Peter Jurutka · Research Program in Molecular Endocrinology

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BACKGROUND

Dr. Jurutka received his Ph.D. in Biochemistry and Endocrinology from the University of Arizona. His graduate work was followed by postdoctoral research at the University of Arizona, College of Medicine, where he also taught medical students for over 10 years. In 2004, he joined the faculty at ASU, and in 2006 he became a founding faculty member at the University of Arizona College of Medicine-Phoenix. Dr. Jurutka is an active member of several scientific research societies and has received a number of prestigious honors, including the Norwich-Eaton Young Investigator Research Award, the John Haddad Young Investigator Award, and the ASU Faculty Achievement Award for Excellence in Student Mentoring. He has authored over 100 research publications in high-impact journals such as *Cancer Research, Nutrition Reviews, Molecular Endocrinology*, and *Journal of Medicinal Chemistry*.

RESEARCH PROGRAM

The Jurutka laboratory applies modern molecular medicine approaches to elucidate essential questions in human health and disease. **Medical student researchers** in our laboratory study the fundamental mechanism of action of steroid hormones, with particular emphasis on vitamin D and its role in the pathophysiology of diseases including:
1) elucidation of genetic "fingerprints" for diagnosis/treatment of irritable bowel syndrome (IBS), **2)** mechanistic effects of "nutraceuticals" such as vitamin D, resveratrol and curcumin on anti-aging gene expression and chemoprevention, especially in GI cancers, **3)** rexinoid drug design/discovery to develop pharmaceuticals for treatment of cancer and Alzheimer's disease in combination with vitamin D, and **4)** neurobiology of vitamin D action in autism and depression.

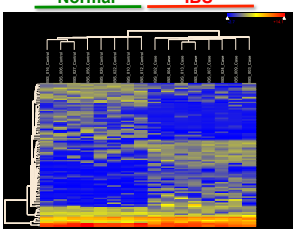
Each of the above active research areas (1-4) has the potential for Mayo Medical School-ASU collaboration. In fact, scientists in the Jurutka laboratory are already engaged in a collaborative research project with Mayo Clinic partners in elucidation of genetic "fingerprints" for diagnosis/treatment of IBS (#1 above), but all four projects (also see below) are available to Mayo Medical School students.

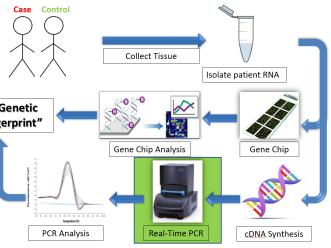
SUMMARY OF RESEARCH AREAS

The slides below provide a summary of our current research focus and potential for Mayo Medical School-ASU partnerships.

1. Vitamin D, Gene Expression and the Microbiome in Irritable Bowel Syndrome*

Background – No reliable diagnostic test for irritable bowel syndrome (IBS) is currently available; pathophysiology unclear





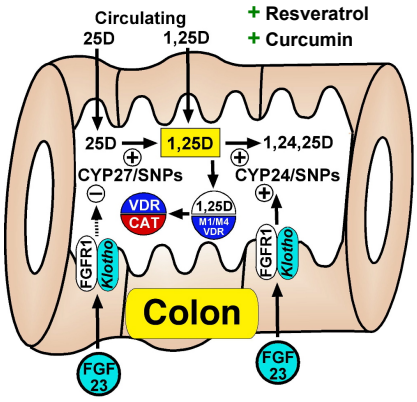
Objective – Identify gene expression-based biomarkers associated with IBS

Hypothesis – Patients with IBS have unique gene expression patterns ("genetic fingerprint") and altered microbiome, as well as lower vitamin D levels compared to healthy controls

*In collaboration with Drs. Todd Sandrin (ASU) and Amy Foxx-Orenstein (Mayo Clinic)

2. Nutraceuticals Vitamin D, Resveratrol and Curcumin as Colon Cancer Chemopreventives

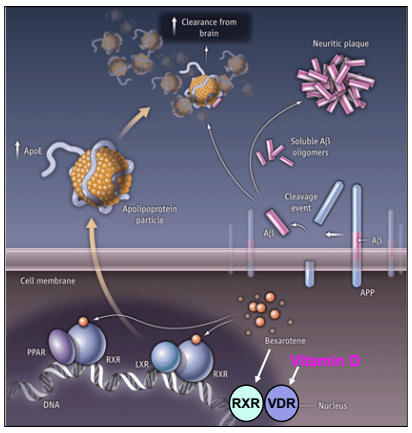
- **Vitamin D (1,25D) and the vitamin D receptor (VDR) synergize with other nutraceuticals like resveratrol and curcumin to modulate intracellular signaling in colonocytes.**
- **Major growth signaling, including the Wnt/β-catenin (CAT) pathway, are attenuated via VDR.**
- **Polymorphisms (SNPs) in the VDR gene (M1/M4), and in vitamin D metabolizing genes like CYP27 and CYP24, may have a functional impact on chemoprevention.**



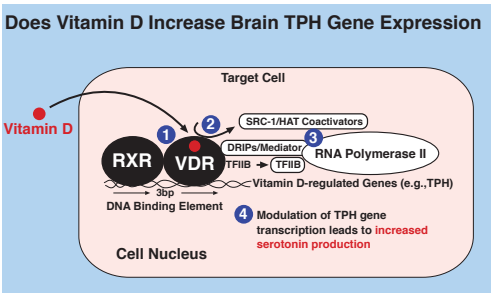
3. Role of Vitamin D and Bexarotene Drug Analogs in Reversing Alzheimer's Disease

- **Bexarotene, an FDA-approved drug for lymphoma, can also reduce Alzheimer's disease plaques in mice.**
- **We are developing novel drug analogs* of Bexarotene with potentially increased potency and decreased side-effects.**
- **We are studying the function of vitamin D in combination with these analogs to determine if an even greater positive effect exists.**

*In collaboration with Dr. Carl Wagner, ASU



4. Vitamin D Deficiency as a Risk Factor in the Development of Autism and Depression



Tryptophan Hydroxylase (TPH) is an enzyme that catalyzes serotonin synthesis. Does vitamin D regulate the expression of the TPH2 gene in the brain thereby modulating serotonin levels during CNS development? Is the incidence of autism spectrum disorders (ASDs) increasing because of escalating vitamin D deficiency and unbalanced serotonin levels, especially in males, in utero? Does vitamin D insufficiency in adults lead to lower serotonin levels that cause depression?