[Medicinski fakultet u Rijeci]

Curriculum
2023/2024

[Za kolegij]

Nutrition and Immune Response: Truths and Misconceptions

Study program:	**Medical Studies in English (R)** (elective) [Sveučilišni integrirani prijediplomski i diplomski studij]
Department:	**[Katedra za fiziologiju, imunologiju i patofiziologiju]**
Course coordinator:	**prof. dr. sc. Mrakovčić-Šutić Ines, dr. med.**
Year of study:	**4**
ECTS:	**1.5**
Incentive ECTS:	**0 (0.00%)**
Foreign language:	**Possibility of teaching in a foreign language**

Course information:

The aim of this elective course is to provide students the opportunity to take a knowledge about the possibilities of modern ways in nutrition and its interaction with immune response. Regulated inflammatory responses are essential to remain healthy and maintain homeostasis. Inflammatory responses can brocked this regulatin and may cause different chronic inflammatory rsponses and contribute to the perpetuation and progression of disease. Typical features of chronic inflammation underlying the pathophysiology of several disorders with loss of barrier function, responsiveness to a normally benign stimulus, infiltration of inflammatory cells into cell compartments where they are not normally found in high concentrations and overproduction of cytokines, chemokines, oxidants, eicosanoids and matrix metalloproteinases (MMPs). Various dietary components (for example omega-3 fatty acids, antioxidant vitamins, prebiotics and probiotics) may modulate predisposition to chronic inflammatory processes (especially low-grade inflammation that is characteristic for obesity and other pathological conditions) and may have a role in therapy. Changes in gut barrier function and anti-inflammatory responses may lead to developing of many autoimmune and inflammatory diseases. Many different factors associated with a Western lifestyle such as an unbalanced diet (low intake of fruits and vegetables, polyphenols and other antioxidants), pollution, psychological stress etc. may reduce the efficiency of antioxidant defences, shifting the redox balance and consequently increase the risk of inflammatory responses which may become chronic. It is very important to know the mechanisms and function of many dietary components to benefit to human health.

o Understand and explain the specifics of innate and acquired immune responses in different eating habits

o Explain the different pathophysiological pictures of diseases that require special forms of nutrition and are accompanied by changes in the immune response

o Explain the guidelines of therapies based on different types of diet

- The influence of diet on innate and acquired immune response
- The influence of diet on the development of the inflammatory process
- Nutrition and obesity
- Nutrition and development of cardiovascular diseases
- Specifics of diet in autoimmune diseases
- Nutrition and tumour diseases
- Nutrition and osteoporosis
- Nutrition and COVID-19
- Nutrition and fibromyalgia

List of assigned reading:

1. P C Calder , R Albers, J-M Antoine, S Blum, R Bourdet-Sicard, G A Ferns, G Folkerts, P S Friedmann, G S Frost, F Guarner , M Løvik, S Macfarlane, P D Meyer, L M'Rabet, M Serafini, W van Eden, J van Loo, W Vas Dias, S Vidry, B M Winklhofer-Roob, J Zhao. Inflammatory disease processes and interactions with nutrition. Br J Nutr .2009 May;101 Suppl 1:S1-45.
2. Iddir M, Brito A, Dingeo G, Fernandez Del Campo SS, Samouda H, La Frano MR, Bohn T. Strengthening the Immune System and Reducing Inflammation and Oxidative Stress through Diet and Nutrition: Considerations during the COVID-19 Crisis. Nutrients. 2020 May 27;12(6):156
3. Bordoni A, Danesi F, Dardevet D, Dupont D, Fernandez AS, Gille D, Nunes Dos Santos C, Pinto P, Re R, Rémond D, Shahar DR, Vergères G. Dairy products and inflammation: A review of the clinical evidence. Crit Rev Food Sci Nutr. 2017 Aug 13;57(12):2497-2525
4. Venter C, Eyerich S, Sarin T, Klatt KC. Nutrition and the Immune System: A Complicated Tango. Nutrients. 2020 Mar 19;12(3):818.

List of optional reading:

1. Yeh KL, Kautz A, Lohse B, Groth SW. Associations between Dietary Patterns and Inflammatory Markers during Pregnancy: A Systematic Review. Nutrients. 2021 Mar 4;13(3):834
2. Silva AR, Bernardo A, de Mesquita MF, Vaz Patto J, Moreira P, Silva ML, Padrão P. A study protocol for a randomized controlled trial of an anti-inflammatory nutritional intervention in patients with fibromyalgia. Trials. 2021 Mar 9;22(1):198.
3. Methenitis S, Stergiou I, Antonopoulou S, Nomikos T. Can Exercise-Induced Muscle Damage Be a Good Model for the Investigation of the Anti-Inflammatory Properties of Diet in Humans? Biomedicines. 2021 Jan 5;9(1):36
4. Philpott M, Ferguson LR. Immunonutrition and cancer. Mutat Res. 2004 Jul 13;551(1-2):29-42.
5. Miggiano GA, Gagliardi L. Diet, nutrition and rheumatoid arthritis. Clin Ter. 2005 May-Jun;156(3):115-23.
6. Jensen KN, Omarsdottir SY, Reinhardsdottir MS, Hardardottir I, Freysdottir J. Docosahexaenoic Acid Modulates NK Cell Effects on Neutrophils and Their Crosstalk. Front Immunol. 2020 Oct 5;11:570380.
7. Mentella MC, Scaldaferri F, Pizzoferrato M, Gasbarrini A, Miggiano GAD. Nutrition, IBD and Gut Microbiota: A Review. Nutrients. 2020 Mar 29;12(4):944
8. Peña-Romero AC, Navas-Carrillo D, Marín F, Orenes-Piñero E. The future of nutrition: Nutrigenomics and nutrigenetics in obesity and cardiovascular diseases. Crit Rev Food Sci Nutr. 2018;58(17):3030-3041
9. Aspray TJ, Hill TR. Osteoporosis and the Ageing Skeleton. Subcell Biochem. 2019;91:453-476.
10. Zabetakis I, Lordan R, Norton C, Tsoupras A COVID-19: The Inflammation Link and the Role of Nutrition in Potential Mitigation. Nutrients. 2020 May 19;12(5):1466
11. Arrese M, Cabrera D, Kalergis AM, Feldstein AE. Innate Immunity and Inflammation in NAFLD/NASH. Dig Dis Sci. 2016 May;61(5):1294-303
12. Bonaventura P, Benedetti G, Albarède F, Miossec P. Zinc and its role in immunity and inflammation. Autoimmun Rev. 2015 Apr;14(4):277-85.

Curriculum:

[Predavanja] list (with titles and explanation):

L1: Nutrition and Immunity-introduction

Understand the regulated inflammatory response and its role in maintaining health and homeostasis.

L2: Nutrition, obesity and immunity

Inflammatory responses can affect the immune response and contribute to the development and progression of disease

L3: Nutrition, physical activity and immunity

Explain the interaction between physical activity, immune response and diet

L4: Inflammatory Diseases Proceses and Interactions with Nutrition

Changes in gut microbiota, as well as changes in gut barrier function and anti-inflammatory responses can lead to the development of many autoimmune and inflammatory diseases.

[Seminari] list (with titles and explanation):

S1: Changes in nutritional status impact immune cell metabolism

Understand changes in innate and acquired immunity during different dietary habits

S2: Fermented foods

Describe the characteristics of fermented foods and their relationship with the immune response

S3: Flavonoids

Explain the characteristics of flavonoids

S4: Nutrition and IBD

Explain the specifics of nutrition in patients with IBD

S5: Nutrition in patients with chronic pain

The influence of nutrition on the characteristics of the inflammatory pain process

S6: : Immunity and Micronutrients change over the life course

Explain the influence of micronutrients on the immune response

S7: Nutritional and Nutrigenetic factorson Immunity in COVID-19

Explain the principles of nutrigenomics

S8: Phytochemicals

Explain the characteristics of phytochemicals

S9: Nutrition and anticancer immunity

Explain the influence of nutrition on the anticancer immune response

Student obligations:

Regular class attendance, writing a seminar paper

Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):

The final grade of the student's knowledge is formed on the basis of the grade acquired during the course (70% of the total grade) and on the basis of the knowledge test at the final exam (30% of the total grade). During the classes, the student's work will be evaluated and evaluated on the basis of a seminar paper that students make in small groups and present during the seminar.

Other notes (related to the course) important for students:

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COURSE HOURS 2023/2024

Nutrition and Immune Response: Truths and Misconceptions

[Predavanja] (Place and time or group)	**[Seminari]** (Place and time or group)
14.05.2024	

L1: Nutrition and Immunity-introduction:
• [ONLINE] (19:30 - 21:45) [214]
  ○ NaIRTAM
 	
L2: Nutrition, obesity and immunity:
• [ONLINE] (19:30 - 21:45) [214]
  ○ NaIRTAM	

prof. dr. sc. Mrakovčić-Šutić Ines, dr. med. [214]	
17.05.2024	

L4: Inflammatory Diseases Proceses and Interactions with Nutrition:
• [ONLINE] (10:00 - 11:30) [214]
  ○ NaIRTAM
	S1: Changes in nutritional status impact immune cell metabolism:
	• [ONLINE] (11:30 - 16:45) [214]
	  ○ NaIRTAM
	
	S2: Fermented foods:
	• [ONLINE] (11:30 - 16:45) [214]
	  ○ NaIRTAM
	
	S3: Flavonoids:
	• [ONLINE] (11:30 - 16:45) [214]
	  ○ NaIRTAM

prof. dr. sc. Mrakovčić-Šutić Ines, dr. med. [214]	
03.06.2024	
	S4: Nutrition and IBD: • [ONLINE] (20:00 - 22:15) [214] ○ NaIRTAM
prof. dr. sc. Mrakovčić-Šutić Ines, dr. med. [214]	
25.06.2024	

	S5: Nutrition in patients with chronic pain:
	• [ONLINE] (15:30 - 21:30) [214]
	  ○ NaIRTAM
	
	S6: : Immunity and Micronutrients change over the life course:
	• [ONLINE] (15:30 - 21:30) [214]
	  ○ NaIRTAM
	
	S7: Nutritional and Nutrigenetic factorson Immunity in COVID-19:
	• [ONLINE] (15:30 - 21:30) [214]
	  ○ NaIRTAM
	
	S8: Phytochemicals:
	• [ONLINE] (15:30 - 21:30) [214]
	  ○ NaIRTAM

prof. dr. sc. Mrakovčić-Šutić Ines, dr. med. [214]	
26.06.2024	

	S9: Nutrition and anticancer immunity: • [ONLINE] (20:00 - 21:30) [214] ○ NaIRTAM
prof. dr. sc. Mrakovčić-Šutić Ines, dr. med. [214]	

List of lectures, seminars and practicals:

[PREDAVANJA] (TOPIC)	Number of hours	Location
L1: Nutrition and Immunity-introduction	1	[ONLINE]
L2: Nutrition, obesity and immunity	1	[ONLINE]
L3: Nutrition, physical activity and immunity	1	
L4: Inflammatory Diseases Proceses and Interactions with Nutrition	2	[ONLINE]

[SEMINARI] (TOPIC)	Number of hours	Location
S1: Changes in nutritional status impact immune cell metabolism	3	[ONLINE]
S2: Fermented foods	2	[ONLINE]
S3: Flavonoids	2	[ONLINE]
S4: Nutrition and IBD	3	[ONLINE]
S5: Nutrition in patients with chronic pain	2	[ONLINE]
S6: : Immunity and Micronutrients change over the life course	2	[ONLINE]
S7: Nutritional and Nutrigenetic factorson Immunity in COVID-19	2	[ONLINE]
S8: Phytochemicals	2	[ONLINE]
S9: Nutrition and anticancer immunity	2	[ONLINE]

EXAM DATES (final exam):