

# C·A·F·F·R·E



Center for Advanced Functional Foods Research and Entrepreneurship

*From Crops to the Clinic  
to the Consumer*



**THE OHIO STATE UNIVERSITY**

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

Supported by

**OARDC**

Ohio Agricultural Research and Development Center

## What is CAFFRE?

CAFFRE is an interdisciplinary center comprised of a diverse group of scientists, medical professionals and policy experts representing 8 colleges on the OSU campus. Since 2005, members of this cohort have collaborated on functional foods research resulting in more than \$19M in nationally sponsored projects and over 300 publications on food and health.

### CAFFRE Leadership



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The CAFFRE mission is to serve as a catalyst for research and development of novel functional foods that enhance health.

## CORE ACTIVITIES

### SCIENTIFIC SESSIONS

CAFFRE seminars provide an opportunity for faculty to network, present current research and discover where investigators might find opportunities for collaboration.



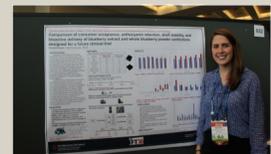
### RESEARCH

In collaboration with the Molecular Carcinogenesis and Chemoprevention (MCC) program and the Cancer Control program within OSU's Comprehensive Cancer Center (OSUCCC), CAFFRE has awarded over \$400,000 to multidisciplinary research teams, with the intent to generate data that can be used for larger external grants and promote team science.



### EDUCATION

With four colleges on the Columbus campus supporting food and nutrition programs, CAFFRE has ample opportunities to engage students in functional foods research. Student support includes travel grants to attend the prestigious John Milner Nutrition and Cancer Prevention Practicum, participation in the annual Arnold Expo Nutrition Challenge and oversight of USDA/NIFA National Needs Fellows engaged in food and nutrition for cancer prevention.



### INDUSTRY PARTNERSHIPS

CAFFRE expertise is frequently sought by the food industry, which is increasingly interested in novel functional food product development.



### COMMERCIALIZATION

CAFFRE has successfully commercialized several products, including soy-tomato juice, soy almond bread and black raspberry confections. Bringing functional foods from the lab to the consumer supports our goal of enhancing human health.



# The Impact of CAFFRE

The collaborative nature of CAFFRE allows investigators of different disciplines to generate funding that may not be accessible or competitive for single investigators. Seed funding provided by CAFFRE has led to over \$19M in federally funded projects since 2005. Here are some of our current success stories.

## HARVESTING THE HEALTH BENEFITS OF TOMATOES



CAFFRE researchers from food science, human nutrition and the James Cancer Center received both USDA and NIH funding to study tomato products containing soy. From growing tomatoes with an ideal carotenoid profile to developing a market-ready, beverage with optimal phytochemical levels, this project looked at the entire development process of bringing a functional food to market. The soy isoflavone-fortified tomato juice is well tolerated, improves blood lipid levels and antioxidant status, and slowed PSA doubling time, a biomarker of prostate cancer progression.

## CITRUS FRUITS TO COMBAT CANCER CACHEXIA



Cachexia is a wasting syndrome associated with cancer and other chronic diseases that leads to an overall decline of health. Dr. Martha Belury, Professor of Human Nutrition, and her team have studied the bioavailability of dietary naringenin, a natural compound found in fruits such as grapefruits and oranges, and its impact on muscle-wasting and inflammation. Initial seed grant support from CAFFRE has led to a \$450,000 NIH-funded exploratory grant (R21) looking at the loss of adiponectin as a contributing factor in cancer cachexia, with additional support for the testing of naringenin as a dietary supplement that prevents muscle loss in aging mice.

## THE FIGHT AGAINST ORAL CANCER: THE POWER OF THE BLACK RASPBERRY

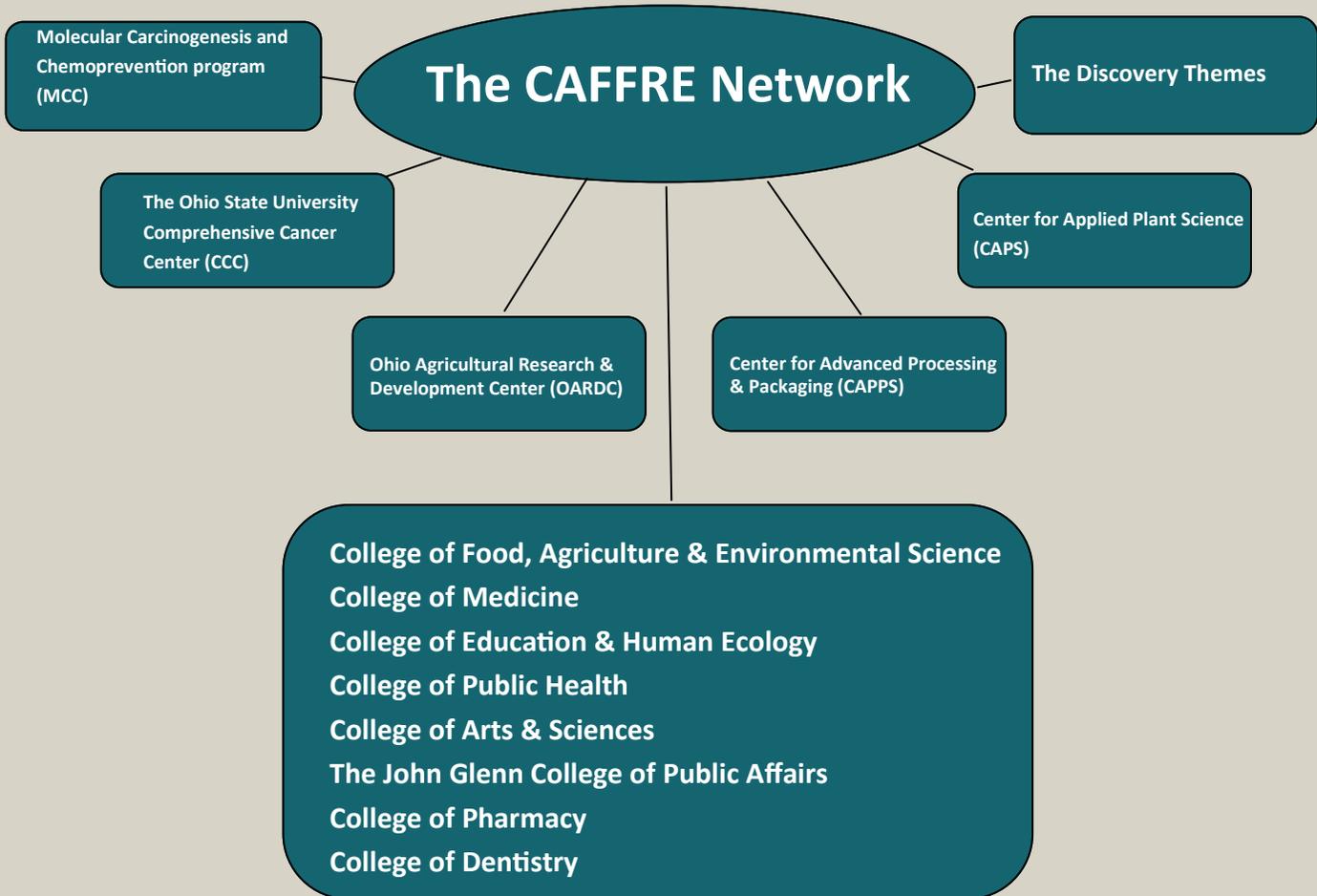


Oral cancer affects thousands of people each year. A team led by Dr. Chris Weghorst from the College of Public Health received CAFFRE support to look at the availability of phytochemicals from black raspberries after interaction with saliva and how this may benefit oral health. Initial data supported a successful \$3.1M NCI - funded research project (U01) that uses a black raspberry nectar to restore oral microbiomes damaged by tobacco use and prevent cancers of the mouth. This project brings together expertise from food science, dentistry and the James Cancer Center to tackle a significant public health issue.

## A BREAD TO BEAT PROSTATE CANCER



An active area of research for CAFFRE is the health benefits of soybeans. Soy is a rich source of bioactive phytochemicals that have demonstrated health promoting properties. Preliminary data generated through CAFFRE funding indicates that dietary soy and its isoflavones may prevent cancer progression by reducing inflammation. A \$1.9M NIH-funded study is now looking at the impact of soy components on the immune system and its role in regulating prostate cancer development using a soy bread invented by CAFFRE researchers.



### Representative Publications

***Dietary Black Raspberries Impact the Colonic Microbiome and Phytochemical Metabolites in Mice***, Molecular Nutrition & Food Research, February 2019

***Novel Tomato-Soy Juice Induces a Dose-Response Increase in Urinary and Plasma Phytochemical Biomarkers in Men with Prostate Cancer***, The Journal of Nutrition, January 2019

***Cruciferous Vegetables, Isothiocyanates, and Bladder Cancer Prevention***, Molecular Nutrition & Food Research, August 2018

***Identification of an Epoxide Metabolite of Lycopene in Human Plasma Using 13C-Labeling and QTOF-MS***, Metabolites, March 2018

***Plasma Metabolomics Reveals Steroidal Alkaloids as Novel Biomarkers of Tomato Intake in Mice***, Molecular Nutrition & Food Research, December 2017

***Raspberry ketone fails to reduce adiposity beyond decreasing food intake in C57BL/6 mice fed a high-fat diet***, Food & Function, April 2017

***Application of a low polyphenol or low ellagitannin dietary intervention and its impact on ellagitannin metabolism in men***, Molecular Nutrition & Food Research, March 2017

