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NUTRITION FRONTIERS

A newsletter of the Nutritional Science Research Group

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Dear Colleague,

Welcome to the fall issue of the *Nutrition Frontiers*, a newsletter from the Nutritional Science Research Group (NSRG), Division of Cancer Prevention, NCI. In this issue, you will learn about increased gut microbial diversity associated with enterolignan excretion, how the plant flavone apigenin controls UVB-induced cutaneous proliferation and angiogenesis, and space radiation-associated lung injury. Learn about our spotlight investigator, Dr. Chin-Yo Lin, and his research on estrogen receptor modulation in cancer prevention. Don't miss upcoming announcements and more.

RESEARCH UPDATE: ON THE CLINICAL FRONT Enterolignan Associated with Increased Gut Microbial Diversity



Plant lignans, polyphenolic compounds found in plant foods and whole grains, are converted by the gut microbiota to the enterolignans, enterodiol (END) and enterolactone (ENL). Enterolignans play a role in cancer prevention and chronic diseases due to their estrogenic and antiestrogenic properties, regulation of hormone metabolism, and antitumor activities. In a cross-sectional study of healthy pre-menopausal women, [Hullar et al](#) evaluated diets (3-day food record) and measured the differences in stool and urinary enterolignan excretion. ENL excretion was positively associated with either the gut microbial community (GMC) or the diversity of the GMC. The bacterial genera, *Moryella spp*, *Acetanaerobacterium spp*, *Fastidiosipila spp*, and *Streptobacillus spp*, were significantly associated with high ENL production. Further research is needed to understand the mechanisms

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Announcements

The 2016 *John Milner Nutrition and Cancer Prevention Research Practicum* will take place March 14 to 18, and is now accepting applications (through December 4, 2015). Learn more about the practicum, eligibility and details for applying [here](#).

Upcoming Events

November 11-13 , 2015
[Translational Nutrition: Optimizing Brain Health](#)
American College of Nutrition
Orlando, FL

November 16 , 2015
[Stars in Nutrition and Cancer](#),
Energy Hormesis and Your Health: A Different View of Energetics and Cancer by Dr. Henry J. Thompson
Bethesda, MD

December 04-06, 2015
[Advances and Controversies in Clinical Nutrition](#)
American Society for Nutrition,
Long Beach, CA

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underlying the differences in gut microbial diversity and composition and the relationship to human health.

RESEARCH UPDATE: WHAT'S NEW IN BASIC SCIENCE Apigenin Controls UVB-induced Cutaneous Proliferation and Angiogenesis

Apigenin, a plant flavone abundantly present in fruits and vegetables, including parsley, onion, oranges, tea, chamomile, and wheat sprouts, is a chemopreventive agent and inhibitor of UVB-induced skin cancer. In a study by [Tong and colleagues](#), apigenin inhibited cutaneous angiogenesis, partly by maintaining high levels of anti-



angiogenic thrombospondin-1 (TSP1). Apigenin mitigated the TSP1 loss due to UVB exposure in the epidermal keratinocytes in culture and in mouse skin. Moreover, it alleviated angiogenic and proliferative responses to UVB radiation in the skin *in vivo*. The regulation of TSP1 by apigenin was post-transcriptional. TSP1 mRNA decreased in UVB-treated cells and remained low in the presence of apigenin. In contrast, apigenin increased translational activity of existing TSP1 transcripts; apigenin increased cytosolic localization of the RNA-binding protein Human antigen R (HuR) and HuR association with TSP1 mRNA, causing enhanced translation and high TSP1 protein levels. These results demonstrate a novel effect of apigenin in the skin, by which apigenin controls UVB-induced carcinogenesis.

Space Radiation-Associated Lung Injury (SPRALI) in a Murine Model



Despite progress in identifying radiation exposure health risks to astronauts during space travel, the long-term effects of space radiation (SR) on the pulmonary system are unknown. [Christofidou-Solomidou and colleagues](#) used a murine risk projection model to investigate the impact of a single, low-level

exposure to SR (protons, ^{56}Fe , ^{28}Si or gamma radiation) on lung, 2 years post-irradiation. SR exposure led to dose-dependent, emphysema-like air space enlargement accompanied by reduced systemic blood oxygenation. Additionally, all exposures caused mild inflammation with prominent lung cellular injury, oxidative stress and

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apoptosis, impaired repair and accelerated senescence. Proton exposure was associated with the most dramatic changes in lung remodeling, despite much lower doses of radiation exposure compared to cancer radiotherapy. This study prompts further investigations into the need for lung-protective countermeasures for manned deep space missions and for mitigation of adverse normal tissue side effects of cancer radiotherapy.

SPOTLIGHT: CHIN-YO LIN



Chin-Yo Lin, PhD is a member of the Center for Nuclear Receptors and Cell Signaling in the Department of Biology and Biochemistry at the University of Houston. He received his BSc in microbiology from Brigham Young University and his PhD in cancer biology from Harvard University. His research focuses on nuclear receptors and their functions in cancer prevention and treatment,

including the roles and mechanisms of action of estrogen receptors in breast cancer and liver X receptors in pancreatic cancer. Using a combination of genomic and molecular approaches, he discovered a novel transcriptional regulatory mechanism by estrogen receptor in repressing the expression of some target genes and received an NCI-sponsored RO3 award the entitled, [*Alternative Mechanisms of Selective Estrogen Receptor Modulation in Cancer Prevention*](#). His group recently showed that activating liver X receptors, a target of phytosterols, can slow the growth of pancreatic cancer cells. He is actively pursuing the translation of these discoveries into cancer prevention strategies.

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DID YOU KNOW?

You Can Eat the Drumstick



Hailed as the "miracle tree," oil from the tropical plant *Moringa oleifera* was used for cosmetic and skin preparations by the ancient Egyptians. Today, all parts of this plant are eaten, mostly in Asia, Africa and the Caribbean. Popularly known as

the drumstick tree, for its green seedpods, moringa can be prepared in much the same way as green beans and the result is an asparagus-like flavor, yum. The fresh leaves are rich in carotenoids, flavonoids, and isothiocyanates and are a good source of protein and vitamins A and E.

The seeds are roasted, boiled and/or pressed to produce edible oils; the roots are often ground to make a horseradish-like condiment. Even the flowers can be consumed and it is thought they have aphrodisiac substances. Don't be surprised to see the dried leaves used as a tea, a powder in smoothies or as a thickening agent in soups or sauces.

Next time you are at an Indian restaurant try the South Indian dish, [sambar](#) and be sure to *eat the drumstick!*

References

Int. J. Mol. Sci. 2015, 16, 12791-12835; doi:10.3390/ijms160612791

<http://www.nutrition-and-you.com/moringa.html> 

<http://www.themoringa.com/nutritional-values> 

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Your friends at the Nutritional Science Research Group

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