Natural Products and New Drugs, Research and Teaching

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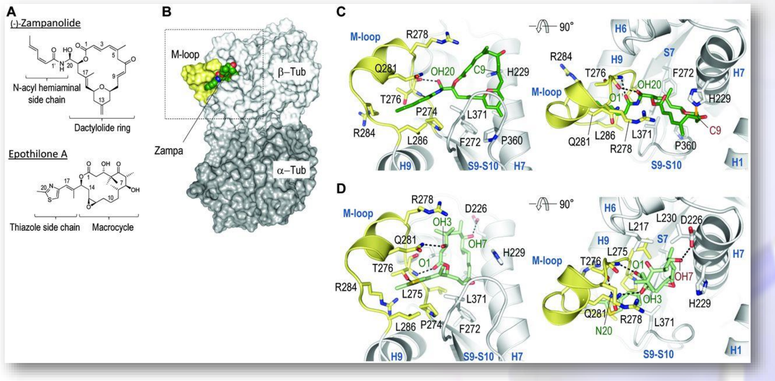
Just like Natural Products are a robust source for new drugs and leads, research is an endless supply for the enhancement of teaching.

Research Project I. Macrolide-Based Microtubule Stabilizing Agents

Naturally occurring macrolides have proven to be highly productive lead structures for anticancer drug discovery, with at least seven epothilone-type agents having entered clinical trials in humans ever the last several years. We are working to identify new drug-like macrolides with improved physicochemical and pharmaceutical properties relative to the known naturally occurring microtubule-stabilizing macrolides.



Research Project II. Analogues of Dietary Natural Products as Anti-Prostate Cancer Agents

The increased risk of prostate cancer in the first generation of Asian men emigrating to the United States suggests a chemopreventive effect of Asian traditional food. Several dietary natural products, curcumin, silybin, quercetin, and genistein, have been identified as candidates for prostate cancer prevention and treatment. However, their respective efficacy in clinic has been limited by their moderate potency and poor bioavailability. We are working to engineer more effective analogues for potential clinical use to treat prostate cancer.

MENTORING (2012-2015)

One postdoctoral research associate; eight graduate students; eighteen undergraduate students.

PATENT APPLICATION:

"Therapeutic Uses of Curcumin Analogs for Treatment of Prostate Cancer", United States Patent Application, 14/318,295, Filed on June 27, 2014. U.S. Patent Application Publication, US20150017720A1, January 15, 2015.

SELECTED PUBLICATIONS (2014-2015):

- "Design, synthesis, and evaluation of novel heteroaromatic analogs of curcumin as anti-cancer agents", *European Journal of Medicinal Chemistry*, **75**: 123-131 (2014).
- "Total Synthesis of Fuzinoside", *Tetrahedron*, **70**: 4022-4030, (2014).
- "Zampanolide and Dactylolide: Cytotoxic Tubulin-Assembly Agents and Promising Anticancer Leads", *Natural Product Reports*, 31: 1202-1226 (2014).
- "Stemona Alkaloids: Biosynthesis, Classification, and Biogenetic Relationships", *Natural Product Communications*, **9**: 1809-1822 (2014).
- "Curcumin-Based Anti-Prostate Cancer Agents", *Anti-Cancer Agents in Medicinal Chemistry*, **2**: 138-156 (2015).

ACHEVIEMENTS

- The research has been rewarding with 8 publications, 25 presentations, three provisional patent applications, and one patent application since August 2012.
- Two groups of curcumin analogues and one group of silybin analogues have been established as promising scaffolds for in-depth development for clinical treatment of prostate cancer.

EXTERNAL COLLABORATORS

- David G. I. Kingston, University Distinguished Professor Bioorganic and Natural Products Chemistry, Virginia Tech
- Feng-Peng Wang, Distinguished Professor, West China Medical Center, Sichuan University, China.
- Guangdi Wang, Professor of Chemistry, Director of RCMI Cancer Research Center, Xavier University of Louisiana.
- Susan L. Bane, Professor of Biological Chemistry, State University of New York at Binghamton.
- Zuo Zhong, Professor of School of Pharmacy, The Chinese University of Hong Kong.
- Harinantenaina Liva, Assistant Professor of Medicinal Chemistry and Pharmacognosy, Ohio State University.

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