

Microbiota and Human Nutrition [006EN] (for professionals)

Syllabus

Course Information

Course Title: Microbiota and Human Nutrition

Course Number: 006EN

Edition and Year: 01/2020

Class/video Hours: 40 Hours

Course Format: Online

Language: English

Location: You must have access to the course site. Online login at URL: <https://spheresea.org/>

Prerequisite: Bachelor's Degree on Nutrition or the equivalent. Alternatively, any degree in Medicine/Biology/Biochemistry/Genetics/Microbiology or another field related to nutrition or Life Sciences.

Lecturer Information

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Course Description

This course is designed to introduce the nutritionists, dieticians, and other professionals that are interested in nutrition (including researchers), to the knowledge of the characteristics, functions, regulation and alterations of the human microbiota, as well as its importance for health and disease. Additionally, it presents the effects of microbiota-nutrition interactions in human physiology and its relevance to the host, the approaches aimed at the recovery and maintenance of a healthy microbiota, and provides useful tools to incorporate this knowledge into the daily work of the Personalized Nutrition professional.

Course Materials

Scientific articles: approximately one hundred articles, mainly reviews, will be provided as additional reading material. Reading these articles is optional but it is recommended to deepen some of the relevant topics.

Student Learning Outcomes

Upon graduating this course, She or He will be able to:

1. Be able to explain the relevance of the microbiota and the microbiome to human health and disease.
2. Be able to discuss the interactions between the microbiota and the human host.
3. Be able to explain how the microbiota and the microbiome are analyzed both in experimental and clinical studies, and to comprehend the graphical representations of these analyses.
4. Be able to explain the main characteristics and functions of the several microbial communities that inhabit the human body, from the periconceptual period to the advanced age.

5. Be able to explain the microbial metabolism as well as the effect of the human feeding patterns in such metabolism.
6. Be able to comprehend the characteristics of the food-derived microbiota, the regulation of the resident microbiota by the diet and the consequences for the human host.
7. Be able to discuss the causes and consequences of dysbiosis of the human microbiota.
8. Be able to explain the several available approaches to regulate the human microbiota, both in health and disease.
9. Be able to analyze and select one or more protocols for the treatment of several human diseases, through the effects on the microbiota, and explain how to integrate them to the Personalized Nutrition process.

Characteristics of course online sessions

1. The student must watch each of the 50 videos, sequentially, corresponding to the 10 components that make up the course. You can watch the videos as many times as you want during the duration of the course. After each video you must answer a rapid quiz about the content. The answers to this set of quizzes do not count toward graduating the course.
2. At the end of each component you must answer a test related to its content. If you do not pass the test, it is recommended that you watch the videos again and repeat the exam. The minimum grade to pass a test is 8/10. You must pass the test of a component in order to move on to the next.
3. This course includes discussion forums, where the student can ask questions, answer other students' questions, deepen the topics or comment on additional readings. The moderation of the forums will be done by the Instructor. It is essential to behave with absolute respect to all participants. Depending on the volume of posts in the forums, your question may be answered after several hours; be patient.
4. Try to use the forums for your questions about the course content. The Instructor's email address should not be used for this purpose. If You have other questions, write to the SPHERES course support email address: vrg_rtr@yahoo.com .

Course Schedule

Component	Title	Topics	Duration
1	Relevance of the human microbiota for the professional performance of the Nutritionist.	<ul style="list-style-type: none"> • The human microbiota within the global microbial diversity in the environment. • The microbiota-diet relationship and Personalized Nutrition. • Regulation of the composition and functions of the microbiota and consequences for human health. • Specialized terminology related to the microbiota to be used in this course. 	1 hour
2	How the microbiota is studied and analyzed.	<ul style="list-style-type: none"> • Scientific representation of the characteristics of the microbiota and the microbiome: microbial diversity and composition. • Scientific representation of the metabolic functions of the microbial community. • Methods and protocols to analyze the microbiota and the microbiome: Sampling and molecular biology. • Methods and protocols to analyze the microbiota and the microbiome: Gnotobiotic organisms. • Guidelines for the design of scientific and clinical studies related to the microbiota. 	3 hours
3	Characteristics and functions of the microbiota that we associate with a healthy person.	<ul style="list-style-type: none"> • The human microbiota and the human cells. • Microbial groups that make up the human microbiota: Bacteriome, archaeome, mycobiome, virome, protozome and helminthome. • What do we mean when we talk about a healthy microbiota? • Interactions between eukaryotes and prokaryotes within the microbiota, and relevance to human health. • General characteristics of the human bacteriome. • General characteristics of the human archaeome. • General characteristics of the human mycobiome. • General characteristics of the human virome. • General characteristics of the 	3 hours

		<p>human protozoome and helminthome.</p> <ul style="list-style-type: none"> • Interindividual and intraindividual variation of the human microbiota. • Co-evolution of humans and their microbiota. • General functions of the microbiota and the microbiome in the healthy person. • Pressures of the modern lifestyle on the human microbiota. 	
4	Establishment and development of the microbiota in humans.	<ul style="list-style-type: none"> • Periconceptual microbiota and fertility. • Pregnancy microbiota and influences on the fetus and the mother. • Sterile womb paradigm <i>versus</i> the <i>in utero</i> colonization hypothesis. • Birth mode and other factors that determine the initial establishment of the human microbiota. • Neonatal and infant microbiota; influence of the feeding mode and consequences for the rest of the life. • Childhood and adolescence microbiota; influence of lifestyle and other factors on eubiosis and host's health. • Microbiota in the human adult; influence of stress and exercise on eubiosis and host's health. • Microbiota in the elderly human, centenarians and super-centenarians; senescence, immunity, oxidation and inflammation. 	4 hours
5	The relationship between food and the microbiota, and its effects on human physiology.	<ul style="list-style-type: none"> • Beneficial and detrimental microbiota as part of food and beverages; interactions between taxa. • Circadian rhythms, human metabolism and the human microbiota. • Direct and indirect effects of ingested food and beverages on the microbiota, and the consequences for human physiology. • Endogenous and exogenous substrates used by the human microbiota. 	3 hours

		<ul style="list-style-type: none"> • Microbial metabolism of carbohydrates. • Microbial metabolism of peptides. • Microbial metabolism of lipids. • Microbial metabolism of biliary acids. • Microbial metabolism of phytochemicals. • Influence of the availability of nutrients in the composition and functions of the microbiota. • Regulation of the human microbiota by changes in the diet. • Comparison of several feeding patterns on the microbiota-derived effects on human health. • General recommendations to achieve and maintain a healthy microbiota in the human population. 	
6	Characteristics and functions of the microbiota and the microbiome in various body niches.	<ul style="list-style-type: none"> • Microbiota of the integumentary system; characteristics and functions in health and disease. • Microbiota of the respiratory system; characteristics and functions in health and disease. • Microbiota of the urogenital system; characteristics and functions in health and disease. • Microbiota of the gastrointestinal system; characteristics and functions in health and disease. 	3 hours
7	Dysbiosis and its importance for the continuum of health and disease in humans.	<ul style="list-style-type: none"> • Small intestine epithelium structures and functions <i>versus</i> large intestine epithelium structures and functions. • The microbiota in eubiosis and the mucosal barrier in the human gut; relevance for the human health. • Dysbiosis, when the balance is lost; disruptions of the microbial community. • Factors that influence the development of dysbiosis. • Associations and correlations between dysbiosis and human disease. 	3 hours
8	Preventive and therapeutic approaches aimed to regulate the human microbiota.	<ul style="list-style-type: none"> • Current and future approaches aimed to the human microbiota. 	3 hours

		<ul style="list-style-type: none"> • Prebiotics: Definitions, accepted and proposed prebiotics, sources, effects on the microbiota and consequences for the host. • Probiotics: Definitions, effects on the microbiota and consequences for the host, importance of dosage and strain, sources, next-generation probiotics. • Synbiotics: Definitions, types, combinations. • Paraprobiotics: Definitions, sources, effects on the host. • Postbiotics: Definitions, sources, effects on the host. • How to select and recommend prebiotics, probiotics, synbiotics, paraprobiotics and postbiotics and their incorporation to dietotherapies. • Microbiota transplants: Definitions, sources, protocols, benefits <i>versus</i> risks, effects on the microbiota and consequences for the host. 	
9	Protocols directed to the microbiota in various human diseases.	<ul style="list-style-type: none"> • Obesity. • Protein-calorie malnutrition. • Diabetes mellitus 1, diabetes mellitus 2, gestational diabetes. • Cardiovascular diseases. • Gastrointestinal diseases. • Hepatic and pancreatic diseases. • Neurological diseases. • Respiratory diseases. • Renal diseases. • Allergies. • Infectious diseases. • Cancer. • Gastrointestinal surgery. 	7 hours
10	Integration of microbial diagnostics and therapies to Personalized Nutrition.	<ul style="list-style-type: none"> • Adult outpatient with metabolic syndrome, as example. • Adult outpatient with end-stage chronic renal disease in hemodialysis, as example. • Adult athlete outpatient, as example. • Adult alcoholic outpatient, as example. • Adult pregnant obese outpatient, as example. • Pediatric overweight outpatient, as example. 	10 hours

		<ul style="list-style-type: none">• Pediatric outpatient with severe allergies, as example.• Adult inpatient with ulcerative colitis, as example.• Adult inpatient with bariatric surgery, as example.• Pediatric preterm newborn inpatient, as example.	
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The instructor reserves the right to amend this syllabus, both online and the document itself, and will notify students of the change(s).

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