nutrition science
DIGEST
Improving health and overall quality of life has become a prominent focus at Purdue with the creation of the College of Health and Human Sciences. It brings together nine departments, the establishment of the Indiana Clinical and Translational Sciences Institute which partners Purdue with Indiana University School of Medicine and the University of Notre Dame, and the launch of the Women’s Global Health Institute. These dreams became realities partly through the development of Discovery Park, which over the last decade brought high-end technology tools to life science and instilled an interdisciplinary and entrepreneurial culture on campus.

As President Mitch Daniels leads Purdue closer to his goals for the best education for the value, Nutrition Science is poised to be a campus leader. The department has been at the top for external grants per faculty for more than five years. A preeminent review team profiled Nutrition Science as competent, collegial, collaborative and rigorous. We have three distinguished professors, four University scholars, a member of the Institute of Medicine of the National Academies, and the department proudly claims this year’s research award winners for both the College of Health and Human Sciences and the University.

Purdue is strengthening its capacity through competitive cluster hires. Of the six themes selected for faculty growth, the Department of Nutrition Science was part of two: 1) epigenetics and chromatin biology and 2) public health and chronic disease. We also were given a faculty position to build our Nutrition Science major. At the same time, the department has acquired more space and the University selected the department for several renovation projects out of the few available from committed state dollars. Thus, we are feeling very appreciated in this difficult economic era.

I invite you to take a look inside to understand why Nutrition Science at Purdue is a good place to partner and invest.

CONNIE WEAVER
Head and Distinguished Professor
Department of Nutrition Science
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LEARNING
The signature areas of our Department of Nutrition Science — Calcium, Vitamin D and Bone Health; Appetite, Metabolism and Obesity; Cancer Prevention; and Botanicals and Bioactives for Health—have a major impact on student training, as do the research centers that have sprung from these signature areas. Upper-level graduate courses in polyphenols, bone biology, ingestive behavior, nutrition and cancer prevention, nutrition and genetics, and obesity reflect signature area expertise. This richness extends to undergraduates, too, as faculty members present special knowledge in undergraduate courses and mentor honors research students. Department strengths in research centers and signature areas greatly aid us to attract high-quality graduate students.

Other learning opportunities for our students are plentiful. The Interdepartmental Nutrition Program Seminar series provides regular opportunities for graduate and undergraduate students to hear external speakers, as well as the Fuqua seminars of our own graduate students. Training with four visiting scholars per semester is a feature of the Special Topics in Ingestive Behavior Seminar, and funding is available through the Avanelle Kirksey Fund for graduate students to travel to another university for short-term training in a new research technique.

Nutrition Science faculty lead several training grants. The Ingestive Behavior Research Center (IBRC) was awarded obesity training grants from the National Institutes of Health (NIH) and the United States Department of Agriculture (USDA), in addition to a postdoctoral training award. Dorothy Teegarden, professor, is director and primary investigator of the NIH-funded Cancer Prevention Internship Program. The object of this campus-wide program is to develop and test a curriculum for cross-training students in the diverse field of cancer prevention with application to other interdisciplinary research topics. In addition to a weekly class, four graduate students and 10 undergraduates are supported for a year and a full-time summer research experience, respectively.

New opportunities for undergraduate students are flourishing. Study Abroad has become an important initiative in the department, and students are able to spend a semester in a high-quality nutrition/dietetic program at Dublin Institute of Technology in Ireland or Curtin University in Perth, Australia. The department also offers a spring break or Maymester trip for the Culture and Cuisine of France led by Elsa Janle, associate research professor. The number of students who take advantage of these opportunities is growing, encouraged by those who have done it.

A clinical education building for Health and Human Sciences is a new concept for training of interdisciplinary teams of health pre-professionals, including dietetic; nutrition, fitness and health; medical; nursing; psychology; and speech, language and hearing students.

DISCOVERY
Nutrition Science faculty continues its leadership roles in interdisciplinary research on and off campus. Solving complex problems requires many skill sets from working in multidiscipline teams and training future professionals to functioning as an entrepreneur.

An unprecedented effort in building infrastructure for clinical and translational research was created through a partnership with the Indiana University School of Medicine and the University of Notre Dame, with funding from the NIH and
participating institutions. Faculty in Nutrition Science provides leadership as Purdue Principal Investigator, the Director of the Purdue Clinical Research Center, the lead of the predoctoral training program and many other roles. This is the first major partnership among the major research institutions in the state. The Women’s Global Health Institute (WGHI), led by Nutrition Science and Bindley Biosciences in Discovery Park, focuses high-technology applications on women’s health prevention, research and training. The WGHI is home to the International Breast Cancer and Nutrition (IBCN) collaboration aimed at preventing breast cancer. International teams have been formed from every continent.

**ENGAGEMENT**

A new translational model of engagement gives fresh flexibility to our land-grant mission to serve the community. In this model, all faculty members are encouraged to take an Extension assignment for a semester and work with our professional Extension staff to translate important research into community programs. This philosophy creates a full circle for health programming across the state as Extension educators are able to become research partners as well as communicate content. For example, this model is taken a step further in the Community Health Education Program (CHEP) arm of the Indiana Clinical Translational Science Institute (CTSI), where the goal is to translate discoveries in the laboratory to bedside and beyond bedside to engage community partners.

Purdue’s talented exhibit staff has taken departmental expertise on the road with two state fair exhibits. The Bone Zone Carnival of Healthy Choices, a reflection of our Calcium, Vitamin D and Bone signature area, was a hit at the 2008 Indiana State Fair. A smaller version of the exhibit traveled to Capitol Hill for the Agricultural Science and Education Exhibition, where it received the Serving the Nation People’s Choice Award. Another exhibit, “To My Plate and Beyond,” was created for the 2012 and 2013 state fairs. This engaging exhibit will follow the Bone Zone and travel to museums and other children’s venues, thus continuing to educate for years to come.

Engagement is also a component of new research initiatives. The biennial international symposium of the IBRC and annual international symposium of the IBCN are bringing the world to Purdue and taking Purdue to the world.

The Nutrition Science Hall of Fame has become a highlight of the departmental year, as alumni and friends are honored for career achievements and contributions. The May Conference and Spring Fest are annual ways to touch external audiences. Twice yearly, research symposia are presented to our corporate affiliates, now representing 25 companies or entities.

Engagement means to stay abreast of the times with new delivery systems, as it is critical to connect with intended audiences through the media they use. From webinars transmitting nutritional health content to Extension educators, to a YouTube video on Vitamin D content developed by Professor Jim Fleet and Specialist Lisa Graves, we utilize new media. The latest technology of the ZipTrip connected thousands of middle school students to learn about nutrition science.

Future plans include disseminating research results and programming via social media and emerging technologies to effectively communicate the messages.

**ON THE HORIZON:** Prof. Jay Burgess is part of pioneering use of new Discovery Learning classrooms through project IMPACT (Instruction Matters: Purdue Academic Course Transformation). Students will flip high-quality online lectures with problem-solving in small groups, a program that could revolutionize how large enrollment classes, such as NUTR 303, are taught.
A PLACE IN HISTORY

Whether it is an honor badge or a championship trophy, most summer camps and school activities offer children ample opportunities for recognition. Youngsters participating in Purdue’s calcium studies, however, earn something even greater — a place in history.

For more than two decades, adolescents participating in Camp Calcium have helped Connie Weaver, department head and distinguished professor, and her team of researchers study calcium metabolism during puberty. In between sports and educational activities, the children have eaten carefully designed diets.

By controlling the youngsters’ calcium intake, the team has determined how calcium requirements are affected by race, gender, age and salt intake. Their work has already paid off; the Institute of Medicine of the United States National Academy of Sciences used their research on Caucasian girls as a foundation for setting dietary calcium requirements for adolescent girls. More recommendations based on Purdue’s research could follow. Now, instead of simply reminiscing on their summer camp fun, youngsters can say they helped shape the health of future generations.

SIGNATURE AREA

CALCIUM, VITAMIN D AND BONE HEALTH

Topics related to calcium and vitamin D are two of the most funded research areas because of the broad relationship of these nutrients to health and the prevalence of deficiencies in the United States and around the world. Our expertise in calcium and vitamin D spans more than two decades, and started with their traditional role in bone health but now extends to other areas such as cancer, hypertension, weight control and diabetes.

With the aging population, evidence of fracture continues to grow. Half of women over age 50 will experience a fracture. Half of peak bone mass is acquired during puberty, making that an important period for lifestyle intervention to help avoid later-in-life problems. Although current calcium and vitamin D requirements are based on bone outcomes, there is also growing support for their relation to other organs and diseases.

Judging from the one-size-fits-all children’s multivitamins that have been on the market for years, it’s easy for parents to assume all children need the same amount of calcium. In reality, children at various ages require different amounts of calcium to build optimal peak bone mass. In addition, kids from different racial groups use calcium differently and have different needs — for example, young Asian girls need less dietary calcium than young white girls to build strong bones. Those are the conclusions that Connie Weaver, department head and distinguished professor, and her research group have been drawing from their extensive studies on children and adolescents. Through “Camp Calcium” (see sidebar), the group helps to establish dietary guidelines for Hispanic adolescents. Hispanic women are especially vulnerable to fracture, and their vulnerability likely begins at puberty.

The racial difference in calcium needs has motivated James Fleet, distinguished professor of nutrition science, to study the role of genetics to determine dietary calcium needs. For years, nutrition scientists have wondered whether dietary requirements can be personalized — but this has been more of a promise than a reality. Fleet and his group use mouse genetics to determine the mechanistic basis for individual and racial differences in the ability to efficiently absorb calcium from the diet. His work also reveals why some individuals lose bone when they consume a low-calcium diet while others do not. This basic work serves as a foundation for future studies in human populations.

One large barrier to meeting calcium needs is that many people avoid calcium-rich dairy foods because they can’t digest the milk sugar lactose. This problem, called lactose malabsorption, affects one-quarter of the population in the U.S. and three-quarters of the world population. “Most malabsorbers can consume some dairy products,” says Dennis Savaiano, professor of nutrition science. “This is especially important in the United States, where three-quarters of dietary calcium comes from dairy, and adequate calcium intake depends on dairy food consumption.” His laboratory has identified ways that lactose malabsorbers can include calcium-rich dairy foods into their diet, including developing a microbial enzyme that assists lactose digestion when added to yogurt.

ON THE HORIZON: Katie Hill Gallant brings us into the world of nutrition in patient populations to expand our studies of healthy populations.
Overweight and obesity are arguably the most pressing nutrition-related public health problems in the United States and globally. The problem is complex; and it requires multifaceted and probably individual-based approaches to address. Multiple faculty researchers in this signature area are investigating how the environment, behavior and physiology interact to determine energy balance.

Dietary approaches to prevent and manage body weight are often unsuccessful, in large part because they fail to address issues that compromise diet compliance such as hunger, satiety and the desire to eat. The importance of exercise in weight management and optimal health has only recently gained attention and remains poorly characterized. A critical deficiency in knowledge and practice exists regarding how appetite and exercise interact to influence food choice, metabolism and energy balance. While it is now widely accepted that energy balance determines body weight, it is also clear that food choices to manage body weight also influence health and quality of life. Researchers in the Appetite, Metabolism and Obesity signature area seek to understand the integration of these factors.

One line of study in the laboratory of Rick Mattes, distinguished professor of nutrition science, focuses on the role of oral fat detection on lipid processing in humans. Research increasingly supports that dietary fat is detected not just by its textural and olfactory properties, but by the taste system itself. If true, this work raises the possibility that the sense of taste is defined by a wider array of primaries (not just sweet, salty, sour, bitter and umami), challenging conventional wisdom. However, more to the point of nutrition, this work has documented that simply detecting fat in the mouth alters how ingested fat is digested and used in the body. Oral exposure leads to rapid mobilization of fat stored in the intestine from the previous meal into circulation resulting in a rise of triglycerides with uncertain implication for cardiovascular disease risk and energy metabolism. It may also alter clearance of fat from the blood and this could be affected by the palatability of food. Similar effects are not observed based on odor or irritation cues provided by dietary fats. Whether fat is detected differently by lean and obese individuals and evokes different responses in these two groups is not resolved, but it is an active area of inquiry in the department.

Pulses, or legumes, such as beans, peas, lentils and chickpeas, are rich in nutritional factors that help promote satiety, including fiber, resistant starch and protein. Research done by Megan McCrory, assistant professor of nutrition science, indicates consuming at least one-half cup per day helps individuals stick with a reduced energy diet and reduces insulin resistance (as assessed by a clinical marker) independent of weight loss. Her laboratory also does meal pattern research and explores how different eating patterns and diet composition contribute to overeating and weight gain and how they may best be managed for weight loss and keeping the weight off. “We are also interested in how personality, attitude and psychological disposition may affect eating patterns and vice-versa,” says McCrory.

Kimberly Buhman, associate professor of nutrition science, is seeking to understand how diet, genetics and drugs influence the absorption of dietary fat. Dietary fat contributes to health problems such as obesity, diabetes and heart disease by providing energy, affecting insulin sensitivity and regulating blood lipid concentrations. Recent research highlights an important role of lipid droplets in cells of the intestine in absorption of dietary fat. Lipid droplets were long thought to be inert storage vesicles, but they are now well recognized as cellular organelles with important and diverse functions.

Understanding how diet, genetics and drugs influence lipid droplet metabolism in the process of dietary fat absorption may lead to identification of novel targets for future therapies to prevent and treat obesity, diabetes and heart disease.

Wayne Campbell, professor of nutrition science, has a special emphasis on geriatric nutrition, muscle strength and muscle function. His work focuses on protein needs and the impact of strength training to combat muscle wasting as we age. How much protein does it take to stay strong in aging? “Our research suggests that older people who habitually consume the Recommended Dietary Allowance for protein experience subtle declines in skeletal muscle size. Thus, we seek to find the optimal protein intake for older and elderly people to consume,” says Campbell. The impact of food form on appetite and the effectiveness of compounds, such as whey protein, also are of research interest.

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**SIGNATURE AREA**

**APPETITE, METABOLISM AND OBESITY**

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**ON THE HORIZON:** Kim Buhman’s work (see article) suggests that increasing our understanding of fat absorption and metabolism may lead to targeted strategies for treating obesity, cardiovascular and metabolic diseases.
Bariatric surgery is on the rise in the United States, with more than 200,000 each year. This popularity is not due to cosmetic corrections, but rather an attempt to control obesity-related diseases, such as diabetes, cardiovascular disease, inflammation and others. But what do we know about the long-term nutritional consequences of having less digestive track for absorption of nutrients? Are we trading one set of health problems for another?

Nana Gletsu-Miller, assistant professor of nutrition science, focuses on long-term nutritional consequences of bariatric surgery, the most effective way to lose weight for those who are severely obese. Many patients also become free of Type 2 diabetes and other obesity-related health issues after surgery. Nutrition becomes compromised in many gastric bypass patients. Deficiencies in iron, vitamin D and calcium are common (with prevalence estimated at 30% and 50%, respectively). To address this issue, Gletsu-Miller studies the best ways to monitor and treat patients. Copper deficiency occurs with 1 in 10 of the patients measured though deficiency in copper is not common in the general population because it is found in food sources such as nuts, shellfish, green leafy vegetables, even chocolate! Copper absorption occurs in the upper part of the intestine and is greatly reduced by gastric bypass surgery. In many cases, copper deficiency goes untreated because patients and their doctors do not recognize the problem. This is a serious outcome, as copper deficiency over the long term can lead to permanent damage to the muscles and nerves, resulting in paralysis. This research also has implications for mineral deficiencies in developing countries and other groups who may be malnourished.
WHAT WE EAT MAKES A DIFFERENCE

Mario Ferruzzi, professor of nutrition and food science, investigates food and dietary factors that impact polyphenol bioavailability and metabolism. Both epidemiological and preclinical evidence support the notion that select grape-derived polyphenol forms may be protective against Alzheimer’s disease (AD). A key consideration for exploring these associations and translating preclinical findings is defining specific biologically relevant polyphenol forms with Alzheimer’s modifying activities. Interestingly, almost all of the bioactive polyphenol forms found in the body are not directly available through our food supply, but are derived from metabolism of precursor dietary polyphenol “backbones.”

Ferruzzi investigates the complex nature of polyphenol bioavailability and metabolism including the modifying effects of factors such as food composition, dietary patterns, dose and dose regime, as well as nutritional and/or patho-physiological status. In collaboration with Elsa Janle, associate research professor of nutrition science, the Ferruzzi laboratory has demonstrated that grape polyphenol bioavailability is adaptable and can be enhanced following repeated oral exposure to grape polyphenols. Further, select polyphenol metabolites that have demonstrated AD modifying activities, including those derived from epicatechin, resveratrol and quercetin, can cross the blood-brain-barrier and accumulate at meaningful physiological levels (nM to uM). Efforts by Ferruzzi and colleagues continue to advance our knowledge on biologically relevant polyphenol forms with Alzheimer’s modifying activities. Interestingly, almost all of the bioactive polyphenol forms found in the body are not directly available through our food supply, but are derived from metabolism of precursor dietary polyphenol “backbones.”

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ON THE HORIZON: Metabolites from dietary constituents formed by metabolism or gut microbiota are being explored as effectors of benefits to health.

While not exactly promising to be the famed Fountain of Youth, many herbal supplements claim to help prolong our life by preventing and treating age-related diseases. Americans buy into the dream at the rate of $5 billion a year on dietary supplements. Despite the popularity of herbal supplements, the efficacy and effectiveness is an evolving study.

The use of botanicals has greatly increased; in some cases, without sufficient concern for safety of intake. Research technology (led by Purdue’s Nutrition Science in collaboration with the University of Alabama-Birmingham through the National Institutes of Health (NIH) Botanicals Center for Age-Related Diseases) was used to partner with Mt. Sinai Medical School in 2006. The partnership created an NIH Center for Excellence Research for grape-derived polyphenols and Alzheimer’s disease.

“We no longer think of botanicals as a source of antioxidants but as a source of bioactive metabolites that activate intracellular cell signaling pathways that reduce chronic disease,” says Connie Weaver, distinguished professor and department head.

This signature area includes scientists from nutrition, science, pharmacy, agriculture, veterinary medicine, physics and chemistry. The Accelerator Mass Spectrometer in the Purdue Rare Isotope Measurement Laboratory in the Department of Physics is one of only two in the United States, and in Discovery Park our capacities in bioavailability and tissue distribution put us in a unique position to study efficacy and safety of botanicals and bioactives.

Purdue’s distinguished reputation in nutrition and pharmacognosy research dates back many decades. Here’s a sampling of the latest research:

Oxidative stress is a component of age-related diseases such as diabetes and Alzheimer’s disease. Elsa Janle, associate research professor, is investigating the potential of green tea and other bioactive-containing products on modulating the effects of oxidative stress on protein damage. Determining the potential of compounds that might be beneficial in prevention of Alzheimer’s disease to cross the blood-brain barrier is a major focus of this investigation in animal models.

Hormone therapy has been largely abandoned and current osteoporosis therapies are under scrutiny for their side effects. This has prompted great interest in safer dietary interventions for reducing age-related bone loss. Purdue developed a rapid screening method for testing the effectiveness of interventions to stimulate bone formation or reduce bone resorption in humans. A rare isotope, Calcium-41, is given to postmenopausal women, and after bone is labeled, urinary excretion measured by Accelerator Mass Spectrometry indicates the amount of bone loss and how this is affected by diet or drug interventions. Using this technique, dietary supplements on the market were determined to be effective or ineffective at reducing age-related bone loss.

Microorganisms in the gut aid the absorption of nutrients. Some dietary fibers that are resistant to digestion in the upper intestine act as food for these microorganisms called “pre-biotics,” and can improve mineral uptake and confer other health benefits. Several of the nutrition faculty have partnered with microbiologists to study these effects.
cancer is now the leading cause of death for those under 85 years of age in the United States. Many adults know they can help reduce their risk of heart attack through changes to their diet and exercise, yet they feel helpless to stop cancer. But thanks to a growing body of knowledge that Nutrition Science researchers are helping to develop, cancer prevention may be possible in the future.

It is increasingly clear that states of abnormal cell growth and death regulation are found in a wide variety of disease states including cancer. "It has been suggested that nutrients play a prominent role in cancer prevention, but how they regulate cells is still unclear," says Dorothy Teegarden, professor and associate dean for research; the lead for Cancer Prevention and control, Oncological Sciences Center (OSC); and director of the Cancer Prevention Internship Program.

The importance of prevention research is growing, and the American Cancer Society estimates 50% of cancer deaths could be prevented through cancer prevention strategies by modifying lifestyle factors and appropriately using available screening for early detection of cancers. Says Teegarden, "Any substantive progress in research in these areas will aid in designing preventive strategies and improve the quality of life for those suffering from these diseases as well as reduce the associated health care costs. Understanding the role of cell growth and death decisions will clearly aid in designing recommendations to prevent specific diseases."

The International Breast Cancer and Nutrition (IBCN) project is a new initiative in cancer prevention led by Sophie Lelievre, courtesy associate professor of basic medical sciences, Connie Weaver, distinguished professor of nutrition science and department head, and Dorothy Teegarden. The project aims to discover diet and epigenetic interactions that prevent breast cancer by studying global diversity in diet and epigenetics.

World-wide participation has been spurred by the creation of an annual international symposium, the first at Purdue (October 2010) and the second in Rennes, France (October 2011), with strong representation worldwide. The project also has full support from Purdue, as well as involvement by NIH and support from the World Health Organization. Currently, there are seven countries partnering in the project.

Silvia Stan, assistant professor of nutrition science, is extending her work with dietary compounds, such as those in garlic that may prevent pancreatic cancer, one of the most deadly of all cancers. She is also exploring the basic mechanisms of how garlic works.

Teegarden’s work shows that vitamin D prevents breast cancer by inhibiting the shift in energy metabolism that occurs in cancer cells that allows them to grow out of control.

A unique mouse model, developed in Professor of Nutrition Science James Fleet’s laboratory, will greatly enhance the ability to study prevention of colon cancer, particularly by environmental influences such as diet.

CHRONIC INFLAMMATION AND CANCER

Chronic inflammation and its impact on degenerative diseases is much in the news. The inflammation story has grabbed the attention of both serious scientists and the popular health world alike. Associate Professor of Nutrition Science Qing Jiang and her lab are focused on chronic inflammation-related diseases, including cancer. She studies the molecular mechanism of inflammation-associated diseases as well as explores prevention and therapy of these diseases using nutrition factors, including natural forms of vitamin E and combinations of vitamin E forms and other antioxidants.

Jiang’s research would indicate that the form of Vitamin E makes a major difference in the research outcome. "Among different forms of vitamin E, only alpha-tocopherol, the major form of vitamin E in tissues and most supplements, has been extensively studied. Other forms were mostly ignored. We have recently discovered that some non-alpha forms of vitamin E have unique properties important to improving human health," says Jiang. Gamma-tocopherol, not alpha-tocopherol, inhibits growth and induces cell death in prostate and lung cancer cells in their studies, but has no effect on normal prostate epithelial cells. Her group recently discovered new metabolites from vitamin E, which showed even more potent anti-inflammatory activities than unmetabolized vitamin E.

Because of these promising results, she adds, "We are investigating the molecular interaction between vitamin E forms, new vitamin E metabolites, and various key enzymes and testing the anti-cancer potential of vitamin E forms in various cancer models." In addition to her work with vitamin E forms on cancer cells, her laboratory is also looking at their impact on airway inflammation in asthma.

ON THE HORIZON: Several faculty members are learning to explore the effect of diet on epigenetics. Diet and gut microbiota micro RNA-induced changes in metabolism are on the horizon. There is a new dimension to the statement, "You are what you eat!"
It is impossible to separate food from nutrition when concerned with health. Foods supply nutrients, toxins and non-nutritive substances with multiple health implications and sensory properties that influence behavioral and physiological responses to them. Nutrition science attempts to understand these processes and develop approaches to exploit them to optimize health.

Projects are underway exploring the interfaces between foods, metabolism and health outcomes. One example is work on the role of food form on nutrient and energy bioaccessibility and bioavailability. Physical and chemical properties of foods determine the efficiency of absorption of food constituents. This has been documented by departmental faculty exploring the role of nuts on appetite and energy balance. Controlled feeding trials reveal important implications for energy balance, that 5-20 percent of the energy from nuts is not absorbed into the body. Other work in the department demonstrates nuts may reduce risk for chronic diseases such as heart disease and diabetes. “The findings that these benefits can be realized without promoting weight gain by nut consumption have altered dietary recommendations about their inclusion in diets,” says Rick Mattes, distinguished professor of nutrition science.

The sensory properties of foods are among the strongest determinants of food choice. However, sensory stimulation also evokes physiological responses that modulate the processing of food in the gastrointestinal tract and the utilization of nutrients in the circulation and peripheral tissues. This evidence, coupled with recent findings that "taste" receptors are present throughout the gastrointestinal tract (especially in conjunction with endocrine cells) and are stimulated by high intensity sweeteners, has raised new questions about the safety and efficacy of these widely used products for weight management. Studies by Mattes and Jim Daniel, associate professor of nutrition science, are exploring properties of high intensity sweeteners and their health impacts.
NUTRITIONAL BARGAIN?

A salad dressing labeled “reduced fat” or “low fat” sells product in our weight-conscious culture, but it might not be a nutritional bargain. In a human trial, participants were fed salads topped off with saturated, monounsaturated and polyunsaturated fat-based dressings and had their blood tested for absorption of fat-soluble carotenoids — compounds such as lutein, lycopene, beta-carotene and zeaxanthin. Those carotenoids are associated with reduced risk of several chronic and degenerative diseases such as cancer, cardiovascular disease and macular degeneration. “If you want to utilize more from your fruits and vegetables, you have to pair them correctly with fat-based dressings,” says Mario Ferruzzi, professor of nutrition science. “If you have a salad with a fat-free dressing, there is a reduction in calories, but you lose some of the benefits of the vegetables.”

Fish4Health™

Advice for Pregnant or Nursing Women, Women Who May Become Pregnant & Children (2-6 years)

Why Eat Fish?

How Much Fish to Eat?

Fish Consumption Advice
The IBRC was organized at Purdue to promote and coordinate interdisciplinary collaborations among laboratories that investigate the environmental and biological controls of food and fluid intake. The groundwork for the IBRC was laid in 1999, when students and faculty from the departments of Psychological Sciences and Nutrition Science and the Interdisciplinary Graduate Neuroscience Program initiated weekly seminars and journal clubs devoted to research on ingestive behavior and its disorders. The sharing of ideas and perspectives that occurred at these informal meetings led to research collaborations, new graduate student training opportunities, expanded course offerings and a biennial international symposium. Consequently, IBRC is gaining a national and international reputation.

“The IBRC is thriving and is often identified as a model for growing a center of excellence on campus,” says IBRC Director Rick Mattes. In fact, new faculty hires have identified collaborative interdisciplinary research opportunities fostered by IBRC as influencing their decision to choose Purdue.

THE THREE GOALS OF IBRC ARE:

1. To promote the highest caliber science in the field of ingestive behavior.

The scientist-in-residence program is bringing top-caliber ingestive behavior researchers to Purdue for extended training and interaction. The Center has organized on-campus meetings to promote collaborative IBRC research, including mini-retreats to brainstorm collaborative ideas and smaller faculty groups to discuss targeted research opportunities in the areas of meal patterning, lipid signaling and fetal origins of disease. Regular contact with the External Advisory Committee provides a continuing reference point for quality.

2. To build “in-reach” education and consultation activities focusing on IBRC-affiliated students and investigators.

The IBRC administers a NIH-funded training grant, Interdisciplinary Training in Signals Controlling Ingestion and Obesity. In 2002, a training grant from the USDA in obesity (Wayne Campbell, principal investigator) was awarded along with a second USDA training grant (Mario Ferruzzi, principal investigator) through the Interdepartmental Food Science Graduate program on “Exploring Foods to Enhance Health and Reduce Obesity” for training at the interface of Food Science and Nutrition. In addition to a number of advanced courses addressing human and animal feeding, a unique course, Special Topics in Ingestive Behavior, and Journal Club are critical training venues for students and faculty. The Journal Club focuses on graduate student and postdoctoral trainees as presenters to give them more experience in scientific communication. Graduate students, postdoctoral students and faculty from multiple departments regularly attend.

3. To develop “out-reach” initiatives that will support the education and professional needs of diverse external groups.

The IBRC website’s home page introduces visitors to the Ingestive Behavior Research Center and its goals, focus, scope of research and outreach. The Biennial IBRC International Symposium on Ingestive Behavior has been a great success. These symposia provide an opportunity to showcase the IBRC and the University. The last biennial international conference featured 25 internationally recognized experts on the topic of “Flavor and Feeding” assembled from the U.S., U.K., Netherlands and Australia, and more than 150 registered for the conference. The next conference will explore the effects of eating patterns on diet quality and energy balance. As has been the case for all conferences, presenter papers were published as a special issue of Physiology & Behavior. The Center’s faculty also speak regularly at professional and lay meetings and participate in engagement such as “ZipTrip.”

Prospective graduate students increasingly acknowledge IBRC as a significant factor in their decision to choose Purdue. “I think the scope of the research done by IBRC faculty attracted me to the program, and I haven’t been disappointed,” says Robin Tucker-Falconer, PhD candidate in the Laboratory for Sensory and Ingestive Studies. “Activities like Journal Club exemplify this. One week the topic might be on eating disorders, the next week we discuss brain imaging and appetite, and the week after that we might discuss how salivary proteins can serve as biomarkers.”
I was attracted to Purdue’s IBRC program because it is a strong interdepartmental program. Due to this interdepartmental cooperation, I am able to conduct research according to my interests in the Foods for Health concentration of Food Science under the guidance of a nutrition professor who has an adjunct appointment in Food Science. I am able to experience the best of both the Food Science and the Nutrition programs.

CHELSEY KEELER
First-year Graduate Student, Interdepartmental Food Science Graduate Program
CHEP

A key component of the Indiana CTSI is the Community Health Engagement Program (CHEP). CHEP acts as a link with Purdue Extension, the IU School of Medicine and University of Notre Dame. The Community Advisory Council of CHEP has more than 300 partners across the state. In each county of the state, Purdue Extension educators bring together the expertise and resources of Purdue to address the health needs in local, urban and rural communities. Through its work with local community health coalitions, Purdue Extension assists communities to identify priorities and then links them via CHEP to researchers. Purdue Extension educators are involved in at least 60 of these coalitions. A team has been created to build the capacity of these coalitions to create action plans and address health needs in their communities.

In 2007-08, 45 of the 92 counties in Indiana had established health coalitions and only 23 had developed and/or were implementing goals. By 2012, the number of coalitions had grown to 60, and 48 coalitions have developed and/or are implementing goals. This remarkable accomplishment is credited to facilitation by Purdue Extension’s outstanding partners in CTSI/CHEP, the Indiana State Department of Health, local health departments and the health care systems. With continued support, our goal for 2017 (based on a survey of counties) is to have 76 coalitions with 73/76 actively implementing goals. Thirty-five counties expect to have implemented interventions and conducted assessments of effectiveness by 2017.

INdiana CLInical AND translational sciEnCeS iNStitute (ctSI)

The Indiana CTSI is a statewide laboratory with a $25 million grant from the National Institutes of Health (NIH) and supplemented by matching funds from our member institutions. It is an infrastructure for innovative public and private partnerships with the goal to speed the transition of discoveries in the lab into new treatments and therapies in the health care system. As one of 61 regional “homes” for clinical and translational health established by the NIH, we also connect researchers and innovators in Indiana to others with a similar mission across the country.

As the only statewide translational hub in the national network, the Indiana CTSI is led by Indiana University, Purdue and the University of Notre Dame. Connie Weaver, department head and distinguished professor, serves as its deputy director. The Bionutrition Program of the CTSI is housed primarily at Purdue with some at the IU School of Medicine.

Translational research that carries discoveries from “bench to bedside” has been supported by $12.5 million in internal grants and awards. The CTSI has generated more than 80 full-time equivalent professional jobs in Indiana. Advancements and achievements through this research infrastructure include drug development projects aimed at diseases such as autism and osteoporosis, a multi-institute partnership to advance the fight against cancer and a device development program to assist people with Alzheimer’s.

CTSI’s research recruitment efforts connect patients with clinical research and contribute to community health projects in areas that range from downtown Indianapolis to southern Kenya. With all of our programs, we consider five essential components. They are:

Research: The Indiana CTSI is committed to accelerating translational research by providing researchers with resources and strategic mentorship to identify, evaluate and support innovative research. Our strong commitment to basic research is highlighted in vignettes throughout this report.

Community: Indiana CTSI’s Community Health Engagement Program (CHEP) fosters robust community engagement by creating novel programs in which participation flows from academia to the community and back again. Support structures include pilot programs in rural and global health research.

Education: The Clinical Investigation and Translational Education (CITE) program and the Translational Science Program of Indiana (TSP) offer training for the next generation of translational researchers through multidisciplinary team research approaches and hands-on clinical preparation.

Technology: Technology development and technology transfer are key objectives of the CTSI that are supported by public and private partnerships. The Access Technology Program (ATP) also improves translational research by encouraging investigators to incorporate novel technologies into their research program and facilitating ease of access to core services.

Partnership: The Indiana CTSI leverages the resources of the greater Indiana community by connecting to a broad array of resources from multiple partner institutions throughout the state of Indiana. The Indiana CTSI has not only begun to connect the translational research activities within our partner institutions, but also enables connections between other institutions funded by the Clinical and Translational Science Award of the NIH.

The Indiana CTSI is working to transform the things we do every day as scholars and researchers — to connect people to create new knowledge, new products and new ideas — and to do it faster and more efficiently.
Imagine preparing three meals a day for research subjects when every portion must be weighed on a sensitive research scale. This happens daily in the metabolic kitchen of Stone Hall. More than 8,500 meals are prepared in an average year. Diet analyses and counseling sessions are also available to Indiana CTSI researchers. The CTSI format has permitted new efficiencies in bionutrition support for clinical research projects that include a food component.

Amy Wright, research dietitian, facilitates the development of experimental protocols and controlled dietary menus with other CTSI-supported faculty and staff. She says, “I love the variety! In the past year, the types of studies, study protocols and study locations have expanded significantly as more researchers are discovering our services.” More than 20 dietary studies across the state are being supported. Research dietetics training has been provided for more than 80 undergraduate and graduate students.

Future planning is to prioritize CTSI funding on 1) mentoring investigators who need to develop research ideas, experimental designs and grants; 2) quality control of bionutrition services and facilities; 3) functional management of staff who are supported by service recharges or investigator grants; and 4) development of a dietary assessment center.
Launched in 2012, the Women’s Global Health Institute (WGHI) at Purdue is dedicated to improving women’s health worldwide throughout the lifespan. The vision of the WGHI is to drive new research paradigms in seeking proactive approaches for prevention and early diagnosis of diseases. The WGHI is built on the foundation of the exceptional research work at Purdue in the last three decades and the combined resources of the College of Health and Human Sciences (HHS) and Discovery Park. The strong technology, engineering, natural and social sciences create an innovative environment that distinguishes the WGHI from other advocacy-type women’s centers by focusing on research and training. We offer the hope of discovery with delivery to women around the world.

The WGHI focuses on four major areas of research. These areas were selected to integrate and synergize the ongoing research strengths across campus at Purdue on truly interdisciplinary topics.

The Focus Areas Include:

› WELLNESS
› NEURODEGENERATIVE DISORDERS
› BONE HEALTH
› WOMEN’S CANCERS

The WGHI will change the way women’s health is addressed. Rather than the classic medical model focusing on treatment, the Institute seeks proactive approaches in developing prevention methods including identifying populations at risk through biomarker discovery for pre-disease conditions, understanding behaviors that promote a healthy lifestyle, detection technology that will aid clinicians in early diagnosis, monitoring effectiveness of therapies and design plus delivery of drugs after disease onset.

Purdue has an infrastructure for studying disease prevention and development of biomedical technologies as well as an established network for community engagement through the NIH-funded Clinical and Translational Science Institute. Purdue’s Discovery Park houses platforms for interdisciplinary research and cutting-edge technologies. Purdue also has a strong track record in the selected focus areas including development of diagnostic tools for breast cancer progress, rapid screening methods for effective anti-bone loss interventions and development of the first Alzheimer’s disease drug.

ON THE HORIZON: Studying primary prevention provides the foundation for interventions that stop tumors from developing. Studying secondary prevention, where dietary preventions are implemented after cancer diagnosis or treatment, will help stop cancer from recurring or spreading.
Left to right: Dean Christine Ladisch, WGHI donor Susan Bulkeley Butler, HHS Student Council President Mara Gallo, Distinguished Professor and Department Head Connie Weaver

Linda Dolby with Aryn Dotterer holding her baby, Emelia
EXERCISE AFFECTS PROTEIN REQUIREMENTS OF ELDERLY

How does weight training help older adults maintain health and physical function? Is the current recommended dietary allowance (RDA) for protein adequate for older people to maintain their skeletal muscle? These are some of the questions addressed in the laboratory of Wayne Campbell, professor of nutrition science.

His research shows that regular performance of resistance exercises and a consistent diet with adequate amounts of high-quality dietary protein are two important ways for older persons to slow the progression of and treat sarcopenia, the age-related loss of skeletal muscle mass and function. Inadequate protein intake will cause adverse metabolic and physiological accommodation responses that include the loss of fat-free mass and muscle strength and size. “Findings from controlled feeding studies show that older persons retain the capacity to metabolically adjust to lower protein intakes by increasing the efficiency of nitrogen retention and amino acid utilization. But they also indicate the recommended dietary allowance might not be sufficient to allow the desired changes in body composition and muscle size with resistance training,” says Campbell. Moderately higher intakes of high-quality protein will help many older people retain or improve their muscles and health. Our new research is exploring how the quantity, sources, timing and patterning of protein intake can help adults of all ages improve their body weight, muscles, bones and health.

ON THE HORIZON: The need for bioinformatics and integrated analysis must grow to accommodate our studies of interactions of diet, gut microbiota and multiple tissues. Improved understanding requires embracing these complexities.

NUTRITION AND EXERCISE CLINICAL RESEARCH CENTER

The resourcefulness and creativity of Nutrition Science faculty and staff to utilize limited space in Stone Hall has been so successful for the past 20 years that we are bursting at the seams. Like a match to firewood, the opportunity to have a large new space in Stone Hall ignites our research capacities with great potential to address the intersection of nutrition and exercise.

One area with strong future potential relates to energy balance. Dietary approaches to prevent and manage body weight are mostly unsuccessful, in large part because they fail to address issues associated with hunger and satiety that sabotage diet compliance. The importance of exercise in weight management and health optimization has only recently gained attention and remains poorly characterized. We need to know much more about how appetite and exercise interact to influence food choice, metabolism and energy balance; areas we are well-equipped to explore.

As one of the leading nutrition departments in the world, our well-established research signature areas bring reputation and productivity to these issues and to the lifelong health goals of the new center. We have a stellar, time-tested record of successfully integrating diet and exercise research and are committed to interdisciplinary training at the undergraduate and graduate levels that emphasize nutrition, fitness and health. In fact, staff from our department provides nutrition counseling and assessment for the Purdue Athletic Department.

Since few people follow the Dietary Guidelines for either diet or exercise, the need for this facility and the research it will support is significant. More than 60 percent of the population is overweight (BMI of 25-29.9) and over 30 percent are obese (BMI of 30 or higher). The Centers for Disease Control and Prevention projects more than 42 percent of the population will be obese by 2030. With more than $35 billion spent annually on weight loss and overweight/obesity-related health care costs linked to chronic diseases such as diabetes, hypertension and osteoarthritis (estimated at more than $100 billion annually), there is great need for answers. Approximately 280,000 preventable deaths are directly linked to obesity annually and, furthermore, obesity is linked to the 90,000 annual deaths from cancer.

The planned facility has space for exercise testing and interventions, large-scale diet preparation, dining facilities, private clinic testing and biological sample processing. The facility will house bionutrition services (including a metabolic research kitchen and ingestive behaviors assessment area); bone, muscle and body composition assessment (including state-of-the-art body imaging equipment and muscle and fat tissue sampling); outpatient clinical health, energy expenditure and function assessment services; exercise testing and training facilities and equipment; interviewing, counseling and health motivation services; and more. The physical footprint of the center also provides new opportunities for the bionutrition core of the Clinical Translation Science Institute (CTSI) and the Ingestive Behavior Research Center (IBRC). While many partnerships already exist, the opportunities for expanding interdisciplinary research, corporate engagement and new programs are abundant.
Rachel Clark supervises student/client interaction.

Prof. Wayne Campbell
ENGAGEMENT

From lab bench to community is the model for engagement in the Department of Nutrition Science. How does this work? A recent translation example from our Calcium, Vitamin D and Bone Health signature area demonstrates just how. Our faculty members are national leaders in discoveries related to vitamin D, so when the new Dietary Reference Intakes for vitamin D were released in 2010 the department readily responded with a fact sheet and corresponding video clips for consumers. The materials address basic questions about the new vitamin D recommendations. The content was written by James C. Fleet, professor of nutrition science, who is a respected basic science researcher in calcium, vitamin D and genomics, and Lisa Graves, Extension specialist. It was reviewed by an expert panel of Purdue faculty, Extension staff and faculty from other academic institutions. (The resources are accessible at www.enjoyfoodbeactive.org.)

In 2012, Indiana State Fair visitors of all ages accessed helpful, practical advice on how to plan healthy meals when they visited the interactive “To My Plate and Beyond” exhibit* in the DuPont Food Pavilion.

The new exhibit illustrates the U.S. Department of Agriculture’s tool that emphasizes the five food groups that are part of a healthy diet: fruits, vegetables, grains, proteins and dairy. “Visitors learned how easy it is to shop for food, grow their own, plan meals and eat together,” says Graves. “From child to adult, the exhibit features tips and ideas for everyone to build a healthy plate.”

Participants “travel” with Max and his dog, Munch, in a flying saucer as they explore simple reminders and other information about eating well. Included is a short quiz that will help them understand the exhibit’s key messages, such as make half of your plate fruits and vegetables, switch to fat-free or low-fat milk and enjoy your food, but eat less.

The exhibit was created by the Purdue Agricultural Communication Exhibit Design Center and specialists and faculty in the Department of Nutrition Science. Funding was provided by the American Dairy Association and Indiana’s Dairy Farm Families.

*This exhibit was made possible through the generous support of the American Dairy Association and Indiana’s Dairy Farm Families.

PROGRAM GUIDES HEALTHY CHOICES ON A LIMITED BUDGET

Tara Conn, a mother of three elementary-age children in Warsaw, Ind., credits Purdue Extension and the Family Nutrition Program (FNP) for her family’s healthier diet. “They taught me about the importance of fresh fruits and vegetables and how to cook safely,” she says.

More than 780,000 people in Indiana like Conn receive food stamps. Forty-six percent of students in the state’s public schools qualify for free and reduced-price meals, and a larger-than-average percentage of these students are
The Family Nutrition Program, in partnership with Purdue Extension, the U.S. Department of Agriculture, and the Indiana Family and Social Services Administration, helps these low-income Hoosiers learn to make healthy food choices on a limited budget.

Conn also credits the program with teaching her to stretch her food dollars. “I would run out of food stamps before the end of the month before. Now I have enough to make it through.”

**DINING WITH DIABETES**

Diabetes adversely affects the lives of almost 700,000 adults in Indiana dealing with this chronic condition. People with diabetes may experience a shorter life expectancy and financial struggles due to higher health care costs. They are also at increased risk for developing long-term health problems associated with diabetes such as heart disease, stroke, high blood pressure, blindness, kidney disease and loss of limbs. Purdue Extension is working throughout Indiana to educate individuals on the need to prevent diabetes and help those with diabetes lessen their risk of long-term complications. Purdue Extension specialists and educators are engaged in offering a program to help people learn how to prepare the foods they enjoy in a way that reduces calories, fat and sodium, and increases dietary fiber. Curriculum to engage Latino audiences is being piloted across the state.

**RECIPE FOR GROWING HEALTHY CHILDREN**

The percentage of overweight children who are younger than five continues to increase in Indiana. Indiana received a 2007 USDA Team Nutrition Training Grant to implement a statewide plan to train child care food service staff to plan meals and snacks that fulfill dietary guidelines and to foster an appreciation for documented benefits of family meals.

The Child Care Culinary Workshops, developed by Barbara Mayfield, nutrition educator, build knowledge and skills in the areas of child nutrition, menu planning, recipes, food preparation and food safety. Child care programs were inspired to create a total environment that recognizes the role of quality nutrition education, positive adult role modeling, and lifelong healthy beliefs and behaviors. There was a demonstrated improvement in knowledge of dietary regulations for whole grains, as well as incorporating a family meal format at participating sites. It was encouraged that meals be served family style and that the preschool children would serve themselves well to build habits toward a lifelong habit for family meals. According to follow-up evaluations completed by 160 participants, desired outcomes are being implemented by many child care providers across Indiana. The potential to impact the health of more than 322,000 children in the state of Indiana through this program is tremendous.
In 1986, the Department of Nutrition Science began formal dialogue among industry, students and faculty in the form of an undergraduate course, Executive in the Classroom. In the mid-1990’s, our Corporate Affiliates program was established in response to a vision of the Nutrition Science faculty to forge a stronger connection between academia and corporations that would benefit from research findings and talent trained by the department. These two different programs offer boundless opportunities for collaboration. Each fall, eight to 10 industry representatives share their business perspectives with students in a class. Executives discuss their education and job paths, profile their companies and outline issues such as production, regulation, research and development, food safety, nutrition, and consumer health. Through the program, many nutrition science undergraduates make connections for internships and jobs. A few find their career goals reshaped.

Twice a year, Corporate Affiliate representatives visit the department for faculty symposiums on topics such as macronutrients; functional foods; nutrient-gene interaction; botanicals and age-related diseases, e.g., Alzheimer’s; ingestive behavior; dietary guidelines; and biotechnology. Michael Kelley, corporate representative from Wrigley, says, “I not only learn a great deal at the Corporate Affiliates meetings, but I get inspired to contribute where I can to research and education. When I am at the meetings, I feel that I am at the forefront of nutrition research.” From an initial meeting of six members, Wrigley is one of 25 corporate affiliates currently in the program (see list).

The vitality and relevancy that the corporate connection adds to the academic climate cannot be overstated. In addition to job and internship opportunities, corporations provide ongoing financial support to the department. Over the past two years, corporate underwriting has allowed the department to:

• Place students in internships and permanent positions.
• Advance research in our signature areas.
• Offer competitive packages to hire NIH-funded faculty who build on department strengths.
• Partner with Purdue on major remodeling of the new Nutrition and Exercise Center.
• Provide updated computers and technology for graduate students, faculty and staff in a period of diminishing state funds for higher education.

As faculty envisioned when they created the programs, a synergy has resulted. Corporate visitors provide a real-world viewpoint for both students and faculty. In return, Corporate Affiliates form academic relationships that are valuable to them. They enjoy previewing the most recent research findings and taking advantage of research affiliations. Jim Kopp of Lallemand Inc. says, “The Corporate Affiliates program provides access to cutting-edge nutritional science and access to the great people behind the data. As a member, you feel the relationship of all the other members and their expertise.”

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**CORPORATE CONNECTIONS**

ABBOTT LABORATORIES  
ALLIANCE FOR POTATO RESEARCH & EDUCATION  
AMERICAN FROZEN FOOD INSTITUTE  
CAMPBELL SOUP CO.  
COLETTA CONSULTING INC.  
CONAGRA FOODS, INC.  
MISSISSIPPI LIME CO.  
HERBALIFE LTD.  
THE HERSHEY COMPANY  
INTERNATIONAL FOOD INFORMATION COUNCIL FOUNDATION  
KRAFT FOODS GROUP, INC.  
LALLEMAND INC.  
MEAD JOHNSON NUTRITION CO.  
MONDELEZ INTERNATIONAL, INC.  
NESTLÉ  
PHARMAVITE, LLC  
SARA LEE CORP.  
THE SCHWAN FOOD COMPANY  
SENSIENT TECHNOLOGIES CORP.  
SOLAE LLC  
SR STRATEGIES  
THE SUGAR ASSOCIATION, INC.  
TATE & LYLE PLC  
WILLIAM WRIGLEY JR. CO.  
UNITED SOYBEAN BOARD

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**ON THE HORIZON:** Public-private partnerships are essential for finding solutions to increasingly complex problems. Just when we thought we had some answers, the questions change. It is an exciting time to be studying nutrition!
DEPARTMENT OF NUTRITION SCIENCE FACULTY

BUHMAN, Kimberly K., PhD
Nutritional Biochemist
Research: Identify novel factors that regulate dietary fat sensing, metabolism, or absorption that may be exploited for preventative and therapeutic interventions for obesity, diabetes and heart disease.

BURGESS, John R., PhD
Nutritional Biochemist
Research: Oxidative stress, defined by the accumulation of reactive oxygen species (ROS), is implicated in the development of many chronic and degenerative diseases as well as some psychological disorders.

CAMPBELL, Wayne W., PhD
Human Nutritionist and Exercise Physiologist
Research: Human nutrition and exercise studies of macronutrient metabolism, protein and energy requirements, appetite, body composition, obesity and weight loss, muscle strength and muscle function, with special emphasis on aging.

DANIEL, James R., PhD
Food Chemist
Research: Carbohydrates, non-cariogenic sweeteners, food gums and fat substitutes.

EICHER-MILLER, Heather, PhD, RD
Human Nutritionist
Research: Food insecurity and low-resource populations, community-based research, nutrition education, nutritional epidemiology, dietary patterns, and public health.

FERRUZZI, Mario, PhD
Food Chemist
Research: Chemistry of food pigments and flavonoids with focus on quantitative and qualitative phytochemical profiling, bioavailability, biological activity, and incorporation into food systems.

FLEET, James C., PhD
Nutritional Biochemist
Research: Molecular mechanisms of vitamin D action through the vitamin D receptor; intestinal calcium absorption; vitamin D and calcium metabolism; vitamin D and cancer chemoprevention; regulation of gene expression; genetic regulation of mineral metabolism.

GLETSU-MILLER, Nana, PhD
Human Nutritionist
Research: Diseases associated with obesity and outcomes following weight loss; strategies for optimizing nutritional outcomes following bariatric surgery.

HENAGEN, Tara, PhD
Human Nutritionist and Epigeneticist
Research: Effects of a low-protein diet and diet-induced epigenetic effects; obesity; and insulin resistance.

HILL GALLANT, Kathleen M., PhD, RD
Human Nutritionist
Research: Nutrition in bone and mineral metabolism with focus areas in calcium and phosphorus metabolism, chronic kidney disease-mineral bone disorder (CKD-MBD), pediatric bone acquisition, obesity, and diabetes.

JANLE, Elsa, PhD
Human Nutritionist
Research: Nutritional and phytochemical effects on diabetes and Alzheimer’s Disease; interstitial fluid chemistry.

JIANG, Qing, PhD
Nutritional Biochemist
Research: Nutrition and inflammation-associated diseases; different forms of vitamin E and cancer chemoprevention/chemotherapy; vitamin E forms, botanical antioxidants and asthma.
KRANZ, Sibylle, PhD, RD  
Human Nutritionist  
Research: Childhood obesity prevention, diet quality, nutrition epidemiology, public health.

MATTES, Richard D., MPH, PhD, RD  
Human Nutritionist  
Research: Regulation of food intake in humans; hunger and satiety; dietary preferences and compliance; taste and smell function; human cephalic phase responses.

MCCORRY, Megan, PhD  
Human Nutritionist  
Research: Dietary composition, eating patterns, and eating behaviors in relation to obesity and its prevention; social and psychological determinants of eating patterns; improvement of dietary assessment methods.

SANTERRE, Charles R., PhD  
Human Nutritionist/Toxicologist  
Research: Food safety and nutrition related to chemical contaminants in foods.

SAVAIANO, Dennis A., PhD  
Human Nutritionist  
Research: Lactose digestion and intolerance, carbohydrate maldigestion.

STAN, Silvia, PhD  
Nutritional Biochemist  
Research: Cancer prevention with diet-derived bioactive compounds; pancreatic and breast cancer chemoprevention.

STEFANSKA, Barbara, PhD  
Nutritional Epigeneticist  
Research: Epigenetic effects of polyphenols and vitamins in cancer prevention and therapy; epigenetic biomarkers for human cancers.

STORY, Jon A., PhD  
Nutritional Biochemist  
Research: Nutritional regulation of cholesterol metabolism.

TEEGARDEN, Dorothy, PhD  
Human Biologist  
Research: Nutrition and cancer, vitamin D and signal transduction, molecular mechanisms in the progression of cancer, exercise, nutrition and bone health, dietary calcium and body composition, vitamin D regulation of lipid oxidation and insulin resistance.

WEAVER, Connie M., PhD  
Human Nutritionist  
Research: Bioavailability of minerals; calcium metabolism, exercise, nutrition and bone health, and iron status.

DONKIN, Shawn, PhD  
Nutritional Biochemistry  
Research: The cellular and molecular processes controlling liver function in response to nutritional, hormonal, environmental and developmental cues.

HYNER, Gerald C., PhD  
Health Promotion  
Research: Risk reduction education using computer-assisted instruction.

KIM, Kee Hong, PhD  
Nutritional Biochemistry  
Research: Dietary and biochemical regulation of the development of adipose tissue and its function for prevention of obesity and its related chronic diseases.

LELEIVRE, Sophie, PhD  
Cancer Pharmacology  
Research: The role of the organization of the cell nucleus in gene expression and genome stability and the relationship between tissue polarity and nuclear functions, notably epigenetics.

LYLE, Roseann M., PhD  
Health Promotion  
Research: Scientific rationale for recommendations for disease prevention and health promotion, nutrition exercise/activity, and health in young women and adults over 50.

ROCHET, Jean-Christopher, PhD  
Medicinal Chemistry and Molecular Pharmacology  
Research: Understanding the role of protein aggregation in neurological and muscular disorders.

SEDLOCK, Darlene A., PhD  
Exercise Physiology  
Research: Excess post-exercise oxygen consumption, energy balance and weight control, components of daily energy expenditure, physiology of upper-body exercise, exercise in spinal cord injured individuals.

BOUSHEY, Carol J., PhD, RD  
Nutritional Sciences and Epidemiology  
Research: Working as part of a multidisciplinary team at the University of Hawaii to provide support to the member investigators of the Cancer Center as they design and conduct studies that include the collection and analyses of dietary intake variable.

WASTNEY, Meryl E., PhD  
Bio-mathematician  
Research: Kinetic Modeling

**COURTESY FACULTY**

BLACK, Randy D, PhD  
Health Promotion  
Research: Obesity/weight management and eating disorders among people with anorexia.
FUND PROJECTS

KIMBERLY K. BUHMAN
• Revealing the Distinct Functions of DGAT1 and DGAT2 in Dietary Fat Absorption.

JOHN R. BURGESS
• Evaluation of Oral Aleira™ Supplementation in Horses with Chronic Lower Airway Inflammation Disease.

WAYNE W. CAMPBELL
• Indiana Clinical and Translational Science Institute (CTSI)
• Effects of Milk Protein Concentrate on Blood Pressure, Inflammation, Muscle Composition, and Metabolic Health in Overweight/Obese Adults
• Effects of Pork vs. Chicken/Fish in a DASH Diet on Blood Pressure Regulation in Older Adults with Hypertension
• Effect of Increased, Egg-based Protein Intake on Muscle Composition, Metabolic Health and Systemic Inflammation in Obese, Older Adults

JAMES R. DANIEL
• The Health Effects of Food Rheology and Reduced Energy Food Components

HEATHER EICHER-MILLER
• Indiana’s Emergency Food Resource Network
• Understanding the Immediate and Long-Term Effects of Supplemental Nutrition Education Program
• Education as an Intervention to Improve Food Security Among Households with Children in Indiana
• Voices for Food: Utilizing Food Policy Councils to Bridge the Gap between Food Security and Healthy Food Choices

MARIO FERRUZZI
• Assessment of the Bioavailability and Functionality of Brain-Targeting Polyphenol Metabolites in Piglets

JAMES C. FLEET
• Inducible Colon-specific Transgenic Mouse for Cancer Research
• Intestinal Calcium Absorption: Molecular Mechanism

NANA GLETSU-MILLER
• Repletion of Copper Deficiency in Humans Targeted Metabolomic
• Profiling of Obesity and Breast Cancer

ELSA JANLE
• Anthocyanins and Structural Derivatives for Drug Discovery in Age-Related Neurodegeneration
• Protective Roles of Grape-Derived Polyphenols in Alzheimer’s Disease
• Assessment of the Bioavailability and Functionality of Brain-Targeting Polyphenol Metabolites in Piglets
• Analytical Methods for Investigation of Peptide Transport

QING JIANG
• Investigation of Anti-Inflammatory Mechanisms and Pharmacokinetics of Novel Metabolites of Vitamin E Forms
• The Role of a Novel Vitamin E Metabolite in Colon Cancer Prevention and Therapy
SIBYLLA KRANZ
• Fiber and Digestive Function in Kids
• Whole Grains and Dietary Fiber Intake in Americans
• Fiber Intake and Quality of Life in School-Age Children
• Development of High-Fiber Foods and Increasing Acceptance of Those Foods in Preschoolers
• Effect of Increasing Dietary Fiber Intake in 3-11 year olds with Chronic Disease Risk on Disease Indicators
• Does the Shape of Food Affect Preschooler’s Liking and Eating of the Food

RICHARD D. MATTES
• Indiana Clinical and Translational Science Institute (CTSI)
• Differential Reward System Responses to Food Aromas in Obese Humans
• The Effects of Including Almonds in an Energy-restricted Diet on Weight, Abdominal Fat Loss, Blood Pressure and Cognitive Function
• Effects of Beef-protein Consumption on Energy Intake — the Protein Leverage Hypothesis
• NIFA National Needs Graduate Fellowships: Exploring Foods to Enhance Health and Reduce Obesity
• Interdisciplinary Training in Signals Controlling Ingestion and Obesity
• Peanut Consumption and Human Weight Management
• Pre-Ingestive Influences on Solid and Fluid Food Intake in Lean and Obese Adults
• Reward System Responses to Food Aromas: Effects of Obesity and Alcohol Intake
• Exploring Foods to Enhance Health and Reduce Obesity (Predoctoral Training Grant)
• Effects of Chronic Almond Consumption at Meals or as Snacks on Appetite, Intake, Body Weight, Glycemia, Insulinemia and Lipids in Healthy Adults
• Infradian Patterns of Feeding and Weight Gain in Humans
• Oral Sensory Detection of Fat by Humans

MEGAN MCCRARY
• Appetitive, glycemic and metabolic responses to legume consumption.
• Relative effects of chronic consumption of egg protein at breakfast with and without fiber on brain neural activation, appetite, glycemic and lipemic control, and self-selected energy intake
• Biomarkers of dietary variables commonly misreported

CHARLES R. SANTERRE
• Helping childbearing-aged women make informed decisions regarding seafood consumption

DENNIS A. SAVAIANO
• Improving Bone Health in Adolescence through Targeted Behavioral Intervention Reversing Milk Aversion

SILVIA STAN
• Targeting Pancreatic Cancer Stem Cells with Phenethyl Isothiocyanate

JON A. STORY
• Dietary Fiber/Cholesterol Metabolism
• Dietary Fiber/Short Chain Fatty Acid Production/Calcium Absorption

DOROTHY TEEGARDEN
• Indiana Clinical and Translational Science Institute (CTSI)
• Vitamin D Regulation of Energy Metabolism in Breast Cancer Progression
• Interdisciplinary Cancer Prevention Research Internship
• Vitamin D Regulation of Insulin Signaling and Muscle Cells

CONNIE M. WEAVER
• Emerging Research on Families and Health (Post-doctoral training grant)
• Calcium Metabolism in Mexican American Adolescents
• Does High Calcium Exacerbate Atherosclerosis?
• Dose Response Effects of Soluble Corn Fiber (SCF) on Calcium Metabolism and Gastrointestinal Microflora in Adolescence
• Regulation of Calcium Metabolism: Influence of RANKL Inhibition
• Supplemental Vitamin D and Functional Outcomes in Early Adolescence
• The Effect of Soluble Corn Fiber (SCF) on Bone Resorption in Post-Menopausal Women Using 41Ca Technology
• Hesperidin and Bone Health in Postmenopausal Women
• The Effect of Grapes on Bone Health and Calcium Metabolism in a Rat Model of Postmenopausal Osteoporosis
• Potassium Bioavailability