BIOAVAILABILITY OF NUTRIENTS

Human Nutrition and Dietetics Bachelor's Degree (2026/27)

Code: 803996
Module: 4
Subject: Bioavailability of Nutrients
Type of subject: Compulsory
Course: Fourth year
Semester: consult calendar
Departments: Nutrition and Food Science
Credits: 6 ECTS

PROFFESORS

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associate professors (to be assigned)

DESCRIPTION

The subject deals with the bioavailability of nutrients, their determination and the changes produced in consequence of industrial and culinary processing, as well as those derived from food preservation processes.
The second part of the subject focuses on the interactions produced by xenobiotics on the bioavailability and utilization of nutrients. In addition, we will study the effects of long-term ingestion of these non-nutritional components on the nutritional status of the individual.
We finish the course by introducing the application of nutrigenetics and nutrigenomics on the bioavailability of nutrients.

COMPETENCES

These correspond to the Module and Subject to which this subject belongs to.

General competences

CG.1.1 CG.1.2 CG.1.4 CG.2.1 CG.2.2 CG.2.3 CG.3.1 CG.4.1 CG.4.2 CG.4.3 CG.4.4 CG.4.5 CG.4.6 CG.4.7 CG.6.1 CG.7.2 CG.8.1.

Specific competences

CE.M1.1 CE.M1.5 CEM1.7 CE.M2.1. CE.M2.2 CE.M3.7 CE.M3.8 CE.M4.01. CE.M4.02 CE.M4.03. CE.M4.04. CE.M4.05. CE.M4.06. CE.M4.07. CE.M4.08 CE.M4.09 CE.M4.10 CE.M4.11 CE.M4.12 CE.M4.13 CE.M4.14 CE.M4.15 CE.M4.16 CE.M4.17 CE.M4.18 CE.M4.19 CE.M4.20 CE.M4.21 CE.M4.22.

PROGRAMME

THEORICAL CLASSES

Theme 1. General considerations. Potential and real nutritional value of nutrients. Concept of bioavailability.
Theme 2. Methods for determining the bioavailability of macro- and micronutrients.
Theme 3. Interactions between nutrients at the digestive level, in their metabolism and excretion.
Theme 4. Consequences of industrial processing on the bioavailability of macronutrients and micronutrients.
Theme 5. Consequences of culinary processing on the bioavailability of macronutrients and micronutrients.
Theme 6. Consequences of preservation processes on the bioavailability of nutrients.
Theme 7. Concept of xenobiotics. Absorption of xenobiotics. The pathways of xenobiotic absorption. Distribution of xenobiotics. Mechanism of transport in body fluids. Distribution sites.
Theme 8. Metabolism of xenobiotics. Phase I and phase II reactions.
Theme 9. The role of the renal barrier in the elimination of xenobiotics. Other elimination pathways.
Theme 10. Sites of action of xenobiotics. Xenobiotic-receptor interactions.
Theme 11. Influence of food on drug absorption and distribution.
Theme 12. Influence of food on drug detoxification and excretion. Effect of nutritional status on drug action.
Theme 13. Influence of drugs on food intake and bioavailability of nutrients.
Theme 14. Influence of drugs on metabolic utilisation of food and nutrients.
Theme 15. Influence of drugs on nutrient excretion.
Theme 16. Nutrient-drug interactions in special population groups. Drug-artificial nutrition interaction.
Theme 17. Alcohol and smoking. Influence of alcohol and tobacco on nutrients and drugs.
Theme 18. Changes in bioavailability and interactions produced by dietary supplements, additives, condiments and food contaminants on food and other xenobiotics.
Theme 19. Interactions of phytopharmaceuticals with food and xenobiotics.
Theme 20. Nutrigenomics and nutrigenetics applied to nutrient bioavailability.

WORKSHOPS

- Functional Foods as a strategy to enhance nutrient bioavailability.
- Designing diets that maximise the bioavailability of nutrients.
- Influence of drug-nutrient interactions on an individual's nutritional status and health.
- Pharmacological effects of some nutrients
- Handling of data from excipient and drugs.
- Organoleptic aspects and food selection of food that help to create palatable meals by optimising the bioavailability of nutrients.

EVALUATION

- The assimilation of theoretical knowledge will be assessed by exams, which will correspond to 70% of the final mark.
- The mark obtained in the evaluation of the workshops will account for 20% of the final mark. Attendance is compulsory and absences will only be accepted with justified and documented cause.
- The continuous assessment of learning will include the student's attitude and participation in classes, tutorials, presentations, debates, class assignments, etc. and will account for the remaining 10% of the final grade.
- A minimum mark of 5 out of 10 must be reached in the first two sections (exam and workshops) in order to pass the subject.

Note - Actions to be taken in the case of a voluntary or accidental infraction of the rules of conduct of the examination:

"The voluntary or accidental infraction of the rules for the exam will not allow the validation of the exam, so the student will have to take an oral exam of the subject in order to establish his/her knowledge of the subject. If the cheating is confirmed as intentional, it will be considered a very serious ethical misconduct, and the Services Inspection will be informed in order to take the disciplinary measures it considers appropriate".

Exams review

The revision of exams will be notified in advance on the Virtual Campus of the subject.

BIBLIOGRAPHY AND REFERENCES

Basic references

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- Mahan, L.K.; Escott-Stump, S. (2009), Nutrición y dietoterapia de Krause, Editorial Masson, 12ª ed., Barcelona.
- Mataix, F.J. (2009), Nutrición y alimentación humana. Tomo I. Nutrientes y alimentos. Tomo II. Situaciones fisiológicas y patológicas, Ergon, 2ª ed., Madrid.
- Requejo, A.M.; Ortega, R.M. (2006), Nutriguía. Manual de Nutrición clínica en atención primaria,

Editorial Complutense, 3ª reimpresión, Madrid.

Specific references

- Molecular Nutrition & Food Research, 2013, (On line ISSN: 1613-4133), Hans-Ulrich Humpf. Editorial.
- Las bases farmacológicas de la terapéutica, 2012, Goodman & Gilman, Biblioteca del CFPBA.
- Nutrición en Colectividades, 2012, En Magíster y Experto en Nutrición, Coinsa.
- Química de los Alimentos, 2012, H.D. Belitz; W. Grosch y P. Schieberle, ISBN: 9788420011622.
- Diet and drug interactions, 2011, Roe D.A. Editorial, An Avi Book.
- Handbook of Drug-Nutrient Interations, 2010, Boullata J.I., Humana Press. Inc. Editor.
- Nutrient-Drug Interactions, 2006, Kelly Anne Meckling. CRC Press.
- Handbook of Food-Drug Interactions, 2003, Beverly J. McCabe, Eric H. Frankel, Jonathan J. Wolfe CRC Press.
- Bravo, M.B.; Martín, M. (2000), Comer saludablemente: Interacciones entre los alimentos y los medicamentos en la atención farmacéutica, Editorial Dykinson, Madrid.
- Química culinaria, 1996, Coenders, Editorial Acribia.
- Fellows, P., Tecnología del procesamiento de los alimentos, 1994, Editorial Acribia.
- Anzaldúa, A., La evaluación sensorial de los alimentos en la teoría y en la práctica, 1994, Editorial Acribia.
- Calvo Rebollar, M. Aditivos alimentarios. Propiedades, aplicaciones y efectos sobre la salud, 1991, Ed Mira .
- Alan R. Gaby, M.D. A-Z Guide to Drug-Herb-Vitamin Interactions. 2ª ed. Ed. three rivers press 2006.
- Meckling KA. Nutrient-Drug Interactions. CRC Press LLC, 2019
- Ramos F, Vitoria IV, Caramona M. Food-drug Interactions: Pharmacokinetics, Prevention and Potential Side Effects. Ed. Nova Medical & Health., 2018

Useful links and web resources

- AESAN-Agencia Española de Seguridad Alimentaria y Nutrición: www.aesan.msc.es
- EFSA-European Food Safety Authority: ww.efsa.eu

  FAO-Food and Agriculture Organization of the United Nations: www.fao.org
- OMS-Organización Mundial de la Salud: www.who.int.es
- BOTPLUS. Consejo General de Colegios Oficiales de Farmacéuticos. http://www.portalfarma.com/inicio/botplus20/Paginas/Bot-PLUS-2-0.aspx