Food As Medicine

Interrelationships of Health, Disease, Food Is Medicine, and Food As Medicine

ALS4932 (27478) - Spring 2024

Tuesday First Period (7:25-8:15AM) = Required Class Zoom Synchronous Meeting
Wednesday at 3:00 PM and Sunday at 3:00 PM each week = Encouraged Zoom Research Chats
Data collection, data entry, data auditing, data analysis, and research reflection =on your own each week

Instructor

Peggy R. Borum, PhD prb@ufl.edu (352) 562-2861 (personal mobile number)
Office Hours: Available Wednesday at 3:00 PM and Sunday at 3:00 PM each week on Zoom and by appointment via Microsoft Teams

Graduate Innovator

Melissa L. Moreno – mel.moreno@ufl.edu
Melissa is a graduate student in the Department of Food Science and Human Nutrition. If you have questions or need assistance from Melissa, you should message her through Microsoft Teams to schedule an appointment. If for some reason that does not work, her University of Florida email address is given above.

Guest Instructors

We are looking forward to having guest instructors and guest speakers visit our class throughout the semester.

Course Overview

Centuries ago, Hippocrates said, "Let food be thy medicine" and since July 27, 1921, ketogenic diet has been used to treat seizures. The recent practice of precision medicine and precision nutrition have emphasized the need to know the chemical composition of food. The Food Is Medicine (FIM) approach to health refers to healthy individuals receiving optimal nutrients that maintain health. The Food As Medicine (FAM) approach to health refers to individuals receiving optimal nutrients that reverse disease and prevent further disease. Personalization of today's precision medicine is essential in both approaches. The nutrients are the chemicals the body has for all its metabolic processes. Most new drug research projects study a single chemical that is not made by the body and has never been seen by the body. This is a very different situation than studying an extremely complex matrix of chemicals called nutrients that can may be made routinely in the human body and have been administered to humans for generations via dietary intake. The optimal range of quantities for each chemical/nutrient is usually smaller for FAM than for FIM. Knowledge gained from FIM can guide FAM and vice versa.

Reasons for the Course Activities

Research is exciting. Learning something that no one has ever known can be the highest of all highs. Basic research questions are very stimulating and extremely important. Translational science research questions can be very satisfying when you realize you have helped someone who had no answer. This type of research also brings a great deal of responsibility because someone with no answer depends on you. When in this position it is important to remember that you should do unto others as you would

have them do unto you. When you realize that the person with no answer could be you, the repetitive tasks that require great attention to detail cannot become boring or something that one just tries to get done as quickly as possible.

For our spring 2024 class, the people with no answers are those who have a diagnosis of epilepsy, and no treatment has helped but has brought adverse side effects. The therapy that we are studying is Precision Ketogenic Therapy (PKT) that alters the diet to reduce carbohydrate intake to very low concentrations and fills in the calories that have been removed with fat calories. Since this is a therapy, it is important that it integrates well with other therapies the patient is receiving and that we know exactly what and how much we are administering. Food has not routinely been used in such a way and as a result the composition of food has not received as many chemical composition analyses as we would like to have.

We take advantage of the fact that the United States labeling laws require many foods to be analyzed for a fairly short list of ingredients. However, there is not a database available to us that gives us all the data we need to use in treatment of patients. When preparing a dietary prescription for using FAM, the first step is to determine the nutrient quantities currently being consumed by the individual. The second step is to estimate the nutrient quantities that should be consumed to meet nutritional needs of the patient. For FAM, one may need to alter the nutrient composition to induce a particular metabolic state. The example we are going to use in this course is the ketogenic diet implemented to induce nutritional ketosis.

The fact that the ketogenic diet is a term that is very popular in the public press is both a benefit and a challenge for utilizing the induction of nutritional ketosis as a therapy. The familiarity of the term may increase one's comfort level with it. However, the term ketogenic diet can refer to a person who is receiving appropriate nutrition with detectable ketones in the urine or it may refer to a person who is receiving very poor nutrition with detectable ketones in the urine. These two ketogenic diets may both depend on food intake and result in ketones in the urine, but they result in a completely different physiological milieu resulting in a different phenotype.

Course Research Objectives and Activities

Professional organizations of physicians have recently commented on the fact that the term ketogenic diet is not defined and as a result it is very difficult to try to evaluate published studies when the composition of intake is not defined. For these and other reasons we have termed our therapy Precision Ketogenic Therapy (PKT). We want to emphasize that we know the composition of the chemicals/nutrients being consumed (no matter the route of administration) and that we are monitoring the individual for a wide array of parameters to detect beneficial or adverse changes in those parameters.

During this course, you will have the opportunity to contribute to our knowledge of the composition of potential components of PKT and to illustrate to healthcare professionals the importance of knowing the chemical/nutrient composition of each ingredient of dietary intake.

Course Education Objectives and Outcomes

Content: Students will demonstrate competence in the concepts of use of nutrients to treat and prevent disease. These will include understanding of Precision Ketogenic Therapy, advantages and limitations of current nutrient databases, and translational science in theory as well as practice. You will be addressing questions that are currently being asked by families who are considering use of Precision Ketogenic Therapy for their loved one.

So ALS4932 is not simply a series of class assignments or three group projects. ALS4932 is an opportunity for you to contribute to a real-world research project that affects real people in Florida who have a problem that their brain is not working well and everything that has been tried so far has not worked. What you are doing is offering them perhaps a last option to treat their child's seizures and to explain why it is necessary to do the many details that are involved.

Research Skills and Critical Thinking: Students will hone skills of data collection, data wrangling, database creation, database utilization to meet specific patient needs, and creation of potential research projects using the data collected.

Collaborative and Teamwork Skills: You will learn the scientific basis of the research, how to implement the research tools and methods required to address the research question, how to structure a team of colleagues to make the research happen, and how to communicate your findings to scientific colleagues. During this class you will learn to use the collaborative software Microsoft Teams which we use to communicate with each other and to collectively work on documents. This research is a project that involves different steps done by different people at different times and thus it is also a project management activity. Thus, we will use software apps to plan our research activity and to monitor our progress. Since Microsoft Teams software has been adopted by many Fortune 500 companies and educational organizations including the University of Florida, competency in its use will be desirable when applying for future internships, education opportunities, and professional positions.

We will divide our class into three teams:

- **Team PerOs** (5 students) will focus on individuals who receive nutrients solely by mouth.
- **Team Tube** (4 students) will focus on individuals who receive nutrients solely by gastric or gastric - jejunum tubes.
- **Team Parenteral** (4 students) will focus on individuals who receive nutrients solely by the intravenous route.

The degree to which patients have been affected by their neurological disease is frequently Per Os<Tube<Parenteral. The goal of PKT is to not only stop seizures but to facilitate the transition from Parenteral to Tube to Per Os administration of nutrients.

Due to a lack of time during our class we will not address the issue of determining current nutrient intake or in calculating optimal nutrient intake. We will begin with a diet prescription of a PKT ratio of 2.5:1, 1700 calories, and 23 grams of protein per day.

Communication with Peers and Scientific Community: Students will present their research progress to each other, to the instructor, and to the research community in both written and oral formats.

Course Responsibilities

Individual Responsibilities

- Individual work reports in OneNote.
- Data collection and data entry for your part of your team's project.
- Wrangling of your research team's data followed by analyses and visualization.
- Contribution to your team's abstract and poster.
- Creation of your part of the team's website contribution and proposal for next research steps to be taken.

Research Team Responsibilities

- Collaborative plan and execution of that plan to have data collected, entered, and wrangled on time.
- Collaborative creation and posting of reports of your research team's research progress.
- Review of your research team's abstract and poster
- Review of your research team's website contribution.

Entire Class Responsibilities

- Contribute to the creation and review of the Undergraduate Research Symposium abstract and poster.

Research Questions and Education Questions to be Addressed

Team Per Os:

- The Per Os patient will have 3 meals and 2 snacks per day. You are being asked to make a recipe for one of the meals that consists of chicken breast, Avocado oil, green beans, heavy whipping cream and peaches.
- Research Question for Team Per Os:
    - What is the difference in chemical/nutrient composition of PKT if we take a precision approach to the recipe versus the more typical approach of:
        - not requiring brand specific diet ingredients or
        - not weighing diet ingredients to the nearest 10th of a gram.
- Questions for Team PerOs from the family of a patient considering PKT:
    - What do the recipes taste like?
    - What do the recipes look like?
    - What if my child must have only certain textures such as puréed food?
    - How long does it take to make the recipes?
    - What is the cost of feeding my child on PKT? Does it cost more to feed my child on PKT than just feeding regular food?
    - How much of my time each day will be required to provide PKT?

Team Tube:

- The Tube patient will receive the Diet Rx in 4 feedings a day administered by a feeding pump. You are being asked to make a recipe for the entire day that is based on some commercial "keto formula" that the patient's insurance will pay for.
- Research Question for Team Tube:
    - What is the difference in chemical/nutrient composition of PKT if we take a precision approach to the recipe versus the more typical approach of:
        - not requiring brand specific diet ingredients or
        - using "net carbohydrate" products
- Questions for Team Tube from the family of a patient considering PKT:
    - How much of my time each day will be spent on PKT activities?
    - Does the prepared recipe go down the tube easily?
    - Do I need a pump?
    - Is my child going to be hooked up to the pump all the time which will make it difficult for us to go out and do things?
    - What is the availability of the products that I need to feed my child?
    - If I must get a prescription will my insurance cover it?

Team Parenteral:

- The Parenteral patient is in the intensive care unit and the team is asking you to make a recipe using parenteral nutrition products that they will administer continuously over 24 hours.
- Research Question for Team Parenteral:
    - What is the difference in chemical/nutrient composition of PKT if we take a precision approach to the recipe versus the more typical approach of:
        - using different brands of lipid emulsions interchangeably or
        - using different brands of amino acid solutions interchangeably
- Questions for Team Parenteral from the healthcare professionals in the Intensive Care Unit:
    - Can our pharmacy make the parenteral PKT nutrition solution using the products currently available in our hospital?
    - Can we use our usual parenteral feeding equipment and protocols for PKT?
    - How much of our time each day will be spent on PKT activities?
    - Will any of the medications or other solutions routinely administered in the ICU affect PKT?
    - Will PKT affect any of the medications or other solutions routinely administered in the ICU?
    - What is the difference in the cost of PKT versus regular total parenteral nutrition?

Why We Are the Ones to Address these Questions

Our research question is a complex one that has many different aspects. The first aspect is the phenotype or refractory epilepsy that brings the patient to the clinic. We have undergraduate students in the following majors that will act as the content experts in addressing issues of metabolism and physiology resulting in the individual patient's phenotype:

- Biology
- Microbiology and Cell Science
- Applied Physiology & Kinesiology
- Communication Sciences and Disorders

Data collected from our research is going to be different types of data collected by different people at different times which usually results in what is referred to as messy data. These data require a great deal of wrangling before they can be used to address the question at hand and to visualize the results that are obtained. Data management, analyses, and visualization are best handled by the content experts with majors in:

- Mathematics
- Biomedical Engineering
- Exploring Engineering Studies

Our research question deals with food which provides the chemicals that our body needs but also is enveloped in a great deal of culture, emotion, religion, and interpersonal relationships. It takes a village to best deal with these issues. These complex attributes of our question are best dealt with by the content experts having majors in

- Psychology
- Political Science
- Exploring Social & Behavioral Sciences

Our multidisciplinary research team is well positioned to address the questions because we have undergraduate student representation of each of these areas.

Recommended Materials

Recommended material will be posted to the Foodomics Class Spring 2024 site.

Evaluation of Grades

Points	Activity
15	Attendance and participation in 15 classes
20	Work reports for 15 weeks of research
25	Timely data collection and analyses
10	Writing abstract
10	Creating poster
05	Participation in Symposium
15	Creating website documents

Grading Scale

Score	Percent	Grade	Grade Points
934-1000	93.4-100	A	4.00
900-933	90.0-93.3	A-	3.67
867-899	86.7-89.9	B+	3.33
834-866	83.4-86.6	B	3.00
800-833	80.0-83.3	B-	2.67
767-799	76.7-79.9	C+	2.33
734-766	73.4-76.6	C	2.00
700-733	70.0-73.3	C-	1.67
667-699	66.7-69.9	D+	1.33
634-666	63.4-66.6	D	1.00
600-633	60.0-63.3	D-	0.67
0-599	0-599	E	0.00

More information on grades and grading policies is here:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Class Attendance and Make-Up Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/ . It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at gatorevals.aa.ufl.edu/public-results/ .

Class Demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at a minimum, if at all.

Materials and Supplies Fees

There are no additional fees for this course.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct- honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Course Schedule

Zoom Link for Tuesday Class Meetings at 7:25AM and for Zoom chats with instructors at 3:00 PM on Wednesdays and Sundays:
https://uflphi.zoom.us/j/4742141397

Date and Activity Overview	Activity details
Tues, Jan 9, 7:25 AM – Zoom Class	Welcome to Class; Introduction to PKT and our research question; Creation and strategic planning of Team Per OS, Team Tube, Team Parenteral
Wed, Jan 10, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Jan 14, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Mon, Jan 15	MLK Holiday
Tues, Jan 16, 7:25 AM – Zoom Class	Progress report by each team: • work accomplished • work plan for the next 2 weeks
Wed, Jan 17, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Jan 21, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Jan 23, 7:25 AM – Zoom Class	Presentation by each team: • abstract draft for Research Symposium • rationale for 3 abstracts or 1 abstract
Wed, Jan 24, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Jan 28, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Jan 30, 7:25 AM – Zoom Class	Parrish Winesett, MD. –Pediatric PKT: The Clinician's Perspective
Wed, Jan 31, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Jan 31, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Mon, Feb 5	Research Symposium Abstract open
Tues, Feb 6, 7:25 AM – Zoom Class	Presentation of updated abstract(s) with supporting data tables and figures
Wed, Feb 7, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Feb 11, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Feb 13, 7:25 AM – Zoom Class	Discussion by each team of detailed data with accompanying conclusions and data challenges
Wed, Feb 14, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Feb 18, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Feb 20, 7:25 AM – Zoom Class	Presentation of finalized data collection and visualization
Wed, Feb 21, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Feb 25, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Feb 27, 7:25 AM – Zoom Class	Presentation of near final abstract(s)
Wed, Feb 28, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Mar 3 11, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Mar 5, 7:25 AM – Zoom Class	Finalize abstract(s) and presentation of draft poster(s)
Wed, Mar 6, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Mar 10, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Mon, Mar 11	Symposium Abstract Deadline
Mar 11-Mar 15	Spring Break

Tues, Mar 19, 7:25 AM – Zoom Class	Finalize Poster(s)
Wed, Mar 20, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Mar 24, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Mar 26, 7:25 AM – Zoom Class	Practice presenting Poster(s)and answering questions
Wed, Mar 27, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Mar 31, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Mon, Apr 1 – Research Symposium	**2024 Spring Undergraduate Research Symposium** - April 1, 2024, at 1:00 – 5:00pm in Stephen C. O'Connell Center
Tues, Apr 2, 7:25 AM – Zoom Class	Research Symposium debriefing and planning for website documents preparation
Wed, Apr 3, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Apr 7, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Apr 9, 7:25 AM – Zoom Class	Presentation by each team of drafts of website contributions
Wed, Apr 10, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Apr 14, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Apr 16, 7:25 AM – Zoom Class	Finalize website contributions
Wed, Apr 17, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Apr 21, 3:00 PM – Zoom Chat	Team collaboration with Instructors
Tues, Apr 23, 7:25 AM – Zoom Class	Reflect on accomplishments and what should be the next research question
Wed, Apr 24, 3:00 PM - Zoom Chat	Team collaboration with Instructors
Sun, Apr 27, 3:00 PM – Zoom Chat	Team collaboration with Instructors