Bocheng Wu, Ph.D. Postdoc associate

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Education

Aug 2015 - May 2021	Ph.D., Chemistry and Biochemistry Georgia Tech, Atlanta, GA. 30332
Sep 2011 - Dec 2014	Bachelor of Science, College of Chemistry Marquette University, Milwaukee, WI.

Summary Statement

My 8-year small molecule drug discovery experience brought me insights and skills in drug discovery field. My Ph.D. career focused on medicinal chemistry of drug structure optimization to target tissue fibrosis and cancers, which brought me 12 publications and 3 patents targeting to breast cancer, liver tumor, and prostate cancer. After being a postdoc, I was further trained as chemical biologist who uses high throughput screening and biotechnologies to tackle undruggable targets of difficult diseases, including T cell exhaustion, thrombosis, and Rhabdomyosarcoma.

Professional experience (Selected projects)

Postdoctoral Associate, Koch Institute of Integrative Cancer Research, **Massachusetts Institute of Technology**, Cambridge, MA. 2022-present

Project 1: TOX is an important transcription factor in both T-cell exhaustion progression and T-ALL leukemia carcinogenesis. This project is to seek for small molecule inhibitor of this highly disordered and undruggable protein. Currently, I have found a lead compound with strong TOX protein binding and inhibition, which induced selective cytotoxicity to TOX-dependent leukemia cells and recovery of exhausted CD8+ T cells against cancer cells.
Advisor: Angela Koehler

Project 2: NR4A is another key transcription factor in the T-cell exhaustion. The protein has an existing inhibitor but is not a selective and on-target ligand of NR4A1. My goal is to seek a direct binders and inhibitors of the Ligand-binding domain and DNA binding domain of NR4A1. This small molecule can be a useful chemical probe for mechanism study and protein-degradation pioneer chemical.
Advisor: Angela Koehler and Peter Westcott

Project 3: vWF is a key protein in blood thrombosis, Angiogenesis, and major cause of the myocardial infarction (Heart attack). Its A1 domain is an active protein-binding domain interacting with GP1Ba, a protein to trigger the formation of pellets. Partial inhibition of A1-GP1B can safely inhibit the formation of thrombosis and blood pellet and avoid internal bleeding. We have found a key inhibitor that could induce maximal 80% inhibition of vWF-GP1B protein-protein interaction and prevented formation of pallet.
Advisor: Angela Koehler and Yunfeng Chen

Project 4: Rhabdomyosarcoma is one of the highly lethal pediatric cancer types with 17% 5-year survival rate. Currently, there is no efficacious drug to cure the cancer. The problematic protein PAX3-FOXO1 is a fusion oncogenic transcription factor that could cause and worsen the development of RMS. My goal is to develop a small molecule proximity degrader of the target, based on an existing ligand found in our lab.
Advisor: Angela Koehler.

Postdoctoral Associate, Department of Chemistry and Biochemistry, **Georgia Institute of Technology**, Atlanta, GA. 2021

Project 1: Histone Lysine Demethylase (KDMs) are typically important in many cancer types including Breast cancer and Liver cancer with regulations of epigenetic activities. KDM inhibitors were found and selective to types of KDMs. However, KDMs undergo compensations when one or more KDMs are selectively inhibited. Therefore, we invented a pan-selective KDM inhibitor and equipped it with Tissue-targeting activity for Breast cancer therapy.

Advisor: Adgeboyega Oyelere

Graduate research, Department of Chemistry and Biochemistry, **Georgia Institute of Technology**, Atlanta, GA. 2015-2021

Project 1: (Thesis project): To tackle Idiopathic pulmonary fibrosis (IPF), an irreversible aging disease, I designed small molecules that showed as good as 5,000-fold anti-fibrosis activities against the current market medicine Pirfenidone. Currently the compounds are patented and on-going with more *in vivo* studies. The lung function and fibrosis process is efficiently recovered with our compound.
Advisor: Adgeboyega Oyelere

Project 2 (Thesis project): HDAC inhibitors are epigenetic regulators and potential anti-cancer compounds. However, the current approved HDAC inhibitors have low efficiency in tumor-penetration and tissue selectivityWe developed two series of HDACi targeting to liver by conjugating the HDAC inhibitor moiety to liver-targeting compounds. The works are protected by patent. The in vivo studies showed promising liver-targeting effect and HCC tumor penetration effect of the novel HDACi. We also found its T-cell infiltration activity in anti-PD1 resistant mouse model and helped eliminate the HCC tumor in 25% of mice after combination therapy.
Advisor: Adgeboyega Oyelere

Project 3 (Thesis project): STAT3 is an oncogenic transcription factor. The existing inhibitors did not successfully pass the clinical trials due to the overtoxicity and off-target effects. We designed and invented a group of STAT3 inhibitors that are highly selective to the STAT3-dependent cell lines.
Advisor: Adgeboyega Oyelere

Publication

1. **Wu, B.,** Chang, J.H., Singh, P., Hostetler, A., Xiang, Y., Guo, S., Wang, F., Zhong, J., Leifer, B., Choudhary, A., Westcott, P., Koehler, A. Small Molecule Modulators of TOX protein to Re-invigorate T cell Activity. *bioRxiv.* https://doi.org/10.1101/2025.03.03.641115

2. Owumi, S., Olanlokun, J. O., **Wu, B.,** Duro-Ladipo, A. M., Oyelere, S. E., Khan, S. I., & Oyelere, A. K. (2024). Elucidation of the Active Agents in a West African Ground Herbal Medicine Formulation

That Elicit Antimalarial Activities in In Vitro and In Vivo Models. Molecules, 29(23), 5658. DOI: 10.3390/molecules29235658.

3. Kohrt, S. E., Novak, E. J., Tapadar, S., **Wu, B.,** Strope, J., Asante, Y., Kim, H., Chang, M. S., Gurdak, D., Khalil, A., Rood, M., Raftery, E., Stavreva, D., Nguyen, H. M., Brown, L. G., Ramser, M., Peer, C., Meyers, W. M., Aboreden, N., Gryder, B. E. (2024). Small-molecule disruption of androgen receptor–dependent chromatin clusters. Proceedings of the National Academy of Sciences, 121(48), e2406239121. DOI: 10.1073/pnas.2406239121.

4. **Wu, B.,** Koehler, AN., Westcott, PM. New opportunities to overcome T cell dysfunction: the role of transcription factors and how to target them. Trends in Biochemical Sciences. Volume 49, Issue 11. p1014-1029. DOI: 10.1016/j.tibs.2024.08.002.

5. **Wu, B.,** Tapadar S, Ruan Z, Sun CQ, Arnold RS, Johnston A, Olugbami JO, Arunsi U, Gaul DA, Petros JA, Kobayashi T. A Novel Liver Cancer-Selective Histone Deacetylase Inhibitor Is Effective Against Hepatocellular Carcinoma and Induces Durable Responses with Immunotherapy. *ACS Pharmacology & Translational Science*. 2024 Sep 5;7(10):3155-69. DOI: 10.1021/acsptsci.4c00358.

6. Chandrasekaran, B., Tapadar, S. **Wu, B.,** Tyagi. A., Saran. Uttara., Johnson. A., Gaul D., Oyelere. A.K., Damodaran. C. Antiandrogen Equipped Histone Deacetylase Inhibitors selectively inhibits Androgen Receptor (AR) and AR-Variant 7 (AR-V7) in Castration- Resistant Prostate Cancer (CRPC) *Cancers MDPI. 2023*, *15*(6), 1769; DOI: 10.3390/cancers15061769.

7. Owumi, S. E., Kazeem, A. I., **Wu, B.,** Ishokare, L. O., Arunsi, U. O., & Oyelere, A. K. (2022). Apigeninidin-rich Sorghum bicolor (L. Moench) extracts suppress A549 cells proliferation and ameliorate toxicity of aflatoxin B1-mediated liver and kidney derangement in rats. *Scientific Reports,* 12(1), 1-19. 2022**.** DOI: 10.1038/s41598-022-10926-1.

8. Wu, B., Sodji, Q. H., Oyelere, A. K. Inflammation, Fibrosis and Cancer: Mechanisms, Therapeutic Options and Challenges. *Cancers MDPI 2022*, 14, 3; DOI:10.3390/cancers14030552.

9. Faura, G. G.*, **Wu, B.*,** Oyelere, A. K., & France, S. Synthetic Methodology-Enabled Discovery of a Tunable Indole Template for COX-1 Inhibition and Anti-cancer activity. *Bioorganic & Medicinal Chemistry*. 2022 116633. DOI: 10.1016/j.bmc.2022.116633.

10. **Wu, B.,** Payero, B., Taylor, S., Oyelere, A. K. Discovery of novel STAT3 DNA binding domain inhibitors. Fut. Med. Chem. 2021 13(15), 1253-1269. DOI:10.4155/fmc-2021-0088.

11. **Wu, B.** Discovery of novel drugs with tissue and cell-type selectivity for cancer and inflammation. (Doctoral dissertation, Georgia Institute of Technology). 2021.

12. Tapadar, S.; Fathi, S.; **Wu, B.;** Sun, C.Q.; Raji, I.; Moore, S.G.; Arnold, R.S.; Gaul, D.A.; Petros, J.A.; Oyelere, A.K. Liver-Targeting Class I Selective Histone Deacetylase Inhibitors Potently Suppress Hepatocellular Tumor Growth as Standalone Agents. *Cancers 2020*, 12, 3095; DOI: 10.3390/cancers12113095.

13. Caggia, S., Tapadar, S., Garrett, A., **Wu, B.,** Venugopal, S. V., Garrett, A. S., Kumar, A., Stiffend, J. S., Davis, J. S., Oyelere, A. K., Khan, S. A. Small molecule inhibitors targeting Gαi2 protein attenuate migration of cancer cells. *Cancers 2020*, 12, 1631; DOI:10.3390/cancers12061631.

14. **Wu, B.;** Fathi, S.; Mortley, S.; Mohiuddin, M.; Jang, Y. C.; Oyelere, A. K. Pyrimethamine conjugated histone deacetylase inhibitors: design, synthesis and evidence for triple negative breast cancer selective cytotoxicity. *Bioorg. Med. Chem*. 2020, 28, 115345; DOI: 10.1016/j.bmc.2020.115345.

15. Crooke, S. N., Schimer, J., Raji, I., **Wu, B.,** Oyelere, A. K., Finn, M. G. Lung Tissue Delivery of Virus-Like Particles Mediated by Macrolide Antibiotics. *Mol. Pharm*. 2019, 16, 2947-2955. DOI: 10.1021/acs.molpharmaceut.9b00180.

Published Patents:

1. Oyelere, A. and Wu, B., Georgia Tech Research Corp, 2024. *Compositions and Methods for Inhibiting Fibrosis, Inflammation and Cancer*. U.S. Patent Application 18/266,508.
2. Oyelere, A., Tapadar, S. and Wu, B., Georgia Tech Research Corp, 2024. *Glycosylated histone deacetylase inhibitors and methods of making and using the same*. U.S. Patent Application 18/266,438.

Provisional Patents

1. Hecker,L. Oyelere, A. Wu, B. Georgia Tech Research Corp. *Nox4 inhibitors and methods of using same.* US Patent Application 63535235.
2. Koehler, A. Wu, B. TOX INHIBITORS AND MOLECULAR GLUES, METHODS OF USE THEREOF, AND KITS COMPRISING THE SAME. US application: 63/256,443.

Invited Presentations

1. Bocheng Wu. Title: **Discovery of small molecule regulators for TOX protein**. Invited and presented at Northeast Regional Meeting of the American Chemical Society (NERMACS). 2023.
2. Bocheng Wu. Title: **Overcoming the undruggable target using SMM.** Invited and presented at University of Texas Medical Branch (UTMB). 2023.

Selected Public Presentations

1. Bocheng Wu, Angela Koehler. **Discovery of small molecule regulators for TOX protein.** Gordon Conference of Bioorganic chemistry. May, 2023.
2. Bocheng Wu, Benny Payero, Justin Keener, Adegboyega K. Oyelere. '**Clemizole-conjugated Histone Lysine Demethylase/Histone Deacetylase Inhibitors as Promising Anti-HCC Agents**'. Presented at ACS National meeting 2022. Poster Presentation. 2022
3. Bocheng Wu. Subhasish Tapadar, Adegboyega K. Oyelere. **'Novel HDACi to suppress HCC tumor growth'**. Presented at Global Webinar on Chemistry and Applied Sciences. Oral Presentation. 2021
4. Bocheng Wu. '**Pyrimethamine derivatives as novel STAT3 inhibitors disrupt DNA binding and induce cytotoxicity to cancers'**. Presented at ACS National meeting 2021. Poster presentation. 2021
5. Bocheng Wu, Shaghayegh Fathi, Shanee Mortly, Adegboyega Oyelere. **HDAC-STAT3 inhibitors that target to Triple Negative Breast Cancer**. presented at AACR annual meeting. Poster Presentation. 2019
6. Bocheng Wu, Stephen N. Crooke, Jiri Schimer, Idris Raji, Adegboyega Oyelere, and M.G. Finn. **Macrolide Mediated Macrophage Uptake of Polymeric Cargoes.** presented at The 70th Southeastern ACS conference.

Awards, grants, fellowships:

- **2024** Selected Awardee of PhRMA foundation Postdoc fellowship of Drug discovery
- **2024** Teaching certificate from Kaufman Teaching Certificate Program of MIT
- **2023** Convergence Scholar Award (Koch institute)
- **2022** Koch Institute Frontier Research Program Award of 2022
- **2021** Runner Award of presentation at Annual Graduate Symposium in Georgia Tech
- **2021** Winner of 2021 Suddath Honorable Mention Award
- **2020** Winner of 2020 ATCC innovative Challenge
- **2014** Winner of Merck Index Award for Top Undergraduate Chemistry Senior
- **2014** The Best Competitor of Undergraduate Research Presentation Competition
- **2011-2014** Dean's List Recipient
- **2011-2014** Ignatius Academic Scholarship

Teaching Experience:

- 7.546/15.480/20.586: The science and Business of Biotechnology (Guest speaker of MIT Sloan)
- General Chemistry (Chem 1310. Georgia Tech)
- General Chemistry (Chem 1211K, Chem 1212K. Georgia Tech)
- Biochemistry I and II (Chem 4511, Chem 4512. Georgia Tech)
- Survey of Biochemistry (Chem3511-A Georgia Tech)
- Organic Synthesis lab (Chem 2380. Georgia Tech)

Mentorship (Undergraduate research mentor)

- David Robichaud (Organic synthesis) Current
- Heng Jui Chang (Biochemistry) 2023 Spring to 2024 Spring
- Peixian He (Organic Synthesis) 2020 Fall, 2021 Spring
- Justin P. Keener and Andrew W. Frazier (Biochemistry) 2020 Fall
- Mikhil Patel (Organic Synthesis and Virtual Screening) 2019 Fall
- Hassan Asif (Biochemistry and Virtual screening) 2019 Fall to 2020 Spring
- Benny Payero (Organic Synthesis) 2019 Spring and Fall, 2020 Spring
- Kate Bullock (Biochemistry) 2019 Spring and Summer
- Oludamilola T Taiwo (Organic Synthesis) 2018 Summer and Fall
- Sara Zimmerman (Biochemistry) 2018 Summer
- Shanee Mortley (Biochemistry) 2017 fall- 2018 Summer

Journal Reviewer:

- Bioorganic & Medicinal Chemistry 2019-present
- Scientific Report, Nature 2020-present
- Bioorganic chemistry 2021-present
- Experimental Biology and Medicine 2022-present
- MDPI 2022-present
- Royal Chemistry 2023-present
- Cell Communication and Signaling 2024-present