

Project: Molecular Endocrinology of the Vitamin D Hormone and Nutraceuticals in Bone Health and Cancer Chemoprevention

School of Mathematical and Natural Sciences • Arizona State University at the West Campus • Phoenix, AZ 85306

Department of Basic Medical Sciences • University of Arizona College of Medicine • Phoenix, AZ 85004

RESEARCH EXPERIENCE

SoLUR and undergraduate researchers in our laboratory apply **modern molecular medicine approaches** to study the fundamental mechanism of action of steroid hormones, with particular emphasis on vitamin D and its role in the pathophysiology of postmenopausal osteoporosis and its activity in the potential chemoprevention of epithelial cancers. This vitamin/hormone functions by binding to the vitamin D receptor. The receptor mediates the effects of vitamin D in target organs such as the intestine, kidney and bone by controlling the expression of certain genes. **The research experience in our lab allows students** to learn about genes regulated by vitamin D and how they participate in kidney/intestinal calcium and phosphate transport, calcium homeostasis, bone remodeling, as well as control of growth.

Other projects for student researchers are directed at the newly discovered role of vitamin D in cellular detoxification and cancer prevention, especially in cancers of the colon. Vitamin D is thought to be a potent antiproliferative/cell

differentiation agent in myeloid leukemia, mammary carcinoma, as well as in skin and prostate cancer cells. Thus, while the traditional role of vitamin D is to promote a strong and healthy skeleton, there is an increasing appreciation that vitamin D is an important chemopreventive nutrient. We have also discovered that the vitamin D receptor can bind to other molecules besides vitamin D, including bile acids, polyunsaturated fatty acids such as the omega-3 lipids found in fish oils, as well as curcumin, an ingredient in curry powder. **Student projects are available for evaluating the biological properties of these bioactive lipids and their relationship to the prevention of diseases such as colon cancer and osteoporosis using modern molecular biology techniques including human cell culture, DNA cloning and transfection studies, PCR and qPCR, Western blotting, use of bioinformatics for data mining, and gene chip analysis.**

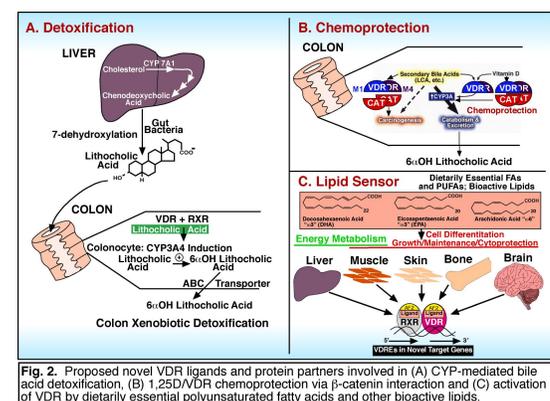


Fig. 2. Proposed novel VDR ligands and protein partners involved in (A) CYP-mediated bile acid detoxification, (B) 1,25D/VDR chemoprotection via β -catenin interaction and (C) activation of VDR by dietarily essential polyunsaturated fatty acids and other bioactive lipids.

By understanding the molecular biology of vitamin D and its receptor, novel therapeutic drugs can ultimately be developed to combat such diseases as osteoporosis and a variety of epithelial cancers.

Past Student Researchers

Previous students in our laboratory have gone on to pursue careers in medicine, health and biomedical research:

<u>Student</u>	<u>Graduation</u>	<u>Current Position</u>
Anna Olibarria	2006	Optometrist, Alumna Midwestern University-Phoenix
Leo Bartik	2006	Anesthesiology, Alumnus Johns Hopkins Medical School
Jana Lemau	2007	Dentist, Alumna Midwestern University-Phoenix
Milen Vitinov	2007	Dentist, Alumnus AT Stills University-Phoenix
Tim Widener	2008	ER Physician, Alumnus UA College of Medicine-Phoenix
Wasiq Zaidi	2009	Physician, Alumnus UA College of Medicine-Tucson
Zach Hernandez	2010	Physician, Alumnus Stanford University
Shane Batie	2011	Physician, Alumnus UA College of Medicine-Phoenix
Chad Van Pelt	2012	Physician, Alumnus UA College of Medicine-Phoenix
Ryan Forster	2012	Graduate Student-Ph.D., University of California, Berkeley
Angelika Stone	2014	Medical Student, University of Utah, School of Medicine
Maryam Hockley	2015	Medical Student, UA College of Medicine-Phoenix

Requirements

Candidates for research positions should have attained sophomore standing or higher, with a background in biology/chemistry, and plans to pursue additional upper division coursework in the biological/biochemical sciences. The minimum time commitment is at least 10 hours per week for a sustained period of 1-2 years or greater. Most lab research is conducted at the Molecular Endocrinology Laboratory located on the campus of ASU West.

Contact

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