds and methods for cancer imaging (US 62/316935) June 2016. Disclosed materials are diagnostic agents comprised of a radical and a fluorophore moiety. Disclosed technology methods for developing smart probes enable visualization of cells associated with cancer, inflammation, or disorders associated with carcinogenesis.

Methods and compositions for diagnostic targeting of COX-1 by PET imaging agents (IPD386033018) **April 2018**. Disclosed subject matter comprised F-18 radiopharmaceuticals for imaging COX-1 in ovarian cancer. Disclosed technology includes novel radiochemical methods for radiolabeling of furanone-containing compounds useful for detection/intervention of ovarian carcinogenesis.

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