

Food for Thought Served Up at the John Milner Nutrition and Cancer Prevention Research Practicum

From March 20-24, 2017 a select group of participants attended the *John Milner Nutrition and Cancer Prevention Research Practicum* hosted by the Nutritional Science Research Group within



National Cancer Institute, National Institutes of Health

Photo credit: NCI, NIH

the Division of Cancer Prevention, National Cancer Institute (NCI), National Institutes of Health (NIH). John Milner and Elaine Trujillo began the annual practicum 14 years ago with sixteen dietetic interns and it gradually grew as others expressed interest in attending. The goal of the practicum is to promote a greater understanding of the complex relationship between diet and cancer prevention and to encourage individuals to actively participate in research that will help clarify the specific role of foods and food components as modifiers of cancer risk and tumor behavior.

One participant, Julia Tobacyk, who is a PhD candidate in pharmacology at the University of Arkansas for Medical Sciences, shares her perspective on the week-long event.

Change

Early in the morning the participants took a bus to the NCI where we were warmly greeted by Ms. Elaine Trujillo, MS, RDN and Ms. Anu Kaur, MS, RDN, RYT. After a healthy breakfast sponsored by the Oncology Nutrition DPG, we jumped right into the Meet and Greet session where all 50 of us learned we were a mix of graduate students, dietetic interns, Registered Dietitian Nutritionists (RDNs), post-doctoral research fellows, physicians, and junior faculty coming from various backgrounds, countries, and cultures. One fifth of the attendees were from overseas, including representatives from Australia, Iceland, Nigeria, Uruguay, France and the United Kingdom. Despite the diversity of the crowd and the mix of dialects and accents, all of us shared a common value that brought us together at the practicum– the drive to make progress in the field of cancer and nutrition. Each attendee revealed an interesting “fun fact” about themselves. Among the participants, we had a karate master, an Olympic weight lifter, a professional dancer, and a former flight attendant.

The first day was filled with lectures ranging from nutrigenomics and other omics to proper experimental designs in nutrition studies, as well as the role of the Mediterranean diet in

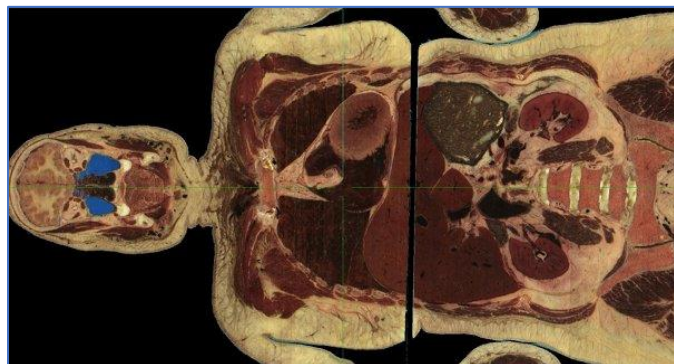
cancer prevention. Even though the day was long and intense, the Breathing Sessions led by Ms. Anu Kaur rejuvenated us and allowed us to stay focused throughout the talks.

During the evening, the American Institute for Cancer Research hosted a reception for the attendees at a local restaurant in Gaithersburg. Several of us sat at a table in the corner and we started asking each other the ice-breaker questions. One of them was: “What do you want to do in life?” This question circulated around the table yielding a plethora of interesting answers, but the simplest answer was the most memorable. One of the dietetic interns at the NIH who is also completing her doctoral degree said simply: “I want to make a *change*.”

And *change* comes in many flavors and forms. For a researcher, this can mean successfully isolating a bioactive ingredient in a food product that may have anticancer properties. For a RDN, *change* is providing readily available nutritional support and hope for cancer patients. For a clinician, *change* may be offering advice that transforms a cancer patient’s mindset and show that he is not alone in his battle against cancer. We were in enthusiastic agreement that participation in the practicum would provide us the resources to work as positive *change* agents when we return to our workplaces!

Home of PubMed

Early Tuesday morning, over 40 participants of the practicum hopped on the bus that took us to the NIH Main Campus in Bethesda. The excitement and enthusiasm of entering one of the world’s foremost medical research centers was palpable among all participants. Our first stop was the National Library of Medicine (NLM), also known as the “Home of PubMed.”



Human Visible Project

Photo credit: [Ptqk License](#)

contributed greatly to medicine, allowing scientists to create virtual anatomical models of the human body.

Once we passed through security clearance, we entered a lecture room. Our first speaker, Ms. Shannon Jordan, opened our tour with a talk on the importance of NLM databases as a powerful research tool. Afterwards, we eagerly spent time flipping through the cross-sectional photographs of the largest “book” in the NLM – [The Visible Human Project](#) – a creation of a complete, three-dimensional representation of a male and female human body. This project

We passed next to the data center and saw the technical staff that keeps PubMed running 24 hours a day, 7 days a week. During the two-minute interval that we stopped and observed the enormous data facilities, there were already over 14,000 electronic views on PubMed!

Parts of the NLM were built as a bomb shelter because it was designed to protect valuable book collections from possible destruction during the Cold War period. Inside the austere walls of the NLM, Dr. Marshall Nirenberg's Nobel medal is sitting in a glass display box. Dr. Nirenberg is the first scientist employed by the NIH who was awarded a Nobel Prize - for his role in deciphering the genetic code.

Upon entering the NIH Clinical Center, one would not expect to see art displayed everywhere. Reflecting on this gives rise to the realization that such an eclectic environment, fusing arts and sciences, inspires and gives birth to the greatest ideas in science. After lunch, Amber Courville, PhD, RD, gave us a tour of the Metabolic Clinical Research Unit. The attendees could observe through the windows of the metabolic chambers and to our surprise, an actual research participant enthusiastically waved to us.

After touring the facility, we attended a series of lectures. Dr. Aaron M. Cypess spoke on the role of brown adipose tissue in thermogenesis. Based on the available research, he discussed the promising avenue of pharmacological agents that target brown adipose tissue in treating obesity and diabetes. The next speaker, Dr. Kevin Hall, spoke on the novel carbohydrate-insulin model of obesity. Dr. Cendric Baker gave a talk on the anticancer properties of turmeric. This raised debatable questions on the phytopharmacology of curcumin, the main bioactive ingredient in turmeric, which is reported to have low bioavailability and a short half-life. The discussion focused on whether the anticancer effects come from curcumin or, alternatively, whether there is a pleiotropic synergy of other, less known, bioactive ingredients in turmeric.

The key note speaker, Dr. John D. Groopman, from Johns Hopkins University, gave a talk about Aflatoxin, a toxic and carcinogenic food contaminant produced by fungi which can enter the human food supply. He spoke about foods that can attenuate Aflatoxin exposure such as sulforaphane, a powerful anticancer compound derived from cruciferous vegetables. He showed compelling data that sulforaphane can significantly reduce DNA damage. Dr. Groopman's intellectually stimulating talk was followed by a group photo, which was the perfect ending to an exciting and informative day!



Dr. John Groopman (center) after his Stars in Nutrition and Cancer lecture, surrounded by attendees from the 2017 John Milner Nutrition and Cancer Prevention Research Practicum and NIH staff

Synecdoche

On Wednesday, the Practicum participants attended thirteen short lectures addressing a wide spectrum of topics. These topics ranged from dietary food components such as calcium, vitamin D and omega-3 fatty acids, as well as whole foods like alcohol, cruciferous vegetables, fermented

dairy products to microbiome, and included interventions such as exercise— all in the context of cancer prevention and treatment.

The first block of speakers spoke on calcium, vitamin D, and bioactive compounds in cruciferous vegetables. Dr. Cindy Davis discussed the challenges of studying vitamin D, emphasizing that existing studies don't address nutrient-nutrient interactions. The audience asked in-depth questions about the dosing regimen of vitamin D supplementation. Dr. Davis stated that supplementation is not recommended for healthy individuals; however, it is helpful for patients deficient in vitamin D. Ultimately, Dr. Davis concluded that the best recommendation is eating foods that contain vitamin D. Dr. Young Kim spoke on the role of cruciferous vegetables in cancer prevention. Her talk echoed in our minds during lunch break; consequently the salad bar was flooded with attendees from the practicum!

Dr. Phil Taylor spoke about alcohol and cancer. His talk was organized into two parts: 1) discussing studies where alcohol consumption increased the risk of certain types of cancers,



and 2) discussing how consuming alcohol in moderation tends to decrease morbidity in humans. One of the attendees raised a point that currently the public health guidelines in the

United Kingdom state that there is no safe margin for alcohol consumption. Dr. Taylor challenged this concept by lightheartedly quoting the ancient Greek philosopher Paracelsus, the father of toxicology, stating: "It's the dose that makes the poison."

Many attendees were thrilled with Dr. Erika Loftfield's talk about bridging the microbiome and metabolome. She discussed the application of metabolomics regarding disease profiling and in generating exposure-disease associations. She stated that the metabolome is a *theoretical phenotype*. Even though scientists can obtain a broad coverage of all the metabolic pathways, they can't identify every single metabolite in the cascade of the metabolism. Interindividual differences, genetic makeup and time point of specimen collection complicate this identification process. This makes the identification process *theoretical* and therefore it may always provide only a snapshot of the *phenotype*.

The last speaker was Dr. Bowles who discussed physical activity. She mentioned that researchers' conceptualizations have typically been influenced by their perception of physical activity based on the times they lived in. Her opinion was depicted by a dose-response curve showing the relationship between "dose" of physical activity and health benefits. Dr. Bowles spoke about how exercise induces both local and systemic changes and it's the systemic changes that are strongly linked to cancer prevention.

All of the presenters addressed current challenges in nutrition and cancer, as well as specified the knowledge gaps that exist for nutritionists, dietitians, clinicians, and researchers to tackle

and fill in. Dr. Bowles used an analogy that cancer prevention is a form of a synecdoche, meaning that there are many factors that create the big picture. Food components, whole foods, metabolome, treatments for cachexia, and interventions such as exercise are the puzzle pieces that all fall into the umbrella term that encompasses cancer treatment and prevention.

From Field to Table

As we entered the US Department of Agriculture (USDA) facility, we were welcomed with fresh muffins, scones, and coffee. The mouthwatering chocolate chip scones were prepared by



U.S. Department of Agriculture

Photo credit: Lance Cheung

Patrick Sullivan, MS, RDN, who is the chef responsible for cooking all the meals for the studies conducted at the facility. The recipe was from the Brassica Study, which is an ongoing project at the USDA.

Our first speaker, Dr. David Baer, shared a brief overview of the USDA. He said that the focus of the USDA is on finding solutions to agricultural problems, which include nutrition. The

nutrition research that is housed at the USDA focuses primarily on diet and dietary needs in humans; whereas research conducted at the NIH focuses on treatment and prevention.

The next speaker, Dr. Craig Charron, spoke on the pharmacokinetic profile of isothiocyanates, which are biologically active components in broccoli. The big question that Dr. Charron tried to assess was whether daily consumption of broccoli will change a patients' metabolism for the better. This topic raised concerns among RDNs about the feasibility and clinical relevance of consuming such high quantities of broccoli. One of the questions from the audience was whether it's better to consume two large bowls of broccoli daily or to eat a diverse panel of vegetables that are equally important and nutritiously dense.

Dr. Janet Novotny spoke on the influence of cranberry products on cardiometabolic health. Dr. Novotny cited previous studies where cranberry juice reduced fasting glucose levels and improved cholesterol/HDL ratios. However, most published studies had a confounding variable of weight loss. Thus, it was difficult to pinpoint whether cranberry juice consumption or weight loss was responsible for the main effect of improving cardiometabolic health. The USDA conducted a study where they controlled the weight of the patients, limiting a bias that previous studies had not considered. This study was designed to evaluate the true effect of cranberry juice on cardiometabolic health and indeed, the treatment group reported improvement of diastolic blood pressure, lower triglycerides, and reduction of C-reactive proteins, which are a marker of inflammation.

After the talks, we were given a tour of the USDA facility, where we saw the human metabolic chambers, the kitchen where food is prepared for all the studies, and the patient recruitment room. The attendees had an opportunity to explore the human metabolic chambers and feel

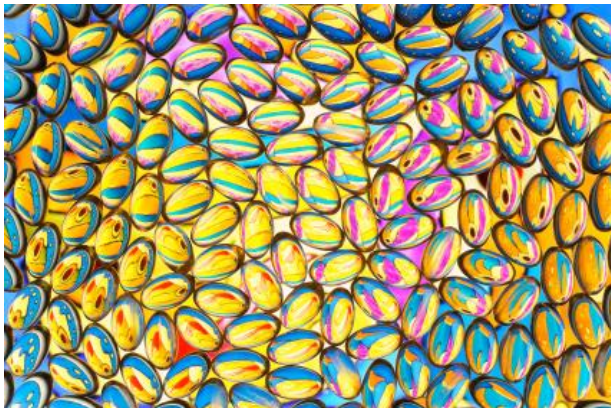
like an actual research participant. Dr. Jayme Leger mentioned that they conducted one study where the research participants were in the metabolic chambers for an entire week and could leave the room every day for only 30 minutes to shower. Once the study is completed, research participants can earn up to several thousand dollars.

Mr. Patrick Sullivan, who received training in culinary arts, spoke on food service considerations in nutrition research. He said that the food is made from whole ingredients and carefully weighted to the second decimal point, so that food intake is easily replicable. Mr. Sullivan said that for most studies, five ingredients are cross utilized in most dishes because this procedure reduces the time and money spent on meals. As he was showing pictures of appetizing breakfasts, lunches, and dinners, he jokingly added: "People praise the variety on my menu but what the research participants don't realize is that we cross use the same 5 ingredients among most dishes!"

As Dr. Baer's stated, the mission of the USDA is to tackle common diseases from a dietary perspective. Towards the end of the day, all the attendees had a comprehensive perspective of the research pipeline at the USDA, ranging from generating an idea to actual food preparation and executing a study.

Health is not a spectator sport!

There is a colossal amount of conflicting information about dietary supplements available to both consumers and medical professionals. Consequently, it is easy to get lost in this maze of information available from such sources as: news channels, the food industry, peer reviewed



journals, magazines, and social media. Dr. Paul Coates, the director of the Office of Dietary Supplements at the NIH, gave a presentation that emphasized the need for systematic reviews over traditional evidence based reviews. He stated that systematic reviews would increase transparency and reduce the potential for bias when addressing public concern about regulating dietary supplements. One of the attendees asked whether dietary supplements should be regulated similarly as drugs. Dr. Coates stated that existing regulations are regularly challenged as either too weak or too strong and, like any regulations, they need to be re-examined from time to time.

Ms. Anu Kaur provided a framework of integrative approaches in cancer therapy such as mind and body practices. Ms. Kaur emphasized the need to examine a patient from a *lifestyle* and *holistic* perspective. She stated that mind and body practices such as yoga, breathing exercises, and mindfulness do result in demonstrable physiological, psychophysiological, and psychological changes. Ms. Kaur emphasized that there is a need for more biomedical research regarding mind and body practices and human physiology.

Our next speaker, Ms. Nan Tolbert, provided advice about improving presentation skills. Ms. Tolbert asked a question to the audience: "What do you do to reduce your anxiety before giving a talk?" At first the audience responded with a long pause of silence. Then, one of the attendees raised his hand and said: "I think about gratitude. If I am gracious, I can't be anxious." Ms. Tolbert responded with a big smile and agreed with those words. She spoke about visualizing success, because, in some ways, the brain cannot distinguish between what is real and what is imaginary. So visualizing success can result in physiological and psychological changes that reduce anxiety. She concluded her talk with an uplifting statement: "You are the point, not the PowerPoint."

Ms. Elaine Trujillo raised an important point concerning the gap between the laboratory and the patient. She stated that, for the most part, the laboratory does not reach the patient. It is important that nutritionists, RDNs, clinicians, and researchers become aware of and fill in these scientific and clinical gaps. Such holistic awareness can provide researchers with a greater sense of human meaning and relevance concerning their research. This practicum is one of the rare opportunities where scientists and clinicians from various backgrounds are brought together and can exchange ideas among one another. Such an exchange allows a clinician to see a researcher's perspective and vice versa.

Most importantly, the knowledge and holistic philosophical perspective gained from the Practicum allowed the attendees to feel like they are not just a spectator in science, but an actual participant that can bring change and advancement in the field of nutrition and cancer.